

1968

Developing a management information system

Richard C. Raupp

Follow this and additional works at: https://egrove.olemiss.edu/dl_hs



Part of the [Accounting Commons](#), and the [Taxation Commons](#)

Recommended Citation

Haskins & Sells Selected Papers, 1968, p. 372-380

This Article is brought to you for free and open access by the Deloitte Collection at eGrove. It has been accepted for inclusion in Haskins and Sells Publications by an authorized administrator of eGrove. For more information, please contact egrove@olemiss.edu.

Developing a Management Information System

by RICHARD C. RAUPP
Consultant, Management Advisory Services, Chicago Office

*Presented before the Data Processing Association,
Ak-Sar-Ben Chapter, Omaha—November 1968*

THE THEME your organization will pursue this year, I understand, is Management Information Systems. Your program committee is to be commended on its choice, for there is much to be said about MIS. More important, many companies are considering Management Information Systems. If they wish to succeed in implementing MIS, however, some attention should be given to lessons already learned by others.

Some of the general concepts of a management information system—those relating to hardware and software—have previously been presented before your organization, I am told. My comments will therefore be systems-oriented. First to be discussed will be the definition of information requirements; second, the design of the total system; and third, the implementation. These are the steps we consider the major ones in developing a management information system. Note that the definition of information requirements precedes and is a separate step from systems design. Under the topic of implementation, we will devote our attention to the implementation plan and project management and to building the data base.

DEFINITION OF TERMS

Many data processing terms vary in meaning at the whim of the user. Management Information System is one of these. Therefore let us spend a moment defining it.

The type of Management Information System we shall be discussing could be defined as a system designed to produce timely and concise information to the various levels of management—information that each manager *requires* in order to plan and control the activities for which he is held responsible. Notice that MIS is requirements- or user-oriented. It also encompasses the entire company and all levels of management.

There is another term we should define in contrast to MIS. The term is integrated data processing. Integrated data processing is merely

the tying together of application programs, using such things as common input and following the information flow from application to application. Integrated data processing is a component of a management information system.

MIS may be considered a philosophical approach to management. MIS requires establishing corporate goals ; all systems are then structured around these goals. MIS states that information critical to management decisions can be identified and collected and reported in a timely and accurate manner.

DEFINITION OF INFORMATION REQUIREMENTS

What, then, are the steps in developing a management information system? One of the most important steps is the definition of information needs. There are two categories of needs : operating system requirements and planning and control requirements.

Operating Systems

Consider the function of information and information systems as they relate to activities taking place in carrying out the purpose of the business. Most of these activities are interrelated. In fact, most organizations function cyclically. The series of actions and events constituting a cycle can be defined as an operating system. Examples of operating systems in a manufacturing organization include :

- Order entry
- Production scheduling
- Inventory control
- Shipping, billing, and accounts receivable

The initial action in each of these systems is followed by one or more events that complete the cycle. Each of these systems constitutes an information loop. Note also that these loops interact with each other. The degree to which systems design takes advantage of this interaction measures the integration of the data processing system.

Most of the data processing effort to the present time has been concerned with operating systems. Because of the number of transactions occurring within an operating system, substantial savings frequently

resulted from computerization. Only the lowest levels of management, however, are interested in information in this degree of detail.

Planning and Control System

What information, then, is required by middle and top management? Note the words *plan* and *control* in the definition of MIS, above. Is it not the purpose of management to plan and control? Therefore, if information necessary to planning and controlling is identified, the information requirements of middle and top management will have been defined.

The technique best suited for defining planning and controlling requirements is the preparation of a comprehensive set of tables itemizing the major control areas of the organization, the planning techniques to be applied, the quantitative data to be collected, the manner of reporting these data, and the frequency of reporting.

Control areas are all the areas and factors that must be controlled to produce a satisfactory over-all result. Control areas are defined by analyzing the characteristics of the business in its totality. Examples of control areas for sales are volume, price, mix, profitability, type customer, customer, geographical area, size order, percentage of market, and backlog. Each of these areas is subject to planning, measurement, and reporting.

For each control area some planning technique must be adopted. There are many techniques to choose from—profit planning and budgeting, forecasting, standards, external indices, etc. The technique chosen must be pertinent to the control area. The composite application of techniques chosen must meet the organization's profit objective.

