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SPECIAL RESEARCH BIBLIOGRAPHY 65-1

LONG-RANGE PLANNING  
AND TECHNOLOGICAL FORECASTING:  
AN ANNOTATED BIBLIOGRAPHY  
SUPPLEMENT 1

Compiled by  
PETER R. STROMER

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**LONG-RANGE PLANNING  
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Compiled by  
**PETER R. STROMER**

*Lockheed*

**MISSILES & SPACE COMPANY**

A GROUP DIVISION OF LOCKHEED AIRCRAFT CORPORATION

SUNNYVALE, CALIFORNIA

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## ABSTRACT

Lockheed Missiles & Space Company recognizes the need for long-range planning as vital not only to its own corporate interests but also to the aerospace industry at large. The Company has also been urged, in correspondence with the Office of Emergency Planning, Executive Office of the President, to maintain its interest in this field as a contribution to requirements of a number of Federal agencies involved in questions of resources and national security. Accordingly, this bibliography has been prepared as part of a continuing survey of the subject. The compilation supplements and updates the basic review compiled by the author and issued in November 1963 as a Special Research Bibliography, LMSC SRB 63-12. (Available from DDC as AD-441 618 or from NASA as N64-22200).

As in the original, emphasis is on planning within the aerospace and defense industry. During the past year both industry and government have conducted introspective studies on such topics as potential convertibility of admitted industry overcapacity to peaceful pursuits and the economic impact of reductions in defense spending. Desirable diversification strategies and goals have been rigorously assessed. While general conclusions may be lacking, sufficient data are available to aid in the decision-making process.

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## LITERATURE SEARCH CAPABILITY DEFINED

The engineering/scientific staff of LMSC is supported by a strong corps of research information specialists whose members ferret out precise information or data pertaining to the bench effort of scientists and engineers. These information sleuths operate in close and constant liaison with the scientist/engineer. The parameters for each search are specified by the engineer or scientist whereupon the information specialist examines the world-wide literature and forwards to him citations and abstracts relating to the subject; language is no barrier. The search also often identifies other authorities in the subject field, recent and current contracts responsive to similar research efforts, and corporate groups or agencies having high capabilities in the subject.

Throughout the literature search, the requester is continuously advised of new findings, chiefly in abstract format. At the conclusion of the search, the information specialist organizes these abstracts and prepares for publication an annotated bibliography, a literature review, or other suitable reports as required. Publication is advisable even if the search is not a specified end item of the contract, since it proves LMSC's concern for quality and non-duplicative effort. Furthermore, the printed special bibliography is given standard internal distribution, including the TIC, which, via the cataloging technique, makes the information available to others at LMSC and, of course, serves to eliminate repetition and possible duplication of research which the bibliography itself supported. It is also preferably initially distributed to key government agencies and institutions, as well as to the major federal documentation centers from whence wide and deep national and international dissemination is effected on a need-to-know basis against specific request. Such dissemination assists in the control of literature on related research underway elsewhere in the scientific community.

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1. Abt, C. C.  
War gaming. INTERNATIONAL SCIENCE AND  
TECHNOLOGY, 32: 29 - 37, Aug 1964.

War games are experiments with alternatives in simulated conflict and their consequences. International conflicts include not only the military but political, economic, and cultural-ideological factors. Value judgments about their qualities are made by game designers and players who assign discrete numbers to them. Quantifying is difficult and risky because apparent numerical distinctions of qualities are deceptive. Outcomes are decided by comparing the numerical results of "if-then" decisions. War games can only exercise, extend, and improve judgment. They cannot predict the future.

2. Aerospace Corp  
THE COMPARATIVE VALIDITY OF MANPOWER  
PREDICTION TECHNIQUES. Rept. no. BSD TDR  
63-125. (Contract AF 04 695 169. DDC AD 414)  
654. 24 Jun 1963.

The report consists of a literature survey including bibliography listings and annotations; a state-of-the-art summary based on the literature survey; and plans and recommendations for future research in the specific area of manpower prediction.

3. Allison, D.  
Defense cutbacks. INTERNATIONAL SCIENCE  
AND TECHNOLOGY, 34: 20 - 31, Oct 1964

The impact of cutbacks in defense expenditures will not drive the U.S. into a depression. But the cuts are hurting defense industries. Three views of future defense spending are presented: (1) The Pessimists about world affairs think spending will begin to rise soon. (2) The Moderates see declines of perhaps a billion per year for five years. (3) The Optimists see a sharp decline since they think international tensions will be easing, and a DOD budget below \$40 billion in 1970. As usual the Moderates are in the majority and seem the ones to bet on.

4. Ansoff, H. I.  
Strategies for diversification. In LONG-RANGE  
PLANNING FOR MANAGEMENT, Ewing, D. W.,  
ed., N. Y., Harper & Row, 1964, p. 115-142

There are four basic growth alternatives open to a business. It can grow through increased market penetration, through market development, through product development, or through diversification. A company which accepts diversification as a part

of its planned approach to growth undertakes the task of continually weighing and comparing the advantages of these four alternatives. One of the aims of this paper is to relate diversification to the overall growth perspectives of management, establish reasons which may lead a company to prefer diversification to other growth alternatives, and trace a relationship between overall growth objectives and special diversification objectives.

5. Archer, S. H.  
The structure of management decision theory. RE-  
SEARCH MANAGEMENT, 14: 269-287, Nov 1964

A manager must make choices among various plans, policies, and strategies. Among other conditions, decisions must be made under varying degrees of information - customarily classified as conditions of risk, certainty, and uncertainty. Decision theory attempts to give structure and rationale to the different conditions under which decisions are made. A great many gaps still exist in the theory. This article provides a review of some of the essential elements of management decision theory and commentary on some of the problem areas where continuing attention might profitably be focussed.

6. Arnoff, E. L.  
Operations research and long-range company  
planning. In LONG-RANGE PLANNING FOR  
MANAGEMENT, Ewing, D. W., ed., N. Y.,  
Harper & Tow, 1964, p. 314 - 339.

Most of the applications of operations research reported on to date have occurred in areas which might be classified as short-range planning, both strategic and tactical. The paper remedies this lack by presenting one detailed case study plus several brief case studies illustrating the techniques of operation research as applied to long-range planning. Author calls attention to the fact that LRP must also include some program for the development of management personnel within a company. It does not suffice to consider expansion and growth only in terms of plant, land, and/or machinery, or solely in terms of balance sheets, working capital, and the like. The human equation is an essential element in any long-range planning program.

7. Bellman, R. E.  
SCIENCE, TECHNOLOGY AND THE AUTOMATION  
EXPLOSION. Rand Corp. rept. no. P-2908. 6p.  
May 1964.

A consideration of the serious effects on our economic and political structure arising from the rapid spread of automation. As it takes over more and more routine occupations, people will be required to engage more in personal and certain professional services. The author feels that some attempt must be made to face the problem now instead of wishfully letting the matter take care of itself.

8. Bernstein, S.  
 THE IMPACT OF PROJECT DEFINITION ON  
 AEROSPACE SYSTEM MANAGEMENT. American  
 Institute of Aeronautics and Astronautics (AIAA)  
 Paper 64-405. 7p.

