Management information systems—What happens after implementation?

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INTRODUCTION

One of the greatest challenges facing the modern business firm is the development of means to efficiently and prudently harness computer technology, and make it produce. Classical computer production has been directed toward making existing tasks more efficient. A typical indicator of this direction has been the automation of clerical accounting and payroll systems. Recent computer production, however, is becoming increasingly oriented toward automation of the decision making processes themselves (the “what if” question). This latter trend has forced the development of large, fast memory, tremendous on-line storage capabilities, powerful operating systems, and generalized, easy retrieval programming languages.

Furthermore, it is recognized that these hardware and software capabilities alone may not be sufficient to provide the desired results. The operating environment must also undergo change. As the complexity and importance of automated information continues to grow, the role of the classical, job-shop service organization must be abandoned. A vital, dynamic support group of Production System Analysts must be substituted which will be responsible for the management and control of this computer based “information utility.”

USE OF MANAGEMENT INFORMATION SYSTEMS

One means by which many firms utilize computing capability is through the development and implementation of management information systems (MIS). MIS attempts to solve the information problem by providing relevant information in the right form to the right person at the right time. Appropriately, MIS has been defined as “an accessible and rapid conveyor belt for appropriate high quality information from its generator to its user.”

The information system should provide not only a confrontation between the user and information, but also, the interaction required for relevant and timely decision making. The heart of an effective MIS is a carefully conceived, designed and executed data base. By fully utilizing MIS, it can become “an intelligence amplifier” and the computer can become an extension of the manager’s memory. Ultimately, the computer should free him from routine tasks, providing more time to devote to the creative aspects of his job.

TECHNOLOGY NOW AVAILABLE

The technology for MIS is available now for most companies:

—Computers have large memory capacities and great speed.
—Memory is now economical.
—Multiprogramming and multiprocessing systems have been developed.
—On-line storage in tremendous quantities is now available.
—Programming languages specifically designed for quick and variable retrieval are available.

Yet, in a recent poll, the users of MIS from 655 firms (73 percent of those responding) stated that their companies had not used computers to maximum advantage in meeting management’s information needs.

WHY IS MIS NOT WORKING?

What is the problem? What then remains for MIS to be widely and effectively utilized by managers as a
partner in the management of their business? Except for the continued improvements in hardware and software technology that will occur, the problems of MIS are primarily problems of how to manage the technology existent. Many reasons may be advanced to account for this mismanagement of MIS and computer technology:

- Difficulty in finding and training EDP personnel.
- Insufficient participation of management in supporting computer application development.
- "Communications gap" between systems personnel and management.
- Improper location of the EDP function within the organizational structure.
- Lack of involvement of user organizations in computer decisions.

Each of these is valid and each must be solved if MIS is to efficiently perform as a "conveyor belt" of information. However, too often, a well conceived, well-designed, and well-programmed information system will fail because it is mismanaged after production implementation. There has been little attention devoted to how an information system should function after it has been conceived, designed, programmed, and implemented. How should the system be operated? What should be the user involvement? Development personnel involvement? These questions must be answered with workable solutions dependent upon the system functions, company policy, and company goals present.

CLASSICAL OPERATION OF INFORMATION SYSTEMS

The classical modes of operation of computer systems are: (1) The design organization, which included system analysts and programmers, continued to be responsible for the execution of the system, (2) the user was educated to a degree whereby he could, at least mechanically, exercise the system to produce what he needed, or (3) the Data Center operation personnel were held responsible for the execution of the system, this responsibility either being exercised by computer operators or control clerks.

The first of these modes of operation, execution by the design organization, is inefficient because human resources will not be effectively utilized. An unbalanced work load would exist, whereby some people would spend most of their time on production runs whereas others would spend only a small amount of time. Furthermore, trained systems analysts and programmers should be utilized as systems analysts and programmers and not performing in a repetitive, production environment.

Development organizations would find it difficult to provide the necessary subsystem interface because they would not be aware of activity in those subsystems in which they had not been involved during the development stages. For example, subsystems of a total system may be developed by different programming groups, relatively independent of each other. In summary then, the management and control of production information systems should be recognized as a full-time job, and programmers and systems analysts would not, and should not be expected to, devote this required effort.

The second possible mode of operation emphasized the development organization designing and programming a system and educating the user to submit his own work to the data center. This was a mechanical process for the user because he neither had the time nor interest to learn enough to solve any EDP problems or effect any system improvements. Consequently, the development organization was responsible for solving all problems. Furthermore, the system was infrequently analyzed to determine if it was continuing to meet user needs and, as a result of this, the user frequently became disenchanted with the information system. Another drawback to this type of operation was that systems could not be designed with more than one direct source of input to or disposition of output from the data base. Data collection and document distribution organizations were formed to exercise this interface with the data base for those areas in which volume demanded it.