Each plan is expressed in some quantitative figure. The management information system provides for collection of quantitative data and comparison with the plan. This recording process is traditionally called "accounting." MIS requires a broader approach to accounting than heretofore practiced. Quantities, hours, and number of occurrences are frequently as important as dollars.

Reporting is the presentation of the results of operations and performance for each control factor and the company over all. Decisions are required on who should get what information. The reporting system should give each key person the information he needs to do his job effec-

tively—and *no more*. Reports may be on a scheduled basis—daily, weekly, or monthly, or on a demand basis. The determining factor once again is need of the manager, not capability of the hardware.

The approach to defining planning and control needs is a functional approach. That means it does not adhere to the existing organization chart of the company. Rather, it asks how a function, say advertising, should be planned and controlled. The persons responsible may be centralized or dispersed divisionally.

MIS DESIGN

The end result of the definition of information requirements is a set of system specifications itemizing EDP inputs, files, processing steps, and outputs. Equivalent documentation should be prepared for non-EDP applications. Usually these specifications are first prepared for the operating systems, and planning and control requirements are then built in.

Controls

A word of caution here. In the rush to replace pencil-pushing, lessons to be learned from the accountants are too frequently forgotten. Control of input, processing, and output are areas to watch. There are many techniques for control—batch balancing of input, control totals carried from run to run, predetermined report totals or ranges, etc. If every feasible control technique is built into the system, a report will never be forthcoming. Therefore, what constitutes adequate control must be determined, and those controls must be included in the input, file, processing, and output specifications.

Hardware

These specifications serve as the basis for selecting hardware and for deciding software requirements. I shall not go into the method of hardware selection. If a thorough job has been done in defining information requirements, the specifications will provide an excellent basis for manufacturers' proposals and for selecting equipment that will do the job at least cost.

Master Plan

A critical point in the development of a management information system has now been reached. A considerable amount of money has been spent, but existing systems have been changed very little. Some reports produced monthly for the past ten years, but not used in nine, have perhaps been eliminated. Perhaps some new reports have been implemented.

But the main product of our effort is a master plan to satisfy the information needs of a company. That plan has a large price tag on it for detail design, programming, and hardware. That plan should contain a realistic estimate of the monetary savings to be realized, of potential effects of better management, and of penalties to be paid if it is not undertaken. All these costs and benefits must be considered by top-level management. Implementation of a management information system is analogous to a complete renovation of every plant and should be given similar attention and commitment.

IMPLEMENTATION

Once top management's approval of a plan is obtained, only implementation remains. Specific system design and programming is no different from the task we have performed over the past five years? Don't you believe it! To achieve the desired results, systems must be highly integrated, as has been demonstrated. Nothing undermines the confidence of management more than to receive two contradictory reports.

Implementation Plan

Because of system interdependence, a detail implementation plan must be developed. Priorities for implementation should be established on the basis of largest payoff.

Every director of information systems dreams of the day he can turn off the company for two years while his staff designs and programs all the needed systems. Science fiction talks of freezing humans, but companies will not stand for it. Some interface between existing EDP systems and the ultimate must be implemented to facilitate the transition. These interim systems should be included in the detail implementation plan.

The implementation plan includes a schedule of systems, time, people,

and cost. This plan should be approved by top management and monitored by them as implementation progresses.

Project Management

Within the data processing department, more detailed planning is essential. A shorter-term plan, say six months, is desirable; the short-term plan should list every sub-system to be worked on in the period and what each man is to do. In other words, work steps or activities should be listed and assigned to individuals.

Each supervisor will find it helpful to list the work activities assigned to his personnel and the estimated hours and completion date. Finally, each employee should account for his time by charging it to a sub-system or program.

Throughout the implementation phase, management will be monitoring progress. This means not only that management is trying to determine whether sub-system 70-13 was implemented on schedule, but whether it adhered to the design requirements of the management information system. Too frequently, once the over-all specifications have been completed, systems analysts tend to forget them. A periodic follow-up of the ultimate goal must be made with all the data processing personnel. If you misplace your copy of the original specifications, doubtless your president can find his copy in seconds.

Data Base

One of the items for discussion mentioned earlier was an approach to data-base design. For over two years I have spent most of my time designing files, designing procedures for collecting data, and assisting in data collection.

