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6 THE MANAGER'S ROLE IN THE DEVELOPMENT OF AN
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10 Phoebe G. Harper
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THE MANAGER'S ROLE IN THE DEVELOPMENT OF AN
AUTOMATED MANAGEMENT INFORMATION SYSTEM

Study Project Report
Individual Study Program

Defense Systems Management School
Program Management Course
Class 76-1 .

by

Phoebe G. Harper
GS-13 DIA

May 1976

Study Project Advisor
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DEFENSE SYSTEMS MANAGEMENT SCHOOL

STUDY TITLE: THE MANAGER'S ROLE IN THE DEVELOPMENT OF AN AUTOMATED MANAGEMENT INFORMATION SYSTEM

STUDY PROJECT GOALS:

To define systems analysis and to point out how, when, and where management should interact with the design analyst in the development of an automated management information system.

STUDY REPORT ABSTRACT:

The basic objective of this paper is to point out how, when, and where management should interact with the design analyst in the development of an automated management information system. To accomplish this objective, the paper will:

1. Define systems analysis and some other pertinent terms, and
2. Describe the system development process, pointing out action points for management throughout the process.

While the topic covered is not an original one, it is one which is often overlooked. The ideas presented are an amalgamation and collection of the best ideas from several sources. The author has drawn heavily on personal experience in the data processing field.

SERVICES MANAGEMENT	REQUIREMENTS TECHNIQUES	INFORMATION SYSTEMS SYSTEMS ENGINEERING SYSTEM MANAGERS	AUTOMATION DATA PROCESSING
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**SYSTEMS ANALYSIS
PROGRAM MANAGEMENT**

**KEY WORDS: Management Information Systems
ADP Systems Analysis**

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Phoebe G. Harper, GS-13, DIA

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EXECUTIVE SUMMARY

↙ The basic objective of this paper is to point how, when, and where management should interact with the design analyst in the development of an automated management information system. To accomplish this objective, the paper will:

1. Define systems analysis, and
2. Describe the system development process, pointing out action points for management throughout the process.

At every stage of the development process of an automated management information system, great emphasis is placed on the involvement of the management team. This is absolutely essential to the success of the system since it is a system to serve management.

The basic goals of an organization and the structure of the organizational management information system must be determined by management, not by the systems analyst. Unless management is willing to participate in certain aspects of the development task, it is extremely unlikely that an effective automated management information system can be designed and implemented.

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INTRODUCTION

The result of the analyst's study is a design -- in particular, a set of specifications for the information system describing exactly how the system will be built to meet the objectives established for it by management. The specification is a document that includes a flowchart of the information paths in the organization, a picture of the data bases upon which the system depends, and a description of the data processing functions to be included in the system. When completed, and after thorough review and approval, by management, the specification will also include detailed designs for each separate module of the system, complete operating procedures for the people who will interface with the system, a test plan to verify that the system works as planned, and resource plans showing the cost, manpower, schedule, and milestones for the project. The project is phased from milestone to milestone. The reason for this is two-fold: (1) to permit management to maintain control of the process and (2) to measure progress against the plan. A milestone is more than just a date on the calendar; it is the point in time at which a specific scope of work is to be accomplished and on which a management decision is required. The purpose of the milestone is to force management to look at the plan and make an overt decision whether to proceed without modification or to make adjustments in the plan to fit the situation. At every stage of the development, great emphasis is placed on the involvement of the management team. This is absolutely essential to the success of the system since it is a system to serve management. A data processing system satisfies the needs of the people who set the requirements for it. In order for managers to be happy with the results, managers must set the requirements.¹

An automated management information system does not make the ultimate decisions but provides (based on the information available in the system) options that can be reviewed by management. These options are substantiated by detailed data so that management can make valid value judgments in selecting from among the options or in determining desirable alternatives.²

THE SYSTEM DEVELOPMENT PROCESS

PROBLEM DEFINITION

The system development process is usually initiated by the definition of a problem by management. Problem definition serves as the basis for assigning tasks and relative priorities as well as a sound beginning for the formulation of system objectives.

Some of the characteristics of good objectives are:

1. They are explicit and written
2. They contain statements reflecting desirable results to be achieved in the future
3. They contain a statement of time frame
4. They contribute to overall mission
5. They are capable of being attained with resources likely to be available within the time frame previously set up
6. They should be capable of being attained with about average performance of resources
7. They should be measurable - capable of being evaluated.

The next step is the establishment of the management information system team. There are many ways to compose this team depending upon the problem to be solved and the way your organization is set up. The important thing for management to be concerned with is the selection of the team leader. Two very important characteristics of a team leader are:

He must understand the job to be accomplished and believe in this effort, and

He must be recognized within his own organization as an individual who gets a job done.

