

5-1973

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Recommended Citation

Burgstaller, Heinz A. and Forsyth, John D. (1973) "Key-Result Approach to Designing Management Information Systems," *Management Adviser*. Vol. 10: No. 3, Article 2.
Available at: <https://egrove.olemiss.edu/mgmtadviser/vol10/iss3/2>

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Perhaps the customary approach to designing a management information system has been all wrong. The authors report on a case where they merely asked each manager what results were vital to him and then provided the information necessary—

THE KEY-RESULT APPROACH TO DESIGNING MANAGEMENT INFORMATION SYSTEMS

by Heinz A. Burgstaller and John D. Forsyth

Queen's University

IN CONSIDERING the problem of organizing and communicating the information required to operate an organization, the president of the General Electric Company once observed:

"This deep problem of communication is not solved by providing more volume of data for all concerned, or even by faster accumulation and transmittal of conventional data, or by wider distribution of previously existing data, or through holding more conferences. Indeed, the belief that such measures will meet the communications challenge is probably one of the great fallacies in business and managerial thinking.

"What is required, instead, is a

far more penetrating and orderly study of the business in its entirety, to discover what specific information is needed at each particular position in view of the decisions to be made there."¹

Interestingly enough, this extremely perceptive remark was not made recently. It came from Ralph J. Cordiner almost two decades ago. The purpose of this article is to specifically consider the problem raised by him.

As recently as 1960, one would have been very hard pressed to find

¹ Cordiner, Ralph J., *New Frontiers for Professional Managers*, McKinsey Foundation Lecture Series, New York, McGraw-Hill Book Company, Inc., 1956.

any courses on management information systems in the curricula of universities whose programs included formal studies of management processes. While business, industry, and governmental agencies were adopting ever more complex versions of the products produced by the post-war information technology revolution, universities neglected to institute teaching and research in how to use this new technology efficiently and effectively to create management information systems. The scholarly literature, for instance, is virtually devoid of any reference to management information systems prior to the mid-1960s.

Understandably, business, industry, and government did not wait

What information should be produced by management information systems? It is this question we shall consider here. Specifically, we shall outline a method for identifying the information requirements of management. We shall indicate the difficulties and pitfalls we have experienced in actually employing this method. Finally, we shall describe a case in which this method has been successfully utilized.

until universities introduced educational activities in this field. Competitive pressures on the one hand and an infectious, imitative drive on the other prodded them to plunge ahead on their own. The number of failures was embarrassingly large because the developed information systems turned out to be very attractive technical structures with no organic life.

However, this developmental strategy, disastrous as it proved for some firms and less than satisfactory for most, was not as irrational as hindsight would tempt us to believe. The designing and installing of management information systems was seen, then, as primarily a technical problem rather than a management problem. And, as such, it was best solved by technical specialists, namely, system analysts and computer programmers. Managers were strengthened in this false belief by the sellers of computing equipment, who hid the new technology behind a formidable barrier of newly developed professional jargon while making extravagant claims and promises as to the performance of their "systems." When promised information systems did not materialize, managers realized that they had to get involved personally.

The study of management information systems is now a formal part of the educational program of most undergraduate and graduate students in business administration. In spite of such educational innovations, however, we have still failed to recognize the real problem of management information systems—the problem which leads to many failures of management information systems in practice. We have not identified or understood the kinds of information needs which are to be served by management information systems. In other words, thus far we have failed in our efforts to identify what *information is management information*. Indeed, we have not even acknowledged this as a key problem area. It is astonishing that the sentiments of Mr. Cordiner have not provoked more

concrete reactions from the business and academic communities.²

What information should be produced by management information systems? It is this question that we shall consider here. Specifically, we shall outline a method for identifying the information requirements of management. We shall also indicate the difficulties and pitfalls that we have experienced in actually employing this method. Finally, we shall describe a case in which this method has been successfully utilized.

The method, outlined below, for identifying a manager's information requirements is bound to fail. However, a consideration of the method does allow us to develop an approach which does succeed.

The Scenario: Suppose that we are members of a staff group or task force charged with the responsibility of identifying the information needs of our organization's managers.

Suppose we simply proceed with a series of face-to-face interviews with the following statements:

We are going to design and implement a management information system. Tell us what information you want.

