

Inter-Service Conference on
AUTOMATING PERSONNEL FUNCTIONS

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PREFACE

It was observed by one of the participants that this meeting could not have been held five years ago. He was referring, of course, to the timeliness of the meeting topic—Automating Personnel Functions. A review of the Proceedings that follow will bear out his contention. The planning, even for automated systems now operational, had barely begun five years ago. Automating personnel functions is for the most part even today in the planning or development stage; however, because the Department of Defense sees clearly the need and utility of automation in personnel matters, it is moving at an accelerating pace to exploit computer sciences in the handling of manpower. Hence, an inter-service meeting on automating personnel functions seems particularly appropriate at this time. It is late enough for a range of projects to be available for discussion and early enough for an inter-service review of these developments to stimulate additional and improved efforts.

This is the seventh in a continuing series of inter-service meetings sponsored by the Office of Naval Research. These meetings have focused on research and development in the management of military personnel. The inside front cover of this report lists the titles of the Proceedings of the earlier meetings. As with previous conferences, this one also was attended by an invited group of service representatives engaged in personnel research and management. They met, as before, to report their activities, to learn what their colleagues have been doing, to examine candidly their more common problems, and to stimulate new research. These conferences have served to bring together professional military personnel managers and military personnel research. This combination has fostered a mutual appreciation for both the operational problems of personnel management and the potential usefulness of research in attacking these problems.

An important characteristic of this series is its inter-service participation, not only in attendance, but in all phases of the planning and execution. An inter-service committee selected the topic, planned the conference, arranged for the service presentations, and cooperated in editing the Proceedings. The members were F. M. McKernan (Army), D. G. Price (Navy), Col. E. Seal (Air Force), J. T. Casey (Marine Corps), and G. L. Bryan and J. J. Regan (Office of Naval Research). The Office of Naval Research is grateful to these gentlemen, especially to Messrs McKernan, Price, and Casey who have served in this capacity a number of times.

Several innovations marked the structure of this meeting. It was longer (three days) than has been customary and, for the first time, was held at a private facility. It seemed desirable, in view of the added length imposed by the topic, to provide a meeting place away from the daily interruptions that confront the attendees, and one where maximum opportunity existed for interaction both during the day and in the evening. Airlie House, Warrenton, Virginia was selected to meet these objectives. The participants felt that this site served these purposes well and added an important dimension to the conference.

The technical sessions were organized along the following lines. There were four major presentations, one from each of the services on an aspect of automating personnel functions in which that service has been particularly active. Each of these talks was followed by three brief commentaries, from the three remaining services, in which they outlined their own activities in the area under discussion. Three discussion sessions were provided so that ample time would be available to air problems and exchange views. The evening discussion session was chaired by the Planning Committee. The remaining discussion and summary sessions were chaired by Drs. Edgerton and McCormick who acted, as they had during earlier meetings in this series, as consultants to the conference. The first evening was marked by a keynote address delivered by Dr. Jack Moshman, Vice President of C-E-I-R.

The Proceedings are arranged so that the four sessions which report service activities appear first, in the order that they were presented. They are followed by the Keynote Address, a summary of the evening discussion session, and summary remarks by each of the consultants. Members of the Planning Committee solicited papers from their respective services, in addition to those which were to be read at the meeting, for inclusion in these Proceedings. The Appendixes contain those papers which were so submitted. They differ from research reported at the meeting only in that they appeal to somewhat more specialized interests.

The papers that appear in these Proceedings represent a broad sample of service activities. They do not describe all of the service effort being put forth in the area of personnel function automation. The topics covered at the meeting were selected to be those in which all of the services have some interest and which would characterize the area at this time. No attempt was made to survey the services and identify all of the research and development in progress. There are no doubt many efforts underway that are of special interest to a particular service which have not been discussed at this meeting.

Something has been said of why the topic was chosen. The background and general features of the conference were described. It might be worthwhile now to turn briefly to the substantive content of the meeting—personnel functions and their automation—and identify some of the principal matters discussed.

While automation certainly includes the use of computers, the terms are not synonymous. A useful and generic definition of automating personnel functions was given by Dr. Christal of the Air Force. He said that the automation of personnel functions implies a method whereby decisions about personnel and personnel systems are made automatically by the application of a set of rules to a set of data. This definition suggests that for personnel decisions to be made automatically, data and rules must be available in a certain quantitative form. Dr. Christal described research underway in the Air Force to obtain such data and develop such rules.

Some of the first applications of computers have, of course, been in automating personnel functions. Personnel departments were early users of computers, for example, in computing payroll, recording test scores, and assembling personnel data of various sorts. The computer in these applications was functioning as an automatic data processor. While this sort of processing is increasing and is prerequisite to further applications, it is not the kind of automating, generally speaking, with which this meeting was concerned. It is the application of sets of rules (algorithms, models, heuristics) to data so processed which characterizes the computer use discussed at this conference and which will permit the automation of personnel decisions. The need for automating these personnel decisions is dramatized when one considers a task such as fitting 100 men with different achievements and aptitudes to 100 different jobs. Dr. Christal explores this example and concludes that "...automation is the only way by which an individual can be given the attention he deserves."