The most serious drawback, however, was that the user of a subsystem would be naturally concerned only with a subset of the total system, that subset being the subsystem which produces the information he needs. If his reports are validly produced, he does not care that he has entered "garbage" into the data base that some other user might inherit. The Data Center, furthermore, because it has no control over what it does or when it does it, will not be in control of its operation and, hence, the operation of the center might tend to be wasteful and inefficient. This is particularly true in the multi-programming environment where much efficiency can be gained by careful scheduling of various job mixes.

The third mode of operation, the use of computer operators or control clerks to set up and run what was requested by the users, was deficient for some of the same reasons mentioned above—(1) The management and control of a system required an indepth knowledge of that system; it is not a part-time job, (2) interfaces between subsystems must be timely and accurately made to generate meaningful output, and (3) input
data control and computer job control must be exercised by the same group for greatest efficiency. This mode of operation, while it provided the data center with some control over its operation, was primarily mechanical with problem solving and system improvement by development personnel.

ADVANTAGES OF PRODUCTION SYSTEMS ANALYST GROUP

The incorporation of a strong support group solely dedicated to managing production information systems will solve many of these traditional operating problems. This group of Production System Analysts provides the following advantages:

1. Development personnel can devote full time to development effort.
2. User devotes full time to improving accuracy and timeliness of data content.
3. Operations—computer operators and control clerks—devote full time to improving the efficiency of the computer.
4. Central point of coordination for data and file maintenance is established.
5. System is constantly analyzed for improvement, ensuring that it meets user’s everchanging needs. Development and maintenance effort is requested as required.
6. Quick and efficient processing of data into the base and the resultant generation of documents, interconnecting dependent information subsystems as necessary, is effected.

PROBLEM OF STAFFING

Proper staffing of this group is perhaps the greatest problem encountered. The types and levels of personnel required for this group, in that the function had no precedent, has been largely experimental, but is now stabilizing itself. One key element is becoming increasingly dominant—the group should be more user-oriented than EDP-oriented. The members of the group, furthermore, must be highly motivated for they are the only bridge between company needs and the computer. It is recognized that many of the tasks performed by the group can be done by non-professional personnel if they are provided adequate documentation and guidance. However, the need for some professionals as group leaders is clearly noted, with each being responsible for several systems or subsystems. He then has the responsibility of directing the activities of the personnel assigned to him. The direction of future staffing and organization will depend upon the specific requirements to efficiently operate and manage the individual information systems. Each system, depending upon its importance, requirements, and complexity, is treated differently, with some systems requiring more or less support than others. The number of non-professional personnel and the strategic placement of the professional personnel needs to be continuously reanalyzed as new systems are implemented.

FUNCTIONS

The primary function of the Production Systems Analyst group is to manage the company data base. This broad function is interpreted to include data verification, file updating, information retrieval, file storage, and quality control.

Generally, all functions and activities can be grouped into three categories—preprocessing tasks, postprocessing tasks, and coordinating tasks.

PREPROCESSING TASKS

Preprocessing tasks consist of:

- Input data collection and verification.
- Tabulation coordination.
- Job setup.

The group provides a focal point toward which flows all data to be entered into the data base. The analyst is expected to act as a screen for all input data, sifting out that which is incomplete, not in the proper format, or unusable. Unusable data may, for example, be in the form of an I-O error on a tape, mispunched data cards, or unreadable data sheets. When input data problems are encountered, the analyst is expected to initiate corrective actions which will expeditiously result in correct data for input into the base. While he is expected to be a data expert insofar as format, he is also expected to be able to recognize invalid content in many instances. The criteria of content expertise varies with the system, but in general, where constraints can be placed on data variability, he should provide a proper screen.

Tabulation coordination includes, when necessary, the preparation and transmission of hardcopy data to the keypunch room, requesting of data card listings, input tape dumps and other associated activities of the computer room, and verifying the results of these activities. If a problem is encountered by the keypunch or computer room in a job, it is resolved, not by these operator groups contacting the user, but by the analyst.
examining the problem and determining a solution, which may include user involvement.

Job setup requires a considerable portion of a typical Production Systems Analyst’s time. It includes the determination of correct files and programs to utilize, preparation of computer operator instructions, and modification of control cards (both program control and job control). Often an analyst must obtain file information such as information content, file numbers, and file names from other personnel. This coordination of system dependencies is vital to successful data base management.