There are at least five different negative responses that we might receive to this request. We can examine these responses by considering five "typical" managers, namely, the *Bottomless-Pit Manager*, the *Accounting Information Manager*, the *In-Basket Manager*, the *Closed-Door Manager*, and the *Mississippi Gambler*.

This examination via caricatures assists us, in turn, in developing a successful method for identifying management's information requirements.

² A recent survey of the literature on management information systems has revealed that this area is still a relatively barren land. See Salomone, Peter, "Survey of Methods for Determining Information Requirements," paper presented at the 12th American Meeting of the Institute of Management Science, October, 1971.

The Bottomless-Pit Manager:
"Tell us what information you want."

This manager responds with one word—"Everything."

He says he needs all the information we can give him. He expresses, literally, an insatiable appetite for information.

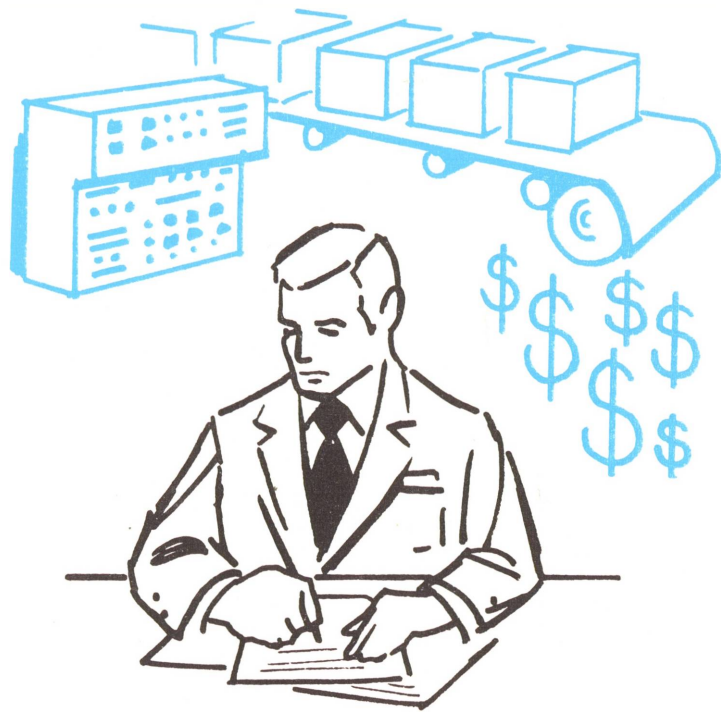
What this manager is really saying, though, is that his job is so big, so wide-ranging, so important, that he needs to know all there is to know. At the same time, he is really confessing that he cannot anticipate the requirements of his job. Moreover, he probably feels that if he were to start identifying specific information requirements he would be simultaneously specifying his perception of the limits of his responsibilities and control. The last thing this manager wants to do is to paint himself into a corner. So instead he takes a defensive position by implicitly staking out a sphere of responsibility that is wider than any human manager can hope to handle.

The Bottomless-Pit Manager wants everything, including copious quantities of information.

Of course, one has serious reservations as to what any manager could possibly do with unlimited quantities of information. If his office were to become a depository for information, a bottomless pit, he would most likely become completely surfeited with it. Information would become master of the manager. The tail would wag the dog.

The Accounting-Information Manager: "Tell us what information you want."

This manager instinctively thinks of management information as being synonymous with financial data. He sees information in terms of dollars and cents and in this vein he can be very articulate and unambiguous in identifying his information needs. He finds the prospect of having information giving the ratio of weekly labor variances to accumulated payroll expenses genuinely exciting. Unfortunately, this manager not only has a serious



There are certain well-defined types who can cause trouble in designing a workable management information system: the Bottomless-Pit manager who always wants "everything". . .

misconception of management information, but he has also lost a proper perspective of the function of a business organization.

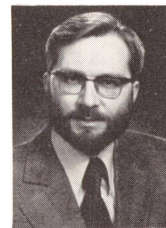
A manager who focuses on the financial data which are produced by the accounting system fails to appreciate the real processes which his authority and responsibilities embrace. He is ignoring the fact that his job involves him in the process of acquiring real resources, of transforming these into real products and services, and of promoting and distributing these outputs to consumers. The Accounting-Information Manager perceives only part of his job, and not the important part at that.

