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MANAGEMENT OF AUTOMATIC DATA PROCESSING SYSTEMS

Gift/wilhelm

by

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The George Washington University

1968



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To Erna and Avrom

Foreword

In the relatively short span of seventeen years since computers first were used for business purposes, the equipment has gone through three generations. Programming languages have progressed from machine language to assembly languages to higher level languages. In contrast, the development of systems using the capabilities of computers has not kept pace. Information on how to manage computers and computer-based systems has lagged even further.

This is not a handbook for the technical supervisor in data processing. Instead, it is intended for senior managers of companies, including the manager of data processing. A glance at the chapter titles makes this clear: Objectives of Data Processing, Organization, Selection of Personnel, Systems Design, External Relationships, Training, Costs, Review and Evaluation, and Outlook. Wofsey has culled through virtually everything available on these subjects and has distilled that which he considers worthwhile. To this he has added some provocative ideas.

Readers may not agree with all of Dr. Wofsey's definitions, ideas, methods, and suggestions. If they are prudent, however, they will try the recommendations, evaluate the results, and modify them to fit particular situations.

Dr. Wofsey's introduction to the educational field began when he joined forces with Dr. Lowell H. Hattery at The American University in 1960. Data processing education had begun there in 1955 with an introductory course. By 1961 courses in systems design, computer management and information storage and retrieval had been added. The collaboration of Drs. Hattery and Wofsey has been a fruitful one. From it came not only added courses, but also the Center for Technology and Administration, with Dr. Hattery its first director and Wofsey the assistant director.

Dr. Wofsey is a lifetime member of the Data Processing Management Association, and is a holder of the Certificate in Data Processing. His activities with the association include: member of the Certificate Advisory Council, International Director, and lecturer on computer management subjects.

R. CALVIN ELLIOT, *Executive Director*
Data Processing Management Association

Preface

Although the first computer was accepted by the Federal government in 1946, it wasn't until five years later that one was used for business-type operations. UNIVAC 1, Serial 1, was delivered to the Bureau of the Census in 1951, where it was intended to assist in processing 1950 census data. It is quite appropriate that the Bureau of the Census be involved in the first governmental use of a computer for processing business-type data. In the latter part of the nineteenth century both Hollerith and Powers developed their models of electric accounting machines, which were conceived and used primarily as data handling devices to assist in preparing census tabulations. Although the use of these predecessors of computers spread throughout government and business, their application generally was restricted to accounting and tabulating.

Comparatively few people recognized the importance of the computer in the early 1950's; if the impact it would have was realized, few wrote or did anything noteworthy to foster its development. It wasn't until the latter part of the decade that the potential of the computer as a powerful tool of management was recognized generally. Coupled with advances in the technology of communications media, the computer became the means of centralized control of large, geographically decentralized government and business organizations. Paradoxically, the computer permitted the decentralization of certain decision-making and yet centralized control of large organizational complexes.

A new generation of phrases entered the management field; integrated data processing, management information systems, total systems, and command and control systems. Unfortunately, however, through 1966 they have denoted more theory than accomplishment. True, some business and governmental systems have been integrated to a fairly high level. However, the surface has only been scratched. New hardware and software developments, such as time sharing, multi-programming, and multiprocessing, have opened the gate more widely for significant advancement in the design and implementation of management information systems.

The industrial revolution, during which facilities for physical production were expanded and improved, is waning; on the other hand, computers have become a dynamic force in a cybernetic revolution. A deterrent to large, integrated systems has been the inability of the human

mind to bring to bear the many relevant details encompassed in a large enterprise. Prior to the computer, so much time was consumed in distilling facts from non-relevant information that it usually was too late to initiate optimum action. The computer, however, makes it possible to store these data, and then to recover them in time and in the form needed to take appropriate actions. The computer is an extension of the human brain. As such, it is the primary factor in the cybernetic revolution now in progress. An analysis concerning how well this powerful tool is being managed, therefore, appears to be justified.