The computerized assignment of recruits to further training is partially operational. Lt. Col. Marsh reported on the Marine Corps program in this area. Several sets of rules have been developed which result in improved assessment of the recruit's probability of success in any one of the school assignments for which he is potentially eligible, and in improved utilization of available recruits in the assignment process. The Navy and Army report on highly similar systems. In fact, all three recruit assignment systems have at least one program in common. These computerized assignment procedures have undergone partial evaluation, and, in every case tested, their use has resulted in improved average assignments. Improvement, in respect to meeting a host of school requirements, is in terms of all the schools and the full group of assignees. Characteristic of automated assignment procedures is the fact that a given individual or school may not be optimally assigned except in terms of all the other individuals and schools. Improvements result, in part, by removing the variability of the assignment clerk, and by taking advantage of the powerful search and trial capability of computers.

Military training is the single most important means for obtaining skilled personnel. Therefore, changes in the nature (e.g., size) of the pool of skilled personnel available, and of the mix of skills required have a significant impact on training requirements. A long-range forecasting system is necessary to provide adequately for changing training needs. The Army has detailed plans for an improved computerized forecasting system. This system will do much more than automate the manual system. As with the assignment systems discussed above, rules will be applied in the search for optimal solutions. The rules presently in use and being adapted for use in the personnel field bear such strange (to the personnel man) names as the Ford-Fulkerson algorithm, Markov Chains of Ergodic States, and various network flow models. These mathematical decision models were developed in Operations Research (OR) settings for maintaining industrial process, logistic, and inventory controls. Whether similarities between industrial and personnel systems are in the long run sufficient for common computerized rules is yet to be determined. The Army's planning study for a system dealing with procurement, training, and replacement will provide an opportunity to test many of these OR models.

The description and analysis of tasks or work requirements has occupied personnel research since the Industrial Revolution. Earlier meetings in this series have been devoted to this topic. The Navy reported efforts it has been making in the area of structuring jobs. This represents work in the data provision phase of automating personnel functions. As Mr. Silverman showed, the computer permits the use of new and more sophisticated techniques of data analysis. An iterative cluster program for grouping tasks was described which is being used in the design of a personnel classification structure.

Dr. Moshman in his address highlighted some of the ways in which computers might be used in automating personnel functions. He spoke of improved natural computer languages, of the simulation of management policy change, and of the development of theoretical models of organization.

By the evening of the second day, all four services had made their presentations, and the audience engaged in a general discussion. A review of the summary of this session might leave one with the impression that in personnel systems the technical issues of automation had been largely resolved, and that administrative problems alone were holding back progress. This would be a false impression. Technical issues abound. A reading of the Army's plans for its automated forecasting system reveals the kinds of technical problems that must be met both in obtaining data and in devising rules for the computer. The emphasis on administrative problems which developed at the discussion session, arose from the fact that most of the participants are professional managers. Their problems are largely administrative. They recognize research needs, support research efforts, and evaluate research results, but are less involved in the technical concerns of automation than they are with the equally important administrative issues facing the automation of personnel functions.

The directed discussion and summary of Dr. Edgerton stressed important implications of automation for many of the traditional activities of personnel research and management. Dr. McCormick in his summary spoke of the information input needs of automated systems. They have been heightened in several ways by the introduction of computers. This point, made many times throughout the meeting, was emphasized by Dr. McCormick with numerous examples.

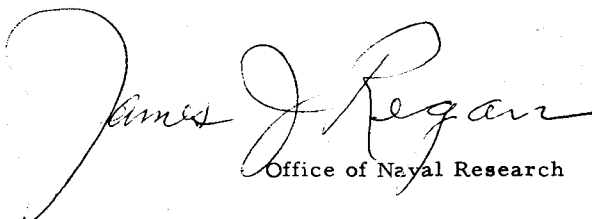
A review of the Appendixes will impress one with the extent and variety of computer applications to personnel functions. Functions which have been or are being automated include allocation of men to fleet units, forecasting enlisted rate requirements, enlisted advancement decisions, and the selection of an appropriate sample.

This conference did not include any discussion on the use of computers in the instructional process itself. The act of training is one of the most significant of personnel functions and automation will play an increasingly important role in its accomplishment. Because of the scope of activity involved and the extent of development plans, a future conference in this series may be devoted completely to the topic of computer-assisted instruction.

Each reader of these Proceedings will take away a somewhat different picture of the state and future of automation in personnel functions; however, all, we believe, will be struck by several pervasive characteristics revealed in the conference. The variety of functions in which the computer is already playing a part is surprisingly large. The number of rules being applied to these functions is limited. The improvements, where evaluation has been attempted, are substantial. The non-technical misgivings about the use of computers are as one might suspect widespread but are being overcome. The need for more and better data of the conventional sort has increased rather than decreased with the use of automated techniques. The use of computers solely as record keepers is no longer of primary interest to personnel research and management people.

An additional distinctive feature emerging not only from this meeting but from earlier ones in this series as well, has to do with the magnitude of military personnel systems. Not only are they large, but their size and composition are subject to rapid and extensive fluctuation. The continuing control exercised over military personnel presents a unique opportunity to evaluate the long-range effects of a given personnel action (e.g., selection or training). The military in exercising leadership in their management of these complex and unique personnel systems are making a distinctive and worthwhile contribution to the science of personnel research and management whose benefits extend well beyond the Department of Defense.

Dr. Wiskoff likened the use of computers in personnel management and research to tuning one component of an automobile. Defects in the remaining components are magnified. The point of view represented by this figure of speech was frequently expressed in the meeting and can set important goals for all of us concerned with the improvement of personnel functions.


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