Author is Director of Program Formulation, Missile Systems Div., Raytheon Co. The Dept. of Defense has advocated the Project Definition Phase (PDP) as one of the prime corrective actions to poor planning, unrealistic schedules, a high rate of design changes, and enormous cost overruns. In essence, DOD contractors are faced with the problem of layout and definition of 8 to 10 years of program effort which in many cases include areas with which they are unfamiliar, such as:

1. The effect of military annual operating costs.
  2. The effect of military pay and allowances, and
  3. The cost of real estate acquisition, land improvement, and utilities.
- At the end of these considerations contractors are expected to back up their estimates by proposing a fixed price or other type of incentive contract which specifies how much they shall be rewarded (or penalized) for variances from the estimated costs, schedules or performance. Pre-proposal efforts which previously required predominantly engineering and marketing efforts will now require, not only considerably increased effort in these areas, but in addition, increased effort by production and additional overhead type personnel.

9. Blumberg, D. F.  
 Marketing applications of advanced military  
 planning techniques. In MARKETING AND THE  
 COMPUTER, Alderson, W. and Shapiro, S., eds.,  
 N. Y., McGraw-Hill, 1963, p. 302 - 316.

Military planning and control techniques utilizing electronic computers are classified and examined under three topical areas:

1. Strategic models for planning
2. Tactical models for planning
3. Intelligence system techniques.

An example from each category is selected and briefly described. The author emphasizes that the techniques are essentially man-machine systems relying heavily on the human as part of the input and output process.

10. Burton, W. W.  
Forecasting manpower needs - a tested formula.  
In LONG-RANGE PLANNING FOR MANAGEMENT,  
Ewing, D.W., ed., N. Y., Harper & Row, 1964,  
p. 532 - 540.

Insufficient time and effort have been expended by industry in the study of manpower forecasting. Author illustrates how he used the program developed at General Motors of "lead time" for replacements and statistically related it to economic forecasts at Minnesota Mining and Manufacturing Co. A relationship was established between manpower and sales dollars using a forecast of sales covering a five-year period.

11. Carrick, P. M., Jr.  
PLANNING A LEAST COST RELIABILITY CON-  
STRAINED DEVELOPMENT PROGRAM: A  
CAPACITATED NETWORK APPROACH. American  
Institute of Aeronautics and Astronautics (AIAA)  
Paper 64 - 410.

Paper presents the results of the development of a method for estimating the resource requirements for any future, technically complex, development program. The approach is designed to provide a minimum cost plan which will assure conformance with reliability requirements. Additionally, the question is asked: Of what value is past development program experience for planning future programs? The technique used is a slight extension of PERT-COST logic in that it deals with selecting the least cost development path from a rather large set of alternatives paths which are themselves defined by the existence of choice between resource inputs. Methodologically, the approach constitutes an application of capacitated network flow theory, which, in turn, is a form of linear programming.

12. Chang, Y. N.  
Coping with planning problems in defense  
industry business. CALIFORNIA MANAGEMENT  
REVIEW, 6: 49 - 54, Winter 1963.

Author is Chief of Market Planning in the Armament Control Div. of Autonetics, a division of North American Aviation, Inc. His paper points out factors peculiar to the defense market that give rise to the fluctuating character of the industry. Planning and developing new business, plus the management of current business, is the dual responsibility of all defense executives and should be carried out concurrently. A solution is proposed centering around an integrated organizational approach advocating a systematic development of defense business.

13. Clamp, J. C.  
The "total" concept of company growth planning.  
INDUSTRIAL DEVELOPMENT AND MANUFACTURERS RECORD, 132: 14 - 16, Sep 1933.

Author quotes the bare essentials of planning as being no more than answers to three fundamental questions:

1. Where are we now?
2. Where do we want to go?
3. How do we want to get there?

The answers to these questions make up the plan for growth - which is no more than a carefully determined frame of reference for today's decision-making and actions, in the light of longer-run trends and objectives.

14. Collier, D. W.  
How should management determine how much company funds to invest in R & D? RESEARCH MANAGEMENT, 7: 393 - 406, Nov 1964.

While there is convincing evidence that investment in research and development brings dollar returns on a statistical basis, they are difficult to apply to any individual organization. There can be no substitute for the exercise of informed judgment by qualified management. The author offers both qualitative as well as quantitative guidelines for optimum use of R & D dollars. The R & D component should be an active participant in the long-range planning process and should be kept aware of current problems also. Such procedures help to establish a basis for informed judgment on the proper level of the company's total R & D effort.

15. Collier, D. W.  
The road ahead for profit-supported industrial research. RESEARCH MANAGEMENT, 7: 129 - 141, Mar 1964.

Computers, statistical analysis, advanced planning and monitoring techniques are factors tending to improve the percentage of successful projects out of the total R & D effort. Another factor that will increase the success ratio of research is the increase in long range planning which will lead to better integration of research management with top management, thereby not only providing better guidance for selecting projects, but also better exploitation of those that are a technical success.

16. Drucker, P. F.  
Long-range planning means risk-taking. In  
LONG-RANGE PLANNING FOR MANAGEMENT  
Ewing, D.W., ed., N.Y., Harper and Row, 1964,  
p. 7 - 20.

Reprint of the author's article in Management Science, 5: 238 - 249, April 1959. Drucker defines long range planning as the organized process of making entrepreneurial decisions. He also attempts to show what long range planning is not- namely it is not forecasting, it does not deal with future decisions, but with the futurity of present decisions.

17. Ewing, D.W.  
The knowledge of an executive. HARVARD  
BUSINESS REVIEW, 42: 91 - 100, Mar-Apr 1964.

Managerial knowledge is divided into three layers: (1) methods and techniques for solving already defined problems (2) realities inside and outside the organization that affect management decisions and (3) information affecting the choice of desirable goals, policies, and standards. The literature of long-range planning is extensive for layers one and two, but coverage is spotty on the desirable goals of long-range planning, the third layer. There are relatively few books and periodical articles designed to help the business executive sharpen his judgment as to what his company should do to meet a changing environment. Long-range planning is strong in methodology and in resources for evaluating the environment but it is short in knowledge about desirable strategies and goals. The author believes this lack has been a serious handicap both to planning as an art and to planners as its practitioners.

18. Ewing, D.W., ed.  
Long-range planning for management. REVISED  
EDITION. N.Y., Harper & Row, 1964. 565p.

Revised edition of a book first published in 1958. The aim of the revised version is more to select from the literature than to bring together most of the available materials. The purpose of the selection is twofold: (1) to help executives think through the planning problems they face in managing operations and (2) to help the neophyte student or planner understand the most important aspects of the planning process. The editor lists the following seven principles as basic to long-range planning:

1. Long-range planning (LRP) is closely connected with the concept of the corporation as a long-living institution.
2. Planning symbolizes the purposefulness of modern management.