This book is based upon a doctoral dissertation at The School of Government and Public Administration of The American University, Washington, D.C. in 1967. The author wishes to express particularly his appreciation for the assistance furnished him by Dr. Lowell H. Hattery, Chairman of his dissertation committee, who provided guidance throughout the periods of research and writing. Without the stimulus he furnished it is doubtful that the dissertation and the book would have been completed. The constructive comments of Dr. William R. Divine, Dr. Carl Hammer, Dr. David D. Levine, and Mr. Charles A. Phillips had considerable impact on the final product. Finally, appreciation is expressed for the hundreds of data processing managers who discussed frankly the problems they have had and the decisions they made, so that others may profit by their mistakes. Every effort in writing this book has been to keep these managers anonymous, although each example cited is based upon an actual happening.

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Chapter I

Objectives of Data Processing

I. Trends

In the early 1950's the primary objective of automatic data processing usually was the reduction of clerical costs. As late as 1960 a United State Department of Labor study of twenty companies showed this to be the most prevalent data processing objective. Savings of equipment and space were next in order of importance, followed by the expectation that greater accuracy and new information ultimately would result in more efficient management and cost reduction.¹

Although it appears that from 1950 to 1960 the major objective of data processing was the reduction of clerical costs, it is not inferred that the tremendous potential of the computer as a tool of management was not recognized. Robinson of the Carborundum Company was one of the first to accept the computer as a tool to revolutionize management methods. Early in 1950 he considered the computer as a challenge to management's limitations and that it should be used as a tool to accomplish management objectives.²

When data processing objectives emerge from the experiences of the company and are developed by data processing management rather than by top management, they tend to lose the comprehensive and broad view that normally would be exhibited by top management. For example, a director of data processing suggested sixteen data processing objectives:

1. *Develop policies for systems, programming, and operating.*
2. *Direct data processing and ensure prompt and continuous implementation of policies.*

¹*Adjustments to the Introduction of Office Automation* (Washington, D.C.: U.S. Department of Labor, May 1960), p. 10.

²Clinton F. Robinson, "Automating Is a Job for Top Management," *Management and Business Automation* (February, 1950), p. 19.

3. *Develop data processing personnel through training and on-the-job opportunities.*

4. *Maintain an active recruitment policy.*

5. *Maintain close liaison with customers.*

6. *Develop liaison with potential customers.*

7. *Develop training programs for actual and potential users.*

8. *Consider the potential values of data processing for the organization.*

9. *Develop a comprehensive and understandable flow of information to actual and potential users.*

10. *Inform management of new potential benefits, both within and outside the organization.*

12. *Report failures, problems, successes, costs, and savings to management.*

13. *Develop data processing budgets and plans for personnel, equipment, supplies, and space.*

14. *Schedule priorities and placate users.*

15. *Develop a sympathetic and cooperative attitude among data processing personnel toward the needs of customers.*

16. *Develop a conscious drive for accuracy.³*

Discussions of the subject of data processing objectives with managers of thirteen computer installations in private industry and three in government indicated that only half of them knew of written objectives for their installation. The computer installations sampled ranged in size from a small card computer to a large computer with ten magnetic tape drives together with a smaller computer with four tape drives.

If anything, the foregoing indicates a higher level of use of objectives than actually existed. One reply classified as having written objectives was:

My objective is listed in my mission: "Accomplish all data processing requirements of the company."

Another classified as answering in the affirmative was:

"Our objective is to do what the company should do—make profit. The feasibility study lists what needs to be accomplished and provides yardsticks for measuring the degree of accomplishment."

Further questions elicited the information that the feasibility study mentioned was four years old at that time.

³M. H. Schwartz, *Organization and Administration of Electronic Data Processing: a Functional Approach* (n.c.: Board of Governors of the Federal Reserve System, March 19, 1963), p. 3.

Although most data processing organizations appeared to have written objectives or missions, either in organization manuals or in feasibility studies, they seldom were consulted. Data processing managers more often seemed to be operating in a confined orbit of seeing that reports got out on time and were accurate, solving personnel problems, taking care of crises, and considering the possible advantages of new equipment. In such an atmosphere many decisions appeared to be based on the pressures of the situation—cures for current emergencies, rather than mature, considered judgment based on long- or short-term objectives. Although the managers may not have understood all of the details nor the ramifications of the objectives they were trying to accomplish, usually they exhibited a general understanding of at least the major objectives.