In the broadest definition of the term, a data base encompasses every information element used by a manager in the decision-making process. These elements may be stored in random access devices or may rest in the bottom desk drawer. At the other extreme, a data base is only those elements that can be retrieved on demand from random access devices or core memory. Neither of the foregoing definitions suits my purpose. I prefer a middle-of-the-road definition that says a data base comprises all the information elements stored in machine-processible media, including tapes and cards.

What, then, are the problems? They are many, including the interdependence of sub-systems, requirements for instant response, and historical data for forecasting. If those examples aren't enough, what data do you have on your competition, your industry, or the economy as a whole?

Building a data base has been compared to building a mosaic. First, the entire configuration is conceived and then built piece by piece. Unfortunately, some data bases resemble an incomplete jigsaw puzzle more than a beautiful mosaic.

How, then, do we build a mosaic? A list of the major steps would include:

- 1) Study the input, file, and output specifications prepared when identifying systems requirements.

- 2) Develop standard names and definitions for each data element and publish a dictionary.

- 3) Develop coding structures that can be used by many sub-systems and are not limited to any single system.

- 4) Design files and choose storage media to achieve most efficient processings for documented needs.

- 5) Use the standard data names in all COBOL programs.

- 6) Design a system to inventory data elements in all existing and contemplated files.

- 7) Police all new files; eliminate data elements for which a constructive purpose cannot be stated.

A thorough discussion of these steps would take us beyond the intended limits of this paper. So let's hit the high points.

The *Dictionary of Standard Data Names* assists in distinguishing between similar data elements. The dictionary can be used also to define jargon peculiar to your company's industry, thus benefiting system analysts and programmers who are newcomers. The dictionary should make definition of terms within documentation unnecessary.

Files are generally organized around one or more codes. In sequential files these codes are sort keys. In disk files, codes are used directly or indirectly for identification of records to be accessed. Common codes may enable combining of files of dissimilar function. For example, a product or item code can be developed for raw materials, finished goods, and

supplies. Transaction codes are essential if a common program is to be used as input to several different sub-systems. Transaction codes can denote not only action to be taken but also priority.

Recently I heard a speaker advocate that everyone acquire a large mass-storage device and stow all their historical data in indexed-sequential files. I can think of few bigger mistakes. A management information system has a broad range of file requirements. Many needs are best served by tape. If disk files are warranted, direct access is frequently more efficient in processing time and even in space requirements than is indexed sequential. Storage media and file organization should be chosen for efficient processing within design constraints of response time. Excess baggage in files can create confusion in addition to wasted effort.

The real importance of the data base is that it forms the link between various application programs. Reports are not very useful if the data base is inaccurate or incomplete.

MANAGEMENT INVOLVEMENT

The development of a management information system such as we defined earlier is a long, complex project. It requires a corporate commitment and management involvement of great magnitude. Because there are implications on organizational structure and the goals of the company, management will want more control than over most systems efforts. This control is frequently vested in an MIS Steering Committee, which determines the scope of the study, approves the design, and follows the implementation to completion.

Working committees representing top management of major functional segments of the entity serve to get agreement on requirements and priorities. Working committees should sign off on design before programming commences.

SUMMARY

The final step in developing a management information system is to review its operation; so, too, the final step in a speech is to summarize the major ideas. So let us repeat the principal thoughts we have developed:

- MIS is requirements-oriented; the definition of information requirements is one of the major steps in MIS development.
- Information requirements are of two types—
 - Operating system requirements
 - Planning and control system requirements
- A detail implementation plan scheduling systems, time, people, and cost is required.
- Project management includes the assignment of tasks to individuals and periodic review of ultimate goals.
- Because of systems interdependence more attention must be given to data-base design. Code structures, file media, and file organization are important considerations.
- Management must be involved throughout the MIS development.

CONCLUSION

By now, some of you are probably thinking, "I hope I don't get involved in one of those things." I haven't tried to hide the complexities and problems to be solved. Some companies have been working on MIS projects two years or more. Their personnel may have heartburn and ulcers, but will survive. Management information systems hold great promise. What happens if your competitor achieves successful implementation after three or four years' effort? Can you short cut somewhere and catch up? It's not that easy, regardless of the financial resources available! Implementation of MIS will remain a long process for the foreseeable future.

The comments here presented are an outgrowth not only of my experiences but those of many men within our firm. The approach to defining planning and control requirements had its roots in work done in 1949 and 1950. From those roots it has grown into a logically constructed approach. That this approach is valid in MIS development we are convinced, and this conviction is supported by experience.