3. Planning is connected with the concept of the corporation as an agent of change.
4. LRP owes part of its rise to increasing research and development.
5. Planning represents the "intellectual movement" in management.
6. LRP reflects the strategic approach as opposed to the tactical approach to organizational behavior.
7. LRP is evidence of confidence in the economic and political stability of our society. Selected papers from this book are individually abstracted in this bibliography.

19. Fisher, G. H.  
 THE ROLE OF COST-UTILITY ANALYSIS IN  
 PROGRAM BUDGETING. Rand Corp. rept.  
 RM-4279-RC. Sep 1964. 44p. DDC AD 608 055.

The decision-making process in the Federal government and program budgeting concepts and analytical techniques which might help sharpen intuition and judgment in making major allocative decisions are discussed. The main purpose of the research is to help improve understanding of the principles of program budgeting, to stimulate others to develop these ideas further, and to accelerate the application of program budgeting in governmental activities. Cost-utility analysis is an integral part of the total program budgeting process.

20. Fulton, J. F.  
 Employment impact of changing defense programs.  
 MONTHLY LABOR REVIEW, 87: 508 - 516,  
 May 1964.

Nearly one-tenth of total employment in the U.S. in 1963 was accounted for by the estimated 6.7 million persons engaged in national defense work. Defense outlays have changed rapidly in recent years, both in their overall level and in the mix of products purchased. The changing inventory of weapons and other equipment required for national security has markedly affected manufacturing processes and the kinds of occupations needed for defense production. Increasing proportions of defense workers are engineers, scientists, technicians, and highly skilled craftsmen, and decreasing proportions are production line workers. The relatively high percentages of well-educated and highly trained workers in the defense industry may be one factor which could facilitate placement of defense workers in other jobs in the economy, if layoffs occur due to shifts or cutbacks in military and space programs. Various steps are being taken by government to cushion employment instability, e.g., in December 1963, President Johnson set up an interagency Committee on the Economic Impact of Defense and Disarmament to evaluate and coordinate activities to minimize potential disturbances due to changes in the level and pattern of defense outlays. Also, the U.S. Arms Control and Disarmament Agency and the Dept. of Defense coordinate similar programs.

21. Fusfeld, H. I.  
Effect of government expenditures on long-range industrial research. RESEARCH MANAGEMENT, 7: 107 - 127, Mar 1964.

The continuing growth of research in all institutions through government funds has decreased some of the incentive for investing company funds in longer range industrial research. Company-funded long range industrial research differs from government contracted or university-sponsored efforts in that it is tied to the overall company capabilities, fields of interest, and plans for future growth. No amount of government funding or of increased university research can replace the conscious use of long-range research by industry to influence its own destiny.

22. Gilpatric, R. L.  
Our defense needs: the long view. FOREIGN AFFAIRS, 42: 366 - 378, Apr 1964.

Deputy Secretary of Defense Gilpatric outlines his views on the nation's future defense needs. He believes a dilemma may face the U. S. over the extent and use of its military power in the event the cold war with Russia eases before major steps are taken toward general disarmament. He proposes a reasonable military posture for the U. S. midway between cold war and a genuinely peaceful world with effective international law and minimal defense establishments. Emphasis is on flexibility with the ability to safeguard the peace depending on large measure on the ability to keep pace with the realities of military defense as they change over the years.

23. Giennan, T. K., Jr.  
THE USEFULNESS OF AEROSPACE MANAGEMENT TECHNIQUES IN OTHER SECTIONS OF ECONOMY. Rand Corp. rept. no. P-2927.  
Jun 1964. 9p. DDC AD 601 619.

The managerial techniques used in the aerospace industry have been shaped by the unique conditions surrounding the industry. The demands of their most important customer, the government, the frequent combination of large state-of-the-art advances with great development urgency, and the large size of many projects have combined to shape management techniques and systems. The author suggests that these techniques cannot be translated into other industries without extensive modifications.

24. Goddard, F. E., Jr. et al.  
A TECHNIQUE FOR ESTIMATING FUNDING  
AND MANPOWER REQUIREMENTS FOR  
RESEARCH AND DEVELOPMENT LONG-RANGE  
PLANNING. NASA CR-53571. JPL Planning  
rept. 35-6, Rev. 1. NASA N64-18450. 8 Nov 1962.

Report outlines the technique that has evolved from a study of the long-range planning and programming problem. The material is extracted from an internal planning report and is presented as only one method by which estimates of resource requirements can be made. Charts and figures required to understand the technique are included, together with a simplified step-by-step procedural example showing how estimated requirements are determined for a given project that, in itself, is a component part of a program and of the overall installation effort.

25. Goldstein, H.  
Projections of the labor force of the United States.  
In EXPLORING THE DIMENSIONS OF THE MAN-  
POWER REVOLUTION. Volume 1 of Selected  
Readings in Employment and Manpower, U. S.  
Congress. Senate Committee on Labor and Public  
Welfare, U. S. Government Print. Off., 1964,  
p. 317 - 337.

Testimony of the Assistant Commissioner for Manpower and Employment Statistics, Bureau of Labor Statistics, U.S. Dept. of Labor. He states that labor force projections should be viewed as indicators of the general dimensions of labor force size and growth. They should not be used as a precise forecast of the expected growth against which the actual labor force growth can be evaluated. Tables of projections include the following:

- (1) Interim revised projections of population, total labor force, and labor force participation rates, by age and sex, 1960, 1965, and 1975.
- (2) Total labor force, by age, 1950, 1960, and projected 1975.
- (3) Changes in total labor force, by age and sex, actual, 1950-1960 and projected 1960-1975.

26. Gordon, R. J. and Helmer, O.  
REPORT ON A LONG-RANGE FORECASTING  
STUDY. Rand Corp. rept. no. P-2982. Sep  
1964. 120p.

Report describes an experimental trend-predicting exercise covering a period extending as far as fifty years into the future. The experiment used a sequence of questionnaires to elicit predictions from individual experts in six broad areas: scientific breakthroughs, population growth, automation, space progress, probability and prevention of war, and future weapon systems. Results are discussed as well as possible means for improving the forecasts.

27. Greenwood, F.  
Effective LRP requires action. ACADEMY OF  
MANAGEMENT JOURNAL, 7: 224 - 228, Sep 1964.

A study of forty five companies in sixteen industries shows that corporate planners help operating managers put long-range plans into practice in three general ways:

1. By continuously studying the environment outside the company, they help spot changes important to the company's future.
2. By auditing internal operations, they help ensure that these are consistent with the company's long-term plans.
3. By being close to line operations, planners help operating executives in various other ways such as assisting with the drawing up of short-term operating plans based on the approved long range plans.

28. Haggerty, P. E.  
Research management - a survival issue.  
IEEE TRANSACTIONS ON ENGINEERING  
MANAGEMENT, EM-11: 3 - 7, Mar 1964.

Author is president, Texas Instruments Inc., Dallas, Texas. Using his own company as an example, the author emphasizes that the key to research management is, first of all, a deliberate determination of key strategies designed to achieve really major goals, followed by the pursuit of R & D tactics aimed specifically at the selected strategies.

29. Hertz, D. B.  
Information flows and the coordination of  
business functions. In MARKETING AND THE  
COMPUTER, Alderson, W. and Shapiro, S., eds.,  
N. Y., McGraw-Hill, 1963, p. 80 - 95.