SYSTEM SURVEY

The system team can now begin to develop a plan for meeting the system objectives defined by management by conducting a system survey. This includes the tasks needed to determine the economic, managerial, operational and technical desirability of automating a management information system.

The first task in the system survey is to review, with the affected management, objectives to be accomplished in the design of the system and to formulate evaluation criteria to determine whether or not the new system will meet requirements. In verifying the system scope, the first major checkpoint is established with management by converting the operational problem statement into a data processing problem definition. This task is usually performed by an experienced data systems analyst using well planned interview techniques with management. The results of this task must be formally recorded and presented to management to ensure complete concurrence before going further with the survey.

Two plans are prepared during the survey. The first is done just as soon as the objectives to be accomplished have been clearly stated and agreed to by management. This first one is the plan for the system survey itself outlining areas to be investigated based upon assumptions of the critical factors and emphasis desired. A second plan and a schedule are prepared as an end product of the survey.

After the data gathering and analysis tasks of the survey have been performed, general design parameters will be formulated. Alternatives can be developed, examined, compared, and documented in a form suitable for presentation to management.

It is the manager's decision to select which option or series of options best satisfies his requirements. It is the responsibility of the systems team to ensure that management has the opportunity to examine a full range of possibilities rather than just present the best automated solution without giving the manager the chance to review alternatives.

Each option which is presented should include estimates for schedule and cost requirements as well as an implementation plan. Accurate and precise forecasts of these estimates is a difficult job at best, however at the time the estimates are presented it is possible to project the costs of detailed analysis and design efforts.

At system survey time, it is suggested that accurate projections be made for analysis and design costs and general projections be made for the costs of further steps in the development process. When analysis and design are completed and specific system specifications are presented and approved, then the general estimates made previously can be updated to more precise ones.

Upon completion of the programming phase of development, precise schedule and cost estimates can be made for implementation. Target dates should also be updated at that time.

Planning and scheduling is a gradual effort and estimates will continually need revising and updating if management is going to be kept abreast of development. Keeping up with revisions and carefully documenting each change establish a basis for reporting and control.

The following is a list of costs to be estimated at system survey time:

- Analysis and design
- Documentation
- Programming
- Equipment to be used during testing.

The documented result of the system survey is called the system proposal. It is a multi-purpose document incorporating design concept and resource requirements for implementing a proposed system, directed at many audiences:

- Headquarters management
- Operating management
- Data processing management
- Programming management

This document should be presented in a manner appealing to all these levels for it is somewhat of a sales document as well as a technical specification.

SYSTEM ANALYSIS

System analysis might best be thought of as the examination of an activity to determine what must be accomplished and how the necessary operations may best be accomplished. While gathering data, the analyst or system team must be objective in retrieving pertinent information. Compiling a comprehensive data base enables the analyst(s) to validate assumptions, premises, and conclusions presented in the system survey. At key points during this phase, the systems analyst will confer with management to ensure that the data being gathered is factually and statistically correct.

Generally two major interim reviews should be conducted with management of the user organization. These reviews may be formal or informal. The purpose is to ensure user participation in the project and to keep them abreast of progress. It also gives user management a chance to review and approve the data base and resulting conclusions.

The range of factual data necessary to describe the operating environment is defined by the following types of information:

- Inter- and intra- organizational relationships
- Types and levels of activities performed
- Data and documentation volumes
- Operating procedures
- Timing constraints
- Control requirements
- Reporting requirements
- Data retention requirements
- Uses of data

There are many sources of the above information. Management should be aware that this is the type of information an analyst is seeking to obtain while data gathering in connection with system analysis.

The systems analyst will translate the information he has gathered into a set of system requirements and into a description of system elements useable for design purposes. These descriptions include:

Determination of adaptability of user requirements to machine processing

Basic file, input, and output requirements

Other pertinent data.

SYSTEM DESIGN

While system design is not a direct concern of management, it will be discussed in some detail here in order to acquaint management with the several approaches to system design. A good manager will want to know this information so that he may discuss the several approaches intelligently with data processing personnel and computer systems analysts.

The straight conversion approach involves cataloguing and describing the existing information system and locating sequences of operations which could be performed by a computer. There are two major drawbacks to this method: (1) failure to fully utilize automatic data processing capacity, and (2) failure to meet precise management needs for data or information.

Another approach is the equipment approach. This starts with the desire of finding uses for a given computer or other pieces of data processing machinery. Work will be oriented toward adapting existing information systems to fit a given computer. Again a problem with this approach is that it may not meet the specific needs of management for data or information. A trap that can easily be fallen into is to think that since you have a computer, automate information systems whether or not it's economically feasible.