It was not until about 1963 that many data processing managers were asking such questions as:

“What are the objectives of the overall system of which data processing is a part?”

“What role does data processing play in achieving these objectives?”

“Do the objectives of data processing reflect that role?”

“What possible alternatives are available which will enable the better completion of these objectives?”

Although the incidence of such penetrating self-evaluation by data processing managers is increasing, its growth is painfully slow, and its overall impact on data processing management is not especially significant. Nevertheless, there is a perceptible movement in this direction, particularly in large governmental systems, where the emphasis is on program management, and in industrial organizations, such as the chemical industry, oil companies, large manufacturers, and railroads.

II. Establishment

Most of the pertinent literature indicated that managers should establish objectives, but the level of management to do this was not clear. A consultant said that top management should use an overall plan to direct all major moves in the right direction. Since data processing crossed all units and functions of an organization it was felt that senior management should set the original goals, and then maintain an active interest in data processing. A management consulting firm advised that management must set the automatic data processing goals to provide a frame of reference for guidance. McDonough stated that success in any job is measured by a set of criteria. A manager should try to find out the criteria used by his superiors and, if appro-

priate, help establish it. He should identify his own criteria and provide criteria for his subordinates.⁴

If it is assumed that top management, senior management, and management are the same levels of management, it would appear that there is unanimity of opinion. Even within top management, however, there are different degrees of responsibility. These different levels of management raise questions concerning which is to establish data processing objectives.

Both in government and in business it appears that the objectives of the system which data processing serves are established by top management, often in consultation with upper levels of management. The objectives of data processing, however, seldom originate at top management level. Instead, the first objectives generally are written in the management department or by the team that completed the feasibility study and designed the system. These objectives are then amended and/or later approved by top management. With the emergence of assistant bureau or corporate directors for management information, the establishment of such objectives tends to concentrate at that level, with the ultimate approval by top management.

Objectives are needed to clarify the interests and aims of management before action is taken. Probably the single factor most important to successful computer operations is a definition by management of the objectives to be attained. These statements typify a belief that data processing objectives should be established "in the beginning." Policy, however, often emerges from experience. Although objectives should be promulgated when a new organization is established, these should change in accordance with experience.

In a data processing division the policies should be sufficiently stable so that the other divisions of the company or bureau will have confidence that the data processing division will not renege on commitments to furnish reports at specific times. It is felt that objectives should be dynamic, not static, and that these objectives should be revised as conditions change. Three events which might indicate that a review of objectives is needed are: a shift in top management personnel, a change in organization, and a change in the product line. Even though conditions do not change, a review of objectives is indicated if, as frequently happens, the original objectives are too ambiguous or too general.

⁴Adrian M. McDonough, "Keys to a Management Information System in Your Company," *The Third Generation Computer*, Management Bulletin 79 (New York: American Management Association, 1966) p. 29.

Although practically all of the data processing installations visited had objectives, in most cases these objectives were effected when data processing was established or when the computer was added. Occasionally the objectives of all elements of a company were reviewed and updated. At that time those of the data processing division were updated along with those of other divisions.

It is suggested that objectives of data processing be reviewed approximately once a year, unless conditions make it evident that such a review is needed earlier. If the review is premature, this will be readily apparent, and may be aborted. Waiting until it is apparent that a change in objectives is needed may be too great a delay. Gradual changes in organization and product line may not be apparent until the total change is well past the time when objectives should be revised. Furthermore, regular review will bring to light objectives which may have been faulty when promulgated.

Documentation

It appears fairly evident that objectives should be written, not only so that they will not be distorted as time passes, but also to furnish guides which the manager of data processing can use in making decisions. Although in an ideal situation the essential parts of the objectives should be in writing, there are circumstances where this would be either unwise or impossible. In any emergency situation there may not be time to write the objectives. In a large company, it may take months to analyze the situation. This is also true in controversial situations. Furthermore, security, business, or political reasons may make it unwise to write the policy formally.