There is a thread of information which runs through a business, generally from the top down, which concerns the views of the business's decision makers concerning a long range future. This forecast may well be a blank, assuming no foretelling of what will happen. Another approach is to assume that the long range future will be very much like the present or the immediate past. Or, if trends are involved, one may assume that the trends will continue as they have for some specific past period. The important thing to recognize in terms of the institution of new devices and new methods of decision making in a business is that each functional area must periodically make decisions on the basis of a long term view. The information which the business uses in forecasting the long range future must be coordinated and the specific forecasts of the outlook dovetailed sufficiently so that joint effective decision making is possible. The use of probability forecasting is recommended so that current action may be undertaken with specific knowledge of the risks defined through consideration of alternative forecasts. Modern methods of analysis and the advent of computers have made the competitive potential and the competitive requirement of coordination necessary for long run survival.

30. Horowitz, I.  
Evaluation of the results of research and develop-  
ment: where we stand. IEEE TRANSACTIONS ON  
ENGINEERING MANAGEMENT, EM-10: 42 - 51,  
Jun 1963.

Some current efforts to solve the problem of evaluating the economic results of R & D are described and critically examined. The various existing techniques have been grouped according to three levels of evaluation: (1) the broad macro-levels of the economy or the industry, (2) the narrower level of the firm, and (3) the sharpest level of the individual research project. General comments are made on a number of mathematical models that have been proposed for evaluation at the various levels. The need for additional work in this area is pointed out.

31. Isard, W. and E. W. Schooler  
 An economic analysis of local and regional  
 impacts of reduction of military expenditures.  
In CONVERTIBILITY OF SPACE AND DEFENSE  
 RESOURCES TO CIVILIAN NEEDS: A SEARCH  
 FOR NEW EMPLOYMENT POTENTIALS. U. S.  
 Senate Committee on Labor and Public Welfare,  
 Wash., D. C., G. P. O., 1964, p. 768 - 794.

Paper presented at the Peace Research Conference, University of Chicago, November 18-19, 1963. The problem of offsetting the impact upon local economies of changes in the level and composition of military expenditures can be effectively attacked. Relatively good techniques are available and necessary data currently exist in the Dept. of Defense files or can be easily accumulated. Authors have examined a few of the great variety of offset programs which are possible within the flexible framework of the U. S. economy. Six regional areas are individually reviewed for possible impacts: (1) The Los Angeles-Long Beach metropolitan area. (2) The San Francisco-Oakland metropolitan area. (3) The state of California. (4) The St. Louis metropolitan area. (5) Kalamazoo County, Michigan. (6) The Philadelphia metropolitan area. Authors conclude that where political, business, and community leaders can agree on the establishment of appropriate offset programs and adequate procedures including financial measures for effecting reconversion of facilities and manpower, few if any local areas need be adversely affected by reduction in the level of military expenditures.

32. Kast, F. E. and J. E. Rosenzweig  
 Management and accelerating technology.  
 CALIFORNIA MANAGEMENT REVIEW, 6:  
 39 - 48, Winter 1963.

A cultural lag exists between scientific and technological achievements and our ability to organize and manage the human and physical resources necessary to utilize them effectively. The growth in importance of the scientists has necessitated a re-evaluation of traditional organizational and managerial concepts. Planning must take into account the different values and preferences attributed to scientists as distinguished from managers. Many industrial scientists strive to achieve influence and power via the external frame of reference through published contributions recognized by other scientists, while most managers of necessity seek the same goals through an internal frame of reference by achieving recognition from their superiors within the organizations in which they are employed.

33. Klass, P. J.  
 'Pattern' planning procedure- part 1: New  
 approach pinpoints vital R & D needs. AVIATION  
 WEEK & SPACE TECHNOLOGY, 81: 56 - 59,  
 28 Dec 1964.

A new scientific approach has been developed by Honeywell to help pinpoint which of thousands of possible alternative research and development projects are most likely to provide maximum payoff in advancing important national-military objectives. The technique can be used by aerospace-defense contractors as well as by government-military agencies and is currently under study by both the Dept. of Defense and NASA. A bill has been proposed in Congress to establish an agency directly under the President which would apply similar methodology to overall government policy decisions. The 'Pattern' acronym is derived from Planning Assistance Through Technical Evaluation of Relevance Numbers. The technique resulted from Honeywell's dissatisfaction with previous long-range planning efforts which leaned too heavily on intuition and individual judgment. By applying quantitative techniques to the long-range planning process, i. e., assigning weighted numbers of relevance or importance to national objectives or priorities, the data can be further analyzed in a digital computer where by a mass of data is refined in any desired technical area. Honeywell emphasizes that the results of a Pattern analysis are only significant when applied to a dynamic situation which reflects relative priorities at a given moment in time. To be effective the data base must be periodically revised.  
 (Note: Part 2 appears in Aviation Week & Space Technology issue of 4 January 1965).

34. Kottler, J. L.  
 The learning curve- a case history in its appli-  
 cation. JOURNAL OF INDUSTRIAL ENGINEERING,  
 15: 176 - 180, Jul-Aug 1964.

The learning-curve principle is applied to forecast and control of direct labor cost. The learning-curve theory is said to propose that as the total quantity of units doubles, the hours per unit, which reflect cost, decline at some constant percentage.

35. Lall, B. G.  
 Questions and answers on the U. S. production  
 freeze proposal. BULLETIN OF THE ATOMIC  
 SCIENTISTS, 20: 30 - 34, Dec 1964.

The U. S. proposal to freeze the number and characteristics of U. S. and USSR strategic offensive and defensive nuclear vehicles is one of the potentially interesting measures

in the disarmament and arms control field introduced during 1964. Essentially the freeze means curtailing production of all strategic bombers, long-range missiles, and antimissile missiles. The proposal plan was presented to the Geneva disarmament conference when it was reconvened on January 21, 1964. Author explains the comprehensive verification and inspection details which have been incorporated in the proposal. Initial Soviet reaction to the U.S. proposal has been negative. No official estimates of the economic impact on the U.S. economy of the production freeze have been released to date

36. Landsberg, H. H., L. L. Fischman and J. L. Fisher  
 RESOURCES IN AMERICA'S FUTURE. Baltimore,  
 Md., Johns Hopkins Press, for Resources for the  
 Future, Inc., 1963. 1017p.

A massive and comprehensive study of the patterns of requirements and availabilities of natural resources in the American economy for 1960-2000 A.D.

Part 1: Requirements for future living.

Part 2: The demand for key materials.

Part 3: Adequacy of the resource base.

Both historical and current consumption patterns are joined in projecting future requirements. To deal with the problem of uncertainty in projection, the authors have adopted three levels, low, medium, and high, with the medium range generally selected as the one that is most realistic. Conclusions are generally optimistic with the authors accepting the possibility that specific shortages may develop occasionally, but in the main, improved technology, increased foreign supplies, and improved private and governmental resource management policies will avoid critical deficiencies.