Unfortunately, financial accounting processes are so embedded in our organizations that some managers find it impossible to divorce accounting systems from information systems and to differentiate between data and information. Probably only a small fraction of any management information is apt to fit into a multi-column ledger system. And our predispositions

should not limit us to such a structure.

The In-Basket Manager: "Tell us what information you want."

This manager's reaction to our question is a conditioned reflex: he examines his "in-basket." This



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Balance Sheet



... the Accounting-Information Manager who is interested in absolutely nothing but dollars and cents and can find variances genuinely exciting . . .

manager's perception of his job, though perhaps subconscious, is that he is being paid to fight fires. And management information, to him, is any information that he needs to deal with the problems which currently occupy his "in-basket."

Such an approach to management information requirements is, of course, rather myopic. It is symptomatic of the manager's tendency to become so immersed in problems in the "in-basket" that he loses a true perspective of the purposes of management information. Furthermore, quite often this manager's information requirements consist of information having only sporadic or episodic value. Even under the best of circumstances it will be very difficult to distill genuine information needs out of fighting brush fires.

It would be informative to re-time and stage manage a second interview with this manager. Immediately prior to his return from a vacation, we might empty his "in-basket" and, then, as soon as he

returns, we could repeat our question about his information needs. Unfortunately, our question would most likely produce a functional psychotic.

The Closed-Door Manager: "Tell us what information you want."

This manager's response is just the opposite to that of the Bottomless-Pit Manager. The Closed-Door Manager asserts that he has all the information that he needs.

But, like the Bottomless-Pit Manager's response, this reply also signals defensiveness. This manager apparently believes that if he were to admit to needing more or different information he would also be confessing that he has not been performing his job satisfactorily for lack of an appropriate knowledge base. To admit to having information needs would be unthinkable.

This manager is an individual who clings to those qualifications which are acquired through experience. But even if all his present information needs, as dictated by his experience, were being satisfied, he would still fail to appreci-

ate that his job is likely to be changing as well.

Experience is a valuable asset. However, in a dynamic environment it is easy to overvalue experience and, to the extent that information needs are co-mingled with experience, it is easy to overvalue them, too. Information needs change, but not behind a "closed-door."

The Mississippi Gambler: "Tell us what information you want."

This manager will also reply that he has no additional or different information needs.

While this manager's response is the same as that of the Closed-Door Manager, his motivations are subtly different. Indeed, the reasons underpinning this manager's response provide us with an important clue as to why this direct approach to identifying a manager's information needs meets with little, if any, success.

The Mississippi Gambler plays his cards close to his chest. He simply does not care to reveal his information requirements. He looks at information as a resource from which flows a certain amount of power. Thus, the Mississippi Gambler will refuse to "tip his hand," even though it is only to reveal his information requirements, unless he can see the value in doing so. Moreover his interest and cooperation will only be obtained if he sees the benefits derived from specifying his information requirements outweighing his perceived "costs" of identifying the information requirements of his job. The Mississippi Gambler is only willing to give up some power if he expects to gain more than an offsetting amount in return.

With his guard up, the Mississippi Gambler's behavior suggests a very genuine question: "What's in it for me?" This question should have been carefully considered by the task force before they started their interviews because there is a major problem demonstrated in the approach outlined above. Walking into a manager's office and asking him what information he needs, or wants, presents him with a very difficult question. The asking of

what information is needed, or wanted, puts all the emphasis on the word "information." The focus of attention on "information" amounts to dealing with a very abstract concept; whereas information should be appreciated for what it is—a resource and, as such, a means to achieving organizational objectives. And combined with its value as a resource are the costs of acquiring and using it. Management information is not a free good.

The Accounting-Information Manager and the In-Basket Manager failed to appreciate what was meant by management information.

The Bottomless-Pit Manager and the Closed-Door Manager failed to acknowledge the "costs" associated with having too much or irrelevant management information.

The Mississippi Gambler was reluctant to discuss his information needs because he could not see any "payoff" to him for doing so.

In order to identify the information needs of these managers we should have begun by stepping backwards from that question and we should have considered, instead, *why* they need information.

Key-result areas

A manager, any individual in the management function, carries out three types of activities: He plans; He executes; He reviews. The planning activity leads into the execution activity, which leads into the review activity, which leads into the planning activity, and so on in such a manner that the activities are continuous, melding one into the other.