As mentioned previously, half of the managers of computer installations interviewed stated that they had written objectives. It is not contended that this survey will withstand rigorous tests of randomness, nor that it is representative of data processing installations in general.

The significant elements, however, are that one data processing manager did not know that he had specific objectives to fulfill, and that half of them were not aware of any written objectives. Since many of them did not know of any written objectives, data processing decisions perforce were in many instances based on a general understanding of the major objectives, rather than on reference to specific written objectives.

III. Characteristics

More and more, people desire to give their best efforts for a purpose,

a direction, a goal. This purpose or policy must be one to command respect and to seem to be worthwhile . . .⁵

Specific

Failure to establish specific objectives can impair the effectiveness of data processing. A survey of the Opinion Research Corporation rated the data processing operations of large corporations into three categories: more effective, average effectiveness, and less effective. In the more effective category 61 percent had broad goals, as contrasted with 26 percent in the middle group and 12 percent in the less effective category. Stated another way, 88 percent of the less effective data processing installations had either narrow goals or no goals. Some electronic data processing failures were traced directly to the failure of management to define its needs. The study concluded that until management used the computer as a tool for profit increases, really significant gains would not be realized. Example of applications listed as being in the profit-making category included: sales forecasting, manpower planning, marginal income analysis, market share forecasting, determining optimum inventory, and planning material requirements.⁶

The desirability of broad goals, however, should not be carried to the extreme view that only broad goals are good goals. Specific goals in terms of time, cost, quality of information, end use, etc., are needed to permit the exact placement of responsibility.

Objectives should be in sufficient detail to provide a firm basis for selecting application areas, for determining sequence of conversion, and for determining the extent to which existing methods and procedures should be revised. The first objectives established for data processing frequently were overambitious and too general. The basic goal of increased profit, referred to earlier in this chapter, is too general as an objective. It might, however, be replaced by such long-range goals as improved competitive position and increased share of the market. Examples of operating requirements which the computer might have the objective to correct are difficulty in obtaining personnel, volume increases, and shortages of space.

An examination of the written objectives for the data processing departments in several governmental bureaus indicated a tendency to

⁵Cathryn Seckler-Hudson, *Organizational Management: Theory and Practice*, (Washington, D.C.: The American University Press, 1944), p. 76.

⁶The Public Opinion Index for Industry, *The Company's Computer Applications* (n.c.: Opinion Research Corporation, October 1963), pp. 6-20.

delineate areas of cognizance—offices for which data processing services were to be performed and systems for which work would be done, rather than to provide objectives toward which the data processing division can aspire. For example:

Accomplish data processing requirements of the Bureau of ———, the ——— Office, and the ——— Office.

Control drivers in the State of ———.

Account for tax collections of the State of ———.

Perform complex calculations otherwise impractical due to manpower shortage.

Provide a centralized data bank for all existing facilities.

Designs, develops, programs, tests, monitors, and maintains the Manpower and Personnel Management System at the Headquarters, Department of the Army level, except that support rendered by AIDSCOM in the Manpower Authorizations area.

Measurable

Objectives should be in sufficient detail to measure the results after the new system is in operation in each application area. If clerical cost reduction is the only goal, a logical measurement is the difference between the costs of the most efficient system without automatic data processing and the costs of people and functions under automatic data processing. Objectives, however, are often less tangible than clerical cost reduction. It is not easy but nonetheless necessary that management should set some criterion of cost increase that will justify the achievement of the objective. They are the only ones with sufficient knowledge and experience to estimate the value of these intangibles. There are, however, certain items which might help management in placing these values:

1. *If the investment is decreased by such factors as lower inventory or faster accounts receivable, the application of a reasonable interest rate to the reduction will result in a factual value to be attributed to it.*

2. *If there are fewer people on the payroll, not only is the payroll reduced, but also peripheral savings will be found in lower training costs, space savings, less waste during training periods, and more flexibility because of better trained employees.*

3. *Savings due to automatic data processing might be used for better fulfillment of missions in governmental organizations and in private industry by reinvestment in product research, increased production, and efforts to expand company markets.*

4. *What are the economic effects of reduced "not-in-stocks," lowered*