37. Leontief, W. W.  
 Proposal for better business forecasting.  
 HARVARD BUSINESS REVIEW, 42: 166 - 182,  
 Nov-Dec 1964.

Author calls for business and government cooperation in the development of up-to-date input-output tables for the economy to provide more meaningful sales forecasts. Use of computers is recommended to transform raw economic data into the final product of specific market forecasts.

38. Magee, J. F.  
 Decision trees for decision making. HARVARD  
 BUSINESS REVIEW, 42: 126 - 138, Jul-Aug 1964.

Author believes the "decision tree" approach has tremendous potential as a decision-making tool for management. The decision tree can clarify the choices, risks,



objectives, monetary gains, and information needs involved in long-range planning. The unique feature of the decision tree is that it allows management to combine analytical techniques with a clear portrayal of the impact of future decision alternatives and events. The interactions between present decision alternatives, uncertain events, and future choices and their results become more visible.

39. Melman, S.  
Key problems of industrial conversion to the civilian economy. IN CONVERTIBILITY OF SPACE AND DEFENSE RESOURCES TO CIVILIAN NEEDS: A SEARCH FOR NEW EMPLOYMENT POTENTIALS, U. S. Senate Committee on Labor and and Public Welfare, Wash., D. C., G. P. O. 1964, p. 878-888.

The conversion of a high-technology-based military industrial system to a civilian economy involves a set of problems without precedent in American society. Assuming that retraining, regrouping, and reequipment of the military-civilian work force can be accomplished, there remains a second problem: what are the potential markets that could be served by the work of a major part of the 6 to 7 million men and women who are now directly engaged in serving the military establishment? The present effective market demand for civilian goods is being thoroughly serviced by the existing consumer-goods industries. At the same time surplus manufacturing capacity is the general rule in industries that specialize in industrial goods. Whose investments will create the new markets for the goods that the present arms industries could produce? Clearly, the availability of the market is a key aspect of conversion capability. For conversion planning it will be necessary to calculate the lead-times in every sphere of industry and service for this will be essential to the preparation of workable plans that could be set into motion on relatively short notice.

40. Meyer, J. R. and R. R. Glauber  
INVESTMENT DECISIONS, ECONOMIC FORECASTING, AND PUBLIC POLICY. Boston, Mass., Graduate School of Business Administration, Harvard University, 1964. 280p.

Monograph provides charts and tables which can be used as determinants of investment outlays by business corporations.

41. Miksche, F. O.  
The nuclear deterrent and Western strategy.  
ORBIS, 8: 221 - 237, Summer 1964.

Author is a Lt. Colonel in the French army. His provocative views on current military planning and thinking both in the U. S. and the U. S. S. R. are presented. He believes that the West has pursued ineffectual policies for handling crises. In order to obtain short-range goals concessions have been made which in effect mortgage the future. The author states that the belief that the invention of nuclear weapons henceforth renders war impossible is as false as the belief that vital interests can be safeguarded by inaction. He uses this rationale to defend the creation of a French nuclear force. However, he makes it clear that sole reliance on nuclear deterrents is unrealistic. Only a military posture based on conventional forces-which depend on suicidal nuclear weapons only as a cover for nonnuclear operations-will make plausible the resolution of the West to seize the political and military initiative.

42. Miller, T. G., Jr.  
STRATEGIES FOR SURVIVAL IN THE AERO-  
SPACE INDUSTRY. Arthur D. Little, Inc.  
report. 1964. 54p.

This study is part of a continuing series of detailed examinations of the defense industry by Arthur D. Little, Inc. It is concerned primarily with the end of the growth market which the aerospace industry experienced during the last decade and with corporate strategies appropriate to this change. According to this report's projections, within the next five years the production portion of the defense budget available to the aerospace industry will decline about 30%, and defense RDT&E will decline about 15%. With NASA budget increases of about 10%, the overall aerospace market will thus decline about 15%. Lack of diversified management experience and deficiencies in long-range planning and market forecasting are industry weaknesses which will require increased attention. A highly detailed model of a typical aerospace company based on mathematical simulation of the long term effects of many simultaneous variables on the operation of an industrial enterprise is described. The model can be refined to a reasonably high confidence level by employing historical market data and the appropriate operating data of a specific company over a selected period of time and making corrections in the model until the simulated outputs match those actually experienced. Advantages of an aggressive company-funded independent R & D program to overall corporate stability is shown by an example using the model.

43. Mitchell, R. S.  
ON THE THEORY OF VALUE. Canadian  
Armament Research and Development  
Establishment (CARDE) rept. no. TN 1579.  
Jun 1964. 20p. DDC AD 448 078

The concept of value is considered as it pertains to research and development activities. It is shown that information may be evaluated in the same way as a material object. Distinction is made between evaluating activities in relation to a goal and the evaluation of the goal itself. A formal expression for the latter concept is suggested which might be used in planning activities.

44. Moreno, I. G.  
TOP MANAGEMENT LONG-RANGE PLANNING.  
New York, Vantage Press, 1964. 300p.

Volume examines the strategy and organization involved in long-range planning and studies the types of enterprise that require long-range planning to achieve the greatest measure of success. Defined are the functions of planning, capital expenditures, sales effort and R & D. The author analyzes the importance of control of the varied activities in the financial field and discusses executive development, including the role played by business administration schools. A blueprint is furnished for the establishment of an organization and control of long-range planning.

45. Moulton, H. B.  
The McNamara general war strategy.  
ORBIS, 8: 238 - 254, Summer 1964.

Author is a military affairs analyst with the U. S. Arms Control and Disarmament Agency. Secretary of Defense McNamara's strategy is defined as being based upon a limited and controlled counterforce capability which requires the U. S. to (1) maintain a military posture enabling the U. S. to mount deliberate and discriminate attacks against enemy bomber and missile sites (2) retain reserve forces for attacks against enemy cities if that proved necessary, and (3) to convince an enemy of our superiority as a basis for terminating a war short of mutual devastation under conditions acceptable to the U. S. McNamara believes that annual expenditures on strategic forces will drop substantially and level off well below the present rate of spending. The Secretary has emphasized, however, that he does not rule out the possibility of new technological breakthroughs, especially in the anti-ballistic missile field, which would require major new expenditures.

46. Murdick, R. G.  
The long-range planning matrix. CALIFORNIA  
MANAGEMENT REVIEW, 7: 35 - 42, Winter 1964.

High-level corporate planning must be based on a complete planning matrix integrating three basic dimensions, functional planning, product planning, and elements-of-cost-planning. There is a need for planners to recognize first that the constraints of corporate goals and policies must be defined before the complete planning matrix can be structured. This paper deals with the nature of the planning matrix, its vectors, and the integration of the vector plans.

47. Murphy, C.J.V.  
The defense industry is facing trouble.  
FORTUNE, 69: 140 - 142ff, Aug 1964.

The slowdown the Pentagon has ordered in weapon procurement and development may force shakeouts and mergers, will displace many workers, and is already jeopardizing a great research apparatus. Recent developments have done nothing to shake Secretary of Defense McNamara's conviction that the U.S. lead in rocket and nuclear technologies, combined with the preponderant power of the strategic forces deployed and being formed, is far too much for the Soviet Union to overcome in the foreseeable future. Believing this, McNamara holds that the U.S. can therefore greatly slow down its vast capital expenditures on experiment, and safely stand for some years to come pretty much on the weapons already in hand or about to emerge from advanced development.