Does a manager need information when he plans his operations? Does a manager need information when he executes his plans? Does a manager need information when he reviews the executed plans? Obviously, the answer to each of these questions is emphatically "yes." This consideration of the management cycle leads us to a method for identifying management information requirements which we shall call the Key-Result-Areas approach.

The Scenario: Suppose, again,



... the In-Basket Manager whose first reaction is to examine his In-Basket to see what today's problems are ...

that we are members of a staff group having the responsibility for identifying the information needs of our organization's managers. An approach to identifying, successfully, these needs consists of three steps. It is interesting to note that only the final step deals with information as such.

Beginning the interview

Key-Result Areas: We could initiate each interview by asking the manager to consider for himself the following questions:

In what areas, covered by my responsibilities and authority, is performance critically important?

Where must I really perform?

Where am I "under the gun"?

These questions are designed to have the manager focus upon an area of decision making which is probably quite small. The assumption is that although every manager may be required to make many decisions, there are, in fact, only a few decisions which are critical.

The marketing manager, for example, may feel that the most im-

portant thing for him to do this year is "open up" the California market for his company's product. That is, he has to pick up a share of the market in the Los Angeles and San Francisco area. If he succeeds he has a promotion, while if he fails ... His company's success in California is a Key-Result Area for this manager.

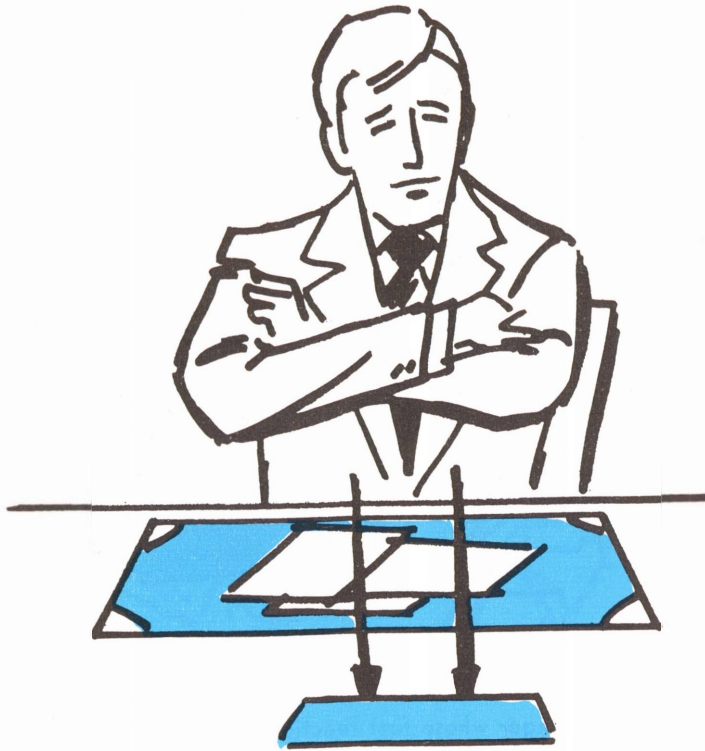
The next question

The Management Cycle: After a manager has identified his Key-Result Areas, we can then shift his attention to the following question:

With respect to those identified areas in which results are critical, what decisions are required in planning, executing, and reviewing your activities?

Here we have the manager consider the management cycle as it applies to his Key-Result Areas.

To continue our illustration, the marketing manager is asked to consider the decisions or choices he has and must make in managing his Key-Result Areas. He has to decide on a promotion plan. What adver-



. . . the Closed-Door manager who won't admit he needs any information he's not getting now . . .

tising media should he use? Should he separate the promotional activities for California from the rest of the country.

Information Requirements: The final step in this process is concerned with identifying the information requirements and can be approached by means of the following questions:

With respect to the management cycle of planning, executing, and reviewing, in those areas in which performance is critical, what classes of information do you need? That is, what kinds of knowledge would you like to have in making decisions relative to the planning activities, execution activities, and review activities?

These final questions place information in its proper perspective. In developing his promotion plans, the marketing manager needs information about his potential customers in Los Angeles and San

Francisco. He needs information about the advertising media. He needs information about the promotional activities of his competitors. This information is management information. Moreover, by following this sequence of steps, the analyst can make the manager recognize the value of information. *Information* becomes a *resource* need in the identical sense in which other resources such as money, manpower, and machines are required by the manager. Information is required in order to get results.