The experience approach finds the analyst studying existing systems in search for parallels between these and other existing automated information systems and looking for recognizable patterns. For the system design, he adapts and copies features of some tried and workable system. Problems with this approach are (1) you run the risk of trying to deal with situations for which no close parallel exists, and (2) management's need

for data and the contribution of data to objectives do not receive the necessary significant attention.

This next approach is considered by most experienced analysts to be the best in order to produce the most efficient system. This is called the systems approach. During the system analysis phase, several questions are asked:

What data are needed?

What functions are data to perform?

How does this data contribute to objectives?

How is the data used?

What is the relationship of the data to the total system?

The starting point in this approach is to catalogue, describe, specify, justify, and rationalize the need or needs. Documentation of the requirement for data is primary. The existing system, if there is one, plays a minor role in this approach. The system design phase of this approach concerns itself with determining the best way to provide the data that has been deemed necessary by management.

The product of the system design phase is a complete and detailed guide to system implementation. This document must be capable of serving as the basis for programming with virtually no outside reference. It should be completely reviewed by the affected management and should be coordinated with the programming staff before acceptance.

Evaluation criteria should come from both managers and systems analysts. These criteria are best expressed as a range, in order not to be too constricting. The selection of these criteria should begin immediately after acceptance of the system design.

IMPLEMENTATION, TESTING, AND CONVERSION

Once the mode of processing for the primary management information system and manual procedures have been defined, the equipment capability must be reviewed. First, the ideal machinery is specified. Then, the degree to which equipment presently available for use can accommodate the requirement is determined.

Correlate the two findings to establish what equipment has been specified and the degree to which it can be matched by or integrated with present equipment. The possible solutions for reconciling imbalances should be studied and the most desirable solution selected on the basis of impact on system design, initial cost, cost of operating the system, availability of additional equipment, staffing requirements, and training requirements.

The next step in implementation is programming. This function is defined as the translation of system design into machine operation.

Planning for system testing and preparing for system installation begins during the system survey and is continued throughout the development process. It is the responsibility of the systems analyst to deliver a product which has been agreed to by management. Three major elements comprise the system test plan:

- (1) system control and validation conditions
- (2) test data
- (3) test schedule.

Of the several checkpoints in system testing, two concern management directly. These are Final System Test Plan - a review of final test approach, conditions to be tested, and data to be used; and Presentation

of Test Results to User - a complete review of test results including conditional handling of input, output, and file manipulation.

During conversion planning, the analyst together with user management must determine the method of conversion, requisite conversion controls, conversion scheduling, and requirements for user training.

Some methods for conversion are: parallel conversion where old manual and new automated systems operate in parallel; immediate conversion where the manual system is discontinued when the new automated system is installed; gradual conversion where the manual system is replaced by the automated system over an extended period of time; and pilot conversion where the new system is operated in controlled conditions until operational impacts are completely evaluated.

Conversion scheduling requires close coordination with all persons to be involved. Tasks must be identified in connection with conversion, timing of conversion tasks has to be established and formalization of the plan, including user review, must be done. This particular phase of systems development sometimes seems to degenerate to chaos. If this is the case, then proper planning and coordination have not been accomplished, and before attempting to go further with this phase, regress to formalization of the conversion plan and attempt to be more thorough this time around.

To assure proper conversion and successful operation of the system, the analyst should determine training requirements and coordinate the training of user personnel with management.

EVALUATION

During the period after installation of the system, the analyst and the user must cooperate in the explicit and systematic process of formal evaluation. Given the evaluation criteria developed earlier, obtain measurements, compare measurements against standards, and prepare summary charts. If there are problems, determine the real causes and take corrective action.

Installation of system modifications will normally require a parallel operation or a period of pilot operations during which the pre-revision system serves as the fallback system.

SYSTEM MAINTENANCE

System maintenance is the continuing function of adjusting the system's performance characteristics to changing operational requirements.

System maintenance or modification may be requested because of

- deficiencies and errors in system performance
- stated requirements for new reports or changes in existing output
- policy or administrative revision necessitating a procedural change
- expansion of user operations to include additional subject matter.

SUMMARY

The basic goals of an organization and the structure of the organizational system must be determined by management, not by the systems analyst. The degree of understanding of these matters that is required for system design makes it mandatory that the systems analyst have frequent opportunity for frank and direct discussion of questions concerning objectives, policies, and organizational structure. Thus, the systems analyst must have free access to management at the appropriate levels. Unless management is willing to participate in certain aspects of the task, it is extremely unlikely that an effective management information system can be designed.³

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