48. National Planning Association  
NATIONAL ECONOMIC PROJECTIONS TO 1974.  
National Economic Projection Series Report no.  
64-3. Jul 1964. 85p.

49. Newell, W. T., Jr.  
LONG-RANGE PLANNING POLICIES AND  
PRACTICES: SELECTED COMPANIES OPERATING  
IN TEXAS. Austin, Texas, University of Texas  
Bureau of Business Research, 1963. 199p.

A research monograph reviewing LRP practices of firms doing business in Texas.  
(Not reviewed.)

50. Novick, D.  
RESOURCE ANALYSIS IN MILITARY LONG-  
RANGE PLANNING. Rand Corp. report P-2881.  
Feb 1964. 13p.

An explanation of three terms (program budgeting, cost effectiveness, and cost analysis) introduced by the office of the Secretary of Defense in 1961. The purpose of this paper is to facilitate communication between the Dept. of Defense, military depts., military contractors, and the business community by clarifying the terms.

51. Ogle, Q. J. and W. R. Humphrey  
A FORECAST OF THE FORM, TIME PHASING,  
AND EXTENT OF REDUCED WORKING HOURS  
PROJECTED TO THE YEAR 1980. Air Force  
Institute of Technology, Wright-Patterson AFB.  
Master's thesis. Report no. SLSR 15-64. Aug 1964.  
DDC AD 451 375L.

Report available upon release approval from Air Force Institute of Technology, School of Systems and Logistics, Wright-Patterson AFB, Ohio.

52. Oram, J. W.  
Long-range planning in industrial relations.  
In LONG-RANGE PLANNING FOR MANAGEMENT,  
Ewing, D.W., ed., N. Y., Harper & Row, 1964,  
p. 524 - 531.

Today's collective bargaining decisions are inevitably of a long-run character, with consequences that extend far into the future. The margin for error is uncomfortably small - competitive survival may well depend upon a company's foresight in current negotiations. In planning its industrial relations future management is faced with a dual responsibility. First, it must do what it considers best for its own company. It is reckless policy to accept the results of other companies' negotiations without first assuring that its own future will not be imperiled. Secondly, it must avoid, as much as possible, actions that will have an adverse effect on other managements. While the overriding responsibility of any management is to protect and advance its own company the fact is inescapable that labor relations have developed to the point where management can no longer enjoy the luxury of isolationism. Some guidelines for management long-range strategy are suggested.

53. Pfaff, W. , E. Stillman and H. Kahn, eds.  
 STUDY FOR HYPOTHETICAL NARRATIVES FOR  
 USE IN COMMAND AND CONTROL SYSTEMS  
 PLANNING. VOL. I: PROFILES OF THE FUTURE  
 VOL. II: THE ALTERNATIVE NATIONAL POLICY  
 CARD DECK. VOL. III: GAME TRANSCRIPT AND  
 COMMAND AND CONTROL ANALYSIS. Hudson  
 Institute, Inc. report. ESD TDR 64-178, v. 1-3.  
 Sep 1963. DDC AD-434 500, AD-434 798,  
 AD-435 038.

Report contains war gaming constraints for deriving the possible detailed character of future diplomatic and strategic conflicts in the time period 1965, 1970, and 1975. War games can be developed using the techniques described from causation, initiation, and course of a series of subwars escalating to a nuclear exchange between the U. S. and the Soviet Union.

54. Quinn, J. B. and R. M. Cavanaugh  
 Fundamental research can be planned.  
 HARVARD BUSINESS REVIEW, 42: 111 - 124,  
 Jan-Feb 1964.

Authors believe that management must: (1) Understand the nature of fundamental research and the way a company uses fundamental knowledge. (2) Clearly define the purposes of the fundamental research program and relate these explicitly to the company's goals and needs. (3) See that the scientific fields selected for study are carefully evaluated to ensure optimum support for the company's long term objectives. (4) Oversee the staffing of the program with executives who understand the company's goals and the science pertinent to those goals and who generate a stimulating environment within which to perform research.

55. Salveson, M. E.  
 The strategy of innovation in technical industries.  
In LONG-RANGE PLANNING FOR MANAGEMENT,  
 Ewing, D. W., ed., N. Y., Harper & Row, 1964,  
 p. 87 - 106.

Author lists the following requirements for LRP:

1. A business-wide perspective in innovation.
2. A continuing flow of innovation for business viability and profits.

3. A set of skills and conditions for successful entrepreneurship within the corporate framework.
4. Organization components for pursuing the processes of entrepreneurship.
5. Adaptation of the business self-image to foreseeable or evolving conditions either through increasing personal flexibility or through organizational decentralization.
6. A balanced flow of resources to the phases in the innovation cycle.
7. Recognition of and plans for the gradual reduction in the ratio of the direct labor force to the indirect labor force and overhead, as the result of technological progress.

The importance of item 7 tends to be overlooked. For, if the rate at which the work force is displaced through technological innovation is greater than the rate at which new employment is created on new products and services, unemployment is an inevitable consequence. In a political democracy with free enterprise, this balance can be maintained best through those free enterprises so planning their activities that the opposing tendencies are equilibrated.

56. Scherer, F. M.  
 THE WEAPONS ACQUISITION PROCESS: ECONOMIC INCENTIVES. Boston, Mass., Division of Research Harvard Business School, 1964. 447p.

Latest volume in a series on the title subject. This text surveys the government's problem of maintaining incentives for efficient and optimum contract performance in the essentially nonmarket environment of developing and producing advanced weapon systems. Of direct concern to planners are the author's conclusions that improved incentive systems are required before it will be possible to reverse the trend toward increasingly detailed direct government control and supervision of contractor operations.

57. Somers, G.G., E. L. Cushman and N. Weinberg, eds.  
 ADJUSTING TO TECHNOLOGICAL CHANGE.  
 New York, Harper and Row, 1963. 230p.

Technological change is accepted as an industrial fact, associated with gains and costs, calling for understanding, adjustment, accommodation and aid. The impact on labor and management, and their reactions and responses, are viewed historically and in the most recent collective bargaining agreements. Private adjustments are related to community and governmental policies in this country and abroad. The differentiation between beneficiaries and sufferers from technological change presents us with a moral as well as an economic problem. Society as a whole is, by and large, a beneficiary. Is it morally acceptable for most of us to enjoy the benefits of new technologies without utilizing every possible means of minimizing the losses and assisting the readjustment of those who are not beneficiaries but sufferers? Society has a moral obligation to accept the cost of necessary programs to this end as a charge against the benefits of technological advance.

58. Space Science Board, National Academy of Sciences  
 NATIONAL GOALS IN SPACE, 1971 - 1985. News  
 release issued 17 November 1964 by the National  
 Academy of Sciences, Washington, D. C.