A case study

The Key-Result Areas approach for determining management's information requirements was recently utilized in a very large Canadian governmental organization. And the approach proved to be successful.

Seventy-eight middle and upper-level managers in the governmental organization were interviewed, us-

ing the method outlined above. These managers headed establishments located in all parts of Canada from British Columbia to Newfoundland. In most cases the establishments were heavily engaged in research and development activities.

The task force or study team conducting the interviews consisted of four men, only one of whom was a member of the Federal civil service. The other individuals were "loaned" to the Government for the purpose of the study, their usual environments being business organizations. The study team enjoyed the full and active support of the senior management of the organization. This support combined with the relative anonymity of the study team members proved to be necessary but not sufficient conditions for the success of the study.

The analysts, working in pairs, were accompanied at each interview by an experienced stenographer who made notes of the main points of the interview and prepared a typed summary of the interview the same day. This summary was then reviewed by both interviewers and used by them to prepare a set of statements describing the information requirements which had been identified during the interview. Copies of these statements of information requirements were, in turn, given to each interviewee for his verification, a very important step which was required in order to provide credibility to the study results in the eyes of senior management.

In total, the study team identified 350 information requirements for the 78 managers. Because of overlapping requirements it was, however, possible to finally condense these 350 requirements into 13 classes of key information needs. Before this step, each manager was given an opportunity to comment on the findings of the study and make suggestions concerning the distillation of these key information requirements from the 350 tentative requirements produced by the interviews. At the end of the four-month period required to complete

the study, the project team presented their findings to the senior management of the organization.

The results of the study served to underscore the importance of identifying the information requirements before developing system structures for management information. The 13 key information requirements, which the study produced, were necessarily of a broad, general nature. They covered both internal and environmental information. Moreover, because of the obvious interdependencies of the planning, executing, and reviewing activities of the managers, the key information needs were highly interrelated. But this does not mean that a monolithic, integrated, computerized management information system is necessarily the preferred vehicle for satisfying the key information requirements. Although such a system is perhaps technologically feasible, integration and computerization have steeply rising organizational costs due to the increasing system complexity and the growing dehumanization of the man-machine system. These costs were abundantly clear to the managers. Indeed, throughout its entire survey of management, the project team consciously avoided any references to computerized information systems for satisfying the needs of managers. As indicated above, the objective of the study was to identify the key information needs. That objective was met.

In closing our reference to this actual case we can add that the report of the project team was accepted by the senior management of the Government organization. And since that time, the organization has become actively engaged in the development of a number of systems to satisfy the key information needs.

Conclusion

At the outset of this discussion we considered an admonition from Ralph J. Cordiner. The Key-Result-Areas approach for identifying management's information requirements



... and the Mississippi Gambler, who plays his cards so close to his chest that he won't admit anything, won't say he either needs information or that he doesn't need it. Information, to him, is power; he is only willing to yield some of it if he can see an immediate payoff for himself.

offers a response to Mr. Cordiner's challenge.

Individual managers, not just the organization, command the spotlight in the Key-Result-Areas approach. Notwithstanding the inertial forces which tend to institutionalize decision-making in organizations, especially large organizations, individual managers ultimately make decisions. Individual managers have responsibility and control. It is the individual manager who must get results. There are critical areas of performance facing every manager. For these reasons, the Key-Result-Areas approach for identifying information needs focuses upon individual managers.

No attempt is made to capture all possible information needs but only those related to Key-Result Areas. This approach concentrates on critical areas of performance and, hence, is concerned with selecting a relatively few number of information needs. This approach then drastically reduces the complexity of the resulting information

system designed to satisfy the needs. Simultaneously, the information system remains effective in terms of the functions it is designed to serve by virtue of the fact that it relates to critical areas of performance.

The Key-Result-Areas approach is not a normative approach to management information. No attempt is made to identify information managers ought to have but, rather, this approach is pragmatic. It results in the identification of information that managers need and can use. The needs are not armchaired. The needs arise from the perspective gained in concentrating upon the decision-making process in Key-Result Areas. Moreover, managers by virtue of their involvement in identifying information needs are apt to be very receptive to having information systems designed and implemented for their use.

We conclude, ourselves, on a very pragmatic note. The Key-Result-Areas approach *works*. We have seen it utilized in one of the most difficult managerial systems—a Government organization.