ANALYZING YOUR INFORMATION NEEDS

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Abstract

The synthesis of data into "useful" and "usable" information is different for each distinct level of management in a company. The usefulness of the appropriate information is not apparent unless the presentation of the data is different for each level of management. A successful analyst must develop a general framework for the synthesis and presentation of data, and this framework should take into account the different informational needs of a heirarchical management structure in a company. This paper will attempt to present some practical guidelines of what data should be presented to each level of management. In addition, the paper will attempt to give some practical ideas of how the to effectively present the information to each level of management.

Introduction

In order to deliver a product which satisfies and keeps a customer, it is essential to thoroughly understand who it is we are servicing. Therefore, before one can develop a successful management information system, it behooves one to fully research and analyze all customer needs and requirements. The acquisition of a complete understanding of a client's needs calls for extensive research on the part of the system developer. This research requires the design to take into account:

1. The different informational needs of various levels of management.
2. The different analytical techniques that should be used on the data.
3. The various methods of information presentation that are appropriate for management.

The function of this paper is to present:

* A general overview of management structure.
* A framework for information needs.
* Some techniques for analyzing and presenting information to Management.

Management Structure

Not all customers are the same, nor are their needs alike. As a matter of fact, when it comes to the three different kinds of management activities - strategic planning, management control, and operational control - the needs are radically different. It is very important to understand that these activities are different and thus their informational needs also have to be different. Only then is it possible to construct systems which will serve the different functions of an organization properly.

In 1965, Anthony stated in his work, *Planning and Control System: A Framework for Analysis*, that management activities could be broken down into three distinct areas:

* Strategic Planning
* Management Control
* Operational Control

This first management activity - Strategic Planning - consists of the small group of high level management personnel who work on organizational goals and the long range plans of the company. In addition, this same group decides what resource allocation is necessary in order to accomplish company goals. The focus of this activity is on the objectives of the company and the means by which the company will accomplish these objectives. This activity typically resides in the upper or executive groups in a company.

The second area of management activity - Management Control - builds the teams necessary to acomplish the goals defined by the strategic planners and manages the resources that are allocated by the strategic planners. The focus of this area of management activity is the assurance of effective and efficient performance through the use of measurement and definition of policies. This activity is typically found in the middle management area of the company.

The third activity that Anthony defines is Operational Control. This actitivity focuses on the accomplishment of the specific tasks and the utilization of the resources that have been allocated to accomplish the goals of the company. Typically, this area comes under the jurisdiction of first line management personnel.

The information requirements for each of these activities is different and systems which are built to provide information to the people who are doing these functions must reflect these differences.

The requirements for the strategic planners are typically futuristic, and are derived from predictions of internal

and/or external data. In addition, strategic planners must have the ability to explore a multiplicity of angles in an environment which they can manipulate themselves. This allows them to be able to project the outcomes of many scenarios. This ad-hoc requirement, to be able to manipulate information easily, requires system design to be flexible and able to easily use complex formulas.

The informational requirements for management control is different from strategic planning. The measurement of performance and the progress towards the accomplishment of the goals set by strategic planners is the primary task of this activity. Middle management repeatedly requires periodic reports on the same information such as financial standing, personnel status and perfomance, etc. They need a stable, consistent set of performance related reports. These reports should provide an accurate and complete picture and should highlight problem areas which need their attention. The management information system should reflect not only the periodic reports but the flexibility to analyze the highlighted problems.

The third area of management activity - Operation Control - is performed by first line management in an organization. Their function is to carry out, in great detail, the specific tasks set by middle management. In short - to get the job done. The information requirements of operational control are uniquely different from the two management activities mentioned above. The majority of the informational needs of this group can be addressed by a comprehensive set of performance exception reports. These reports should be used to highlight problem areas of performance in their unit and in the company as a whole. A system designed for them should have a set of performance reports which measure the overall performance and can act as a report card.

Informational needs for management are different and it is important that systems be built which recognize this diference. It is also important to realize that although management activities are correlated, the simple aggreagation of data from one management level to another will not serve the needs of the group which was not given its unique service and analysis.

INFORMATION FRAMEWORK

In order to design a system that satisfies the end users needs, it is necessary to first create a general framework - or a set of principles - which can be used to characterize information needs. The next section of

this paper outlines a set of principles which the author has used successfully.

In 1971, Gorry and Scott Morton outlined a framework in their work *Framework for Management Information Systems*. They use the following categories to break down the informational characteristics for management system development:

1) Level of Detail
2) Accuracy
3) Type of Information
4) Frequency
5) Time Horizon
6) Source
7) Age.

Level of detail refers the bulk of material to be presented. For example - upper managemt is not interested in a thousand pages of daily information - they can either read this or do their job. Therefore, it is necessary to aggregate or summarize for them.

Accuracy has to do with exact accounts or measurements. Total accuracy is essential for first line management, but an unbiased sample is more than enough for upper management.

Type of information raises the question - qualitative or quantitative? Upper management typically wants qualitative, while first line management needs quantitative information to perform their job.

Frequency attempts to capture how often information should be presented to the user. The answer will be different for each user. For example - first line management should have daily exception reports of performance, whereas middle management should be able to judge performance on a set of weekly reports.

Time horizon indicates the difficult, yet very important, challenge of determining whether the informational need is historical or predictive. For example - first line management is only interested in yesterday's performance. The strategic planner, on the other hand, is constantly investigating predictive scenarios.

Source is determining whether the informational need is internal or external to the organization.

Age explores the relative currency of the informational need. For example - first line management requires highly current information (yesterday's), while strategic planners usually use last quarter's informational data.

These categories should each be

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examined when the system is being designed. Each level of management has a unique and different set of requirements for the above categories. The designer's responsibility lies with thorough analysis of the user's needs and efficient processing of the data into the required information.

MANAGEMENT DECISION PROCESS

Analysis of management information requires an acute understanding of the process that is used by management to make a decision. In 1960, Simon stated in his work _New Science of Management Decision_, that this process can be broken down into three fundemental steps. The first step is the data gathering step. The second step is the analysis of the data, and the development and invention of possible solutions to the problem. The final step of the process is the choice of one of the solutions. Each problem can have many possible solutions and it is the management information system designer's responsibility to provide a system flexible enough to analyze the many sides to any given event.

There are two kinds of management decisions: structured and unstructured. Structured decisions are routine and repetitive and management can usually develop a set of procedures or algorithms which are reliable when similiar events occur. This structured set of decisions has been the historical, and often the only, set that management information systems have attempted to tackle.

There is a major challenge in managerial decision making which has hitherto not been tackled by system designers.

These are the problems that can not be proceduralized and require a creative solution. These problems are typically complex and usually brand new to the decison maker. These problems are highly unstructred in their nature and there are no hard and fast algorithms in existence which can be used to solve them. Management uses their experience to solve these unpredictable problems by adhering to their rules of thumb. With the development of artificial intelligence technology and expert system methodolgy, management information systems now have the tools to begin to help management in these areas.

In a word - it is important to understand decision making and types of decisions which management encounters and uses when designing management information systems.

ANALYSIS OF DATA

Analysis can be defined as the process that transforms data into useful and usable information. Useful information is the information