The analyst is required to know capabilities of and be able to correctly execute all programs in those systems for which he is responsible. Computer operators turn to him for the resolution of all problems with the requested work, rather than the user or the development organization. He is expected to analyze job failures and actively seek the correct solution. He may request the user to submit correct data; he may correct a control card error; or he may determine that there may be a program error. In this last case, the development or maintenance organization is notified of the problem and is provided the hardcopy documentation required for their analysis. Note that the Production Analyst does not make any program modification himself, this task being reserved for development and/or maintenance organizations. After a program correction has been made and tested by development, the Production Analyst will instate the new issue of the program into the production cycle as soon as possible. The Production Management group, however, writes utility programs to perform functions such as data listings, tape copies, and data reformatting. Also, they are expected to be experts in the preparation of Job Control Language (JCL) statements and the modification of these control cards as necessary to exercise a series of programs. The analyst is thus given considerable latitude to modify runs as the user’s needs change, as the computer operating system changes, or to enable the system to be operated more efficiently. Development support should be required only when a source program needs to be modified.

The task of job checkout includes the analysis of both job control (JCL) messages and user written, program generated diagnostic messages. JCL messages are analyzed for each job to ensure that proper and orderly execution of each program has transpired. As discussed previously, if any failures are encountered, the Production Analyst is expected to actively seek resolution, involving the user, computer operations, or the development group as necessary. The analyst requires an excellent ability to read core dumps. He is also responsible for notifying the user of any program diagnostics so that he may take corrective action. This type of diagnostic is typical of data validation and update programs, and the information usually must be quickly conveyed to the user.

Tabulation coordination includes the transmission of written instructions to computer tab operations in the data center regarding decollating, bursting, card interpreting and other similar activities.

Document review includes verification of (1) correct printing, (2) correct heading and format, (3) correct number of copies, (4) correct paper size and type, and (5) a reasonable content. Note that the user must certify that the content of all documents is correct, but nevertheless, the Production Systems Analyst is expected to measure the content of a document within the framework of the input data used to generate it prior to distributing to the user. This document review, furthermore, is not intended to be a substitute for the normal quality control procedures of the computer operations group.

Record keeping usually includes (1) a log of file names and numbers, (2) contractual documents generated, (3) date and time of runs, (4) run flowcharts, and (5) a log of problems encountered and resolutions enacted. These records become important in determining future schedules and usage forecasts but, more importantly, are critical if reruns are necessary. The contents of a data base may number several hundred reels of tape. Without correct file information, incorrect runs may be made or part of the data base may be accidently scratched. The maintenance of meaningful production run information, in summary, is possibly the most important function of this control group.

COORDINATING TASKS

Coordinating tasks consist of:

- Scheduling keypunch and computer resources.
- Forecasting keypunch and computer usage.
- Production planning.
- Establishing and properly storing system data bases.

POSTPROCESSING TASKS

Postprocessing tasks consist of:

- Job checkout.
- Tabulation coordination.
- Document review and distribution.
- Updating of production records.

From the collection of the Computer History Museum (www.computerhistory.org)
As opposed to preprocessing and postprocessing tasks which are easily definable, coordinating tasks are not so easily categorized. These tasks are performed primarily by Information Systems professionals within the group.

These persons are responsible for working jointly with the users and the computer and keypunch sections to establish schedules which will first, meet the needs of the business, and second, optimize the use of the data center’s productive resources. Schedules must be constantly analyzed for effectiveness in regard to both objectives above and modifications negotiated when needed. Forecasting of resource usage is also a responsibility of this group, in that the user is almost always too far removed from the data processing function itself to accurately forecast computer and keypunch usage. However, the analyst must obtain from the user some indication of what his projected level of activity (relative to past activity) is to be before he can project computer and keypunch resources required. This method of forecasting has been demonstrated to be extremely accurate.

Production planning activities include a continuing analysis to (1) improve the operation of the system, and (2) better meet user requirements. This analysis may include recommendations to the development organization for new programs or to the maintenance organization for modifications to existing programs. It may include the development of a new data transmittal form and subsequent instruction may be necessary to the keypunch section for efficient encoding of the data.

The data base organization, including filing and labeling procedure, must be developed. Record keeping procedures must be devised uniquely for each system, emphasizing that information which is necessary and practical.

The needs and requirements of the user must be frequently analyzed to ensure the continued relevancy of the entire system. An outdated system or subsystem is an expensive process. After a system has been in production for years, the development organization will not and should not be responsible for this analysis.

CONCLUSION

As stated in the introduction, a great challenge facing the modern business firm is development of means to harness computer technology to provide the right information to the right people at the right time. One tool which has received considerable attention in the past few years and which is now practical with the stabilization of third generation technology is an Integrated Management Information System. Nevertheless, as evidenced by a recent poll in which seventy-three percent of those responding indicated that their companies were not using computers to maximum advantage, this tool, Management Information Systems, is not working in many instances. Valid reasons for this lack of success are available as previously discussed. However, it is this writer’s contention that many systems do not develop to their potential, not because of ill-conceived design or poor programming, but rather, because of mismanagement of the system after implementation. While it may not eliminate all the problems in a system, the recognition that Management Information Systems must be managed and controlled will certainly provide many solutions.

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