The Space Science Board has recommended that unmanned exploration of the planet Mars, involving both physical and biological investigations and expressly the search for extra-terrestrial life, be made the primary objective of the nation's space effort in the ten to fifteen years following the Project Apollo manned lunar landing. Possible alternatives to Mars exploration, such as extensive manned lunar exploration and development of manned orbiting space stations and laboratories are not regarded as primary goals, because they have less scientific significance. However, both have sufficient merit to warrant parallel programs but of lower priority. The manned lunar program of this decade will provide for the unmanned planetary tools of the next decade. During the unmanned exploration of Mars time will be available to develop the more complex systems for man's ventures beyond the moon. In addition to providing continuing advice to the Federal government on scientific aspects of the national space program, the Board provides for participation by U.S. scientists in activities of the Committee on Space Research (COSPAR).

59. Stanford Research Institute  
 Industrial adjustments to shifts in defense spending.  
In CONVERTIBILITY OF SPACE AND DEFENSE  
 RESOURCES TO CIVILIAN NEEDS: A SEARCH FOR  
 NEW EMPLOYMENT POTENTIALS, U.S. Senate  
 Committee on Labor and Public Welfare, Wash., D.C.  
 G. P. O. 1964, p. 697 - 708.

Excerpted from "Potential industrial adjustments to shifts in defense spending: an analysis of a reduction in strategic programs", prepared for the Dept. of Defense, Office of the Director of Defense Research and Engineering. It is estimated that the elimination of strategic weapon systems could result in the layoff of about 30,500 engineers and scientists in defense companies. The actions that the Federal Government could take to assist defense contractors in adjusting to large cutbacks would involve numerous controversial questions of public policy.

60. Steiner, G. A.  
 Does planning pay off? In LONG-RANGE  
 PLANNING FOR MANAGEMENT, Ewing, D.W., ed.  
 Harper & Row, 1964, p. 61 - 64

Determining pay off is a matter of relating the value of planning results to the costs of planning. On the whole, payoff calculations are probably more easily determined



for short-range than for long-range plans. Long-range plans may not pay off for five, ten or more years.

61. Steiner, G. A.  
Why and how to diversify. CALIFORNIA  
MANAGEMENT REVIEW, 6: 11 - 18, Summer  
1964.

Effective long-range planning is indispensable to top-quality diversification planning. Diversification is but one aspect of the operations of an enterprise. In the long-range planning process, decisions are made about the fundamental objectives of the enterprise as a whole and its major parts, the basic strategies to achieve them and the detailed plans to assure that objectives are met. These long-range planning decisions affect the degree and direction of diversification in light of all other major actions which may affect the future operations of an enterprise.

62. Stewart, C. T., Jr.  
Peace trend will bring better business; cutting back  
defense spending and rechanneling brainpower will  
spur long-run economic growth. NATION'S  
BUSINESS, 52: 66 - 68ff, Jun 1964.

Author is a Research Professor of Economics, George Washington University. His thesis is that the rechanneling of money and personnel from defense to civilian pursuits will stimulate a variety of industries from household appliances to industrial machinery. The author alleges that a heavy commitment to defense spending has not been good for our economy because it has diverted skills and resources from productive investment and much-needed civilian research and development. He contrasts the modest economic gains of the U. S. and the United Kingdom, both saddled with large defense commitments, to the spectacular rates of investment and economic growth of Germany and Japan.

63. Stone, J. J.  
Bomber disarmament. WORLD POLITICS,  
17: 13 - 39, Oct 1964.

Author discusses bomber disarmament as a partial measure which might be agreed upon by the U. S. and Russia in the absence of more general progress toward disarmament. Since U. S. bombers are playing an ever more marginal role in the U. S. strategy, the author concludes their dismantlement would not be a great loss.

64. Sutton, G. P.  
LONG RANGE PLANNING FOR A MAJOR COMPONENT MANUFACTURER. American Institute of Aeronautics and Astronautics (AIAA) Paper 64-404. 7p.

Author is Director, Long Range Planning, Rocketdyne Div., North American Aviation. For the past 8 years Rocketdyne has prepared an annual long range plan which, more recently, has been supplemented by quarterly planning reviews. (1) Division establishes and evaluates the near- and long-term goals or objectives for itself as well as for each of its major organizational units. (2) Next, they select, from possible alternatives, a method of achieving these objectives - a method that must be feasible, practical, and within their resources. Although the normal plan is for ten years, only the next year is planned in operating detail, 5 years in less detail, and the balance of the planning period is examined only in broad terms. External influences, such as geopolitical factors, current and future defense dogmas, technological breakthroughs, etc. are assessed as they may affect the desirability of doing work in certain areas.

65. Thornton, S. F.  
PLANNING: A BIBLIOGRAPHY. System Development Corp. Rept. no. TM 1391 00 01, 14 Feb 1964. 36p. DDC AD-431331.

The bibliography includes references on planning, encompassing long-range planning, research planning, and financial planning. Related topics such as forecasting, marketing, management and organization have also been covered.

66. Tickton, S. G.  
The long-term budget projection: a case study from education. In LONG-RANGE PLANNING FOR MANAGEMENT, Ewing, D.W., ed., N. Y., Harper & Row, 1964, p. 505 - 523.

Although colleges and universities have long-range planning problems similar to those of industry and trade, it is unusual for them to engage in long-range fiscal planning. A few small liberal arts colleges decided to work out a long-range analysis technique built around their budgets. Their objective was to gain some financial perspective for the decade ahead, taking into account all their long-range commitments such as tenure, automatic-increase salary schedules, fringe-benefit arrangements with escalator clauses, etc. This paper describes the process followed by one of these

colleges, indicates the types of data needed and the basis of the projections made, and describes the results obtained. By using a technique similar to the one described, other colleges and universities can work out their own future pictures and can use organized data as a basis for new decisions on their future activities.

67. U. S. Congress. Senate Committee on Labor and Public Welfare  
 EXPLORING THE DIMENSIONS OF THE MAN-POWER REVOLUTION. Volume 1 of Selected Readings in Employment and Manpower. Washington, D. C., U. S. Government Printing Office, 1964. 586p.

From May to December 1963, a Subcommittee on Employment and Manpower conducted extensive hearings designed to plumb the depths of the Nation's manpower and employment problem. This was the first time a congressional committee had attempted to look at U. S. employment problems on a comprehensive rather than a piecemeal basis. This document supplements the testimony of witnesses heard by the subcommittee and provides excellent background material for anyone involved in long-range planning. Selected papers have been individually abstracted within this bibliography.

68. U. S. Congress. Senate Committee on Labor and Public Welfare  
 CONVERTIBILITY OF SPACE AND DEFENSE RESOURCES TO CIVILIAN NEEDS: A SEARCH FOR NEW EMPLOYMENT POTENTIALS. Volume 2 of Selected readings in Employment and Manpower, Washington, D. C., U. S. Government Printing Office, 1964. p. 587 - 1106.

In early December 1963 the Subcommittee on Employment and Manpower concluded 6 months of hearings on the Nation's manpower and employment problems. The final weeks of these investigations were devoted to the impact of the national defense and space efforts upon national employment and economic growth. This document is an extension of the hearings and contains much additional substantive information upon which the subcommittee will base the recommendations arising from its studies. Selected papers have been individually abstracted within this bibliography.

69. Ullman, J. E.  
 Problems of occupational conversion. In CON-  
 VERTIBILITY OF SPACE AND DEFENSE RE-  
 SOURCES TO CIVILIAN NEEDS: A SEARCH FOR  
 NEW EMPLOYMENT POTENTIALS, U.S. Senate  
 Committee on Labor and Public Welfare, Wash.,  
 D. C. G. P. O., 1964. p. 675 - 690.

There is an important need to define the requirements of a program of occupational conversion which at least attempts to minimize the disturbances. The estimated extent of the problem is defined with special reference to concentrations by professions and by regions. Certain alternative employments are then specified and the types and complexity of retraining assessed. The conditions of employment and the job market in the present defense industry is examined and related to problems in the personal finances of the employees that are highly pertinent to the conversion process. A series of plans are proposed that industry could undertake to prepare for disarmament.

70. Ward, C. C.  
 The "new myths" and "old realities" of nuclear war.  
 ORBIS, 8: 255 - 291, Summer 1964.

Author is a retired Rear Admiral, U.S.N., formerly the Judge Advocate General, U.S.N. His thesis is that the basis of U.S. military policy, as he sees it, is the creation of a strategic force consisting principally of a invulnerable and hardened Minuteman missile force coupled with the sea-based Polaris force. This minimum deterrent with only scant attention paid to the provision of air defense and the replacement of obsolete bombers makes the U.S. vulnerable to a sustained Soviet development program designed to deliver a devastating attack on the U.S. If the Soviet can mount a surprise nuclear first strike of sufficient magnitude, the defender (U.S.) which would have lost substantially its entire population and most of its retaliatory weapons, would be incapable, both physically and rationally, of making any effective retaliation. An ideal precondition to the use of this strategy would be a substantial advance reduction in U.S. strategic capabilities brought about by U.S. unilateral disarmament.

71. Ways, M.  
The era of radical change. FORTUNE, 69:  
113-115ff, May 1964

Within a decade or two it will be generally understood that the main challenge to U. S. society will turn not around the production of goods but around the difficulties and opportunities involved in a world of accelerating change and ever widening choices. Most American political and social issues today arise out of concern over the pace and quality of change. The author emphasizes that while the lone individual can not cope with radical change neither can a more centralized government perform tasks requiring flexibility, adaptability, and willingness to accept risk. The solution lies within the so-called "middle-tier" organizations, business corporations, local government services, labor unions, professional associations, philanthropic foundations, universities. The challenge to these organizations is to develop a generally accepted integrating system of ideas and values in the era of radical change.

72. Weber, A. R.  
The interplant transfer of displaced employees.  
In ADJUSTING TO TECHNOLOGICAL CHANGE,  
Somers, G. G. et al., eds., N. Y. Harper and  
Row, 1963, p. 95 - 143.

Because the introduction of new technology frequently has been the occasion for the geographical shift of production facilities, the problem of relocating displaced employees within and between different labor markets has emerged as a problem of some significance. In view of the character of contemporary labor-management relations, especially in multiplant firms, the creation of interplant transfer programs calls for the establishment of a complex system of rights and procedures by which designated objectives can be achieved. Data were compiled on eight case studies in which programs for the interplant transfer of displaced employees have been developed. Subject areas covered include: (1) the nature of transfer rights, (2) procedures for the exercise of transfer rights, (3) the integration of seniority (4) the relationship between seniority, transfer rights, and service benefits, and (5) the negotiation of transfer agreements.

73. Weidenbaum, M. L.  
 The transferability of defense industry resources to civilian uses. In CONVERTIBILITY OF SPACE AND DEFENSE RESOURCES TO CIVILIAN NEEDS: A SEARCH FOR NEW EMPLOYMENT POTENTIALS, U. S. Senate Committee on Labor and Public Welfare, Washington, D. C. G. P. O. 1964, p. 848 - 855

Paper analyzes the portions of the American economy which are heavily dependent on defense work and indicates some of the opportunities for and obstacles to transferring defense industry resources to civilian applications. Author calls for a long-range national program to encourage the development of alternate demands for any potentially surplus defense industry resources. Such a program would require: (a) the development of public policy on the respective roles of government and industry in utilizing the resources that may become available (b) assigning responsibilities to the various government agencies involved, defense as well as nondefense, and (c) developing mechanisms for carrying out those responsibilities both in the private sector as well as the public sector of the economy.

74. Wells, J. G. and R. H. Waterman, Jr.  
 Space technology: pay-off from spin-off.  
 HARVARD BUSINESS REVIEW, 42: 106 - 118,  
 July-August 1964.

Attempts on the part of government and industry to exploit or increase spin-off frequently have suffered from an unclear picture of the nature of spin-off. Failure to recognize the complex and multiple nature of the intangible form of these spin-offs as opposed to the more publicized but less important tangible form has caused underestimation of potential benefits. Proper exploitation of technological transfer from space programs to commercial applications can be a stimulus to economic growth.

75. Weston, J. F., ed.  
 Defense-space market research. CAMBRIDGE, MASS., M. I. T. PRESS, 1964. 186p.

In the past, defense firms have been product-oriented. They have viewed their operations in terms of products and product lines. In addition, in seeking to develop new business, there was a strong customer orientation in terms of Air Force, Navy, and Army. Particularly for longer range planning, both product and customer orientation will become less important as a consequence of the new program structure approach to military planning and budgeting. Of greatest import to planning will be a mission

orientation. This mission orientation is stated in terms of the jobs that have to be accomplished in the defense of the nation, whether performed by individual services, a unified service, or indeed by a unit other than a government agency. Who and where and how the mission is carried out is subject to change as the social, political, and technological characteristics of society evolve and change. This book is intended as both a text and a reference source for information pertinent to defense-space market research.

76.

Wolfe, T. W.

Soviet strategy at the crossroads. CAMBRIDGE,  
MASS., HARVARD UNIV. PRESS, 1964. 338p.

This study under Rand Corporation sponsorship analyzes and evaluates recent changes in Soviet strategy and doctrine. Nuclear warfare, first-strike vs. deterrent concept, conventional vs. nuclear forces are among the topics reviewed. Material is based on data contained in both official texts and published literature.

77.

Zishe, R. P.

The progress function in the aerospace industry -  
an historical analysis. IEEE TRANSACTIONS  
ON ENGINEERING MANAGEMENT, EM-10:

74 - 86, Jun 1963.

The progress function is a predictive model developed by the airframe industry in the 1930's. It is also called the "improvement curve" or the "learning curve". It reflects the relationship between gross production output and the effort required to produce each unit of production. Perhaps the most suitable application of the progress function is as a planning guide in developing long-range projections for a wide variety of programs. The computational ease with which the progress function can be calculated allows many projects to be considered and compared in a product mix without expensive detailed delineation of each project element. Long-range personnel requirements based on progress curves can also be developed to establish requirements for training, educational support programs, layoff and rehire trends, and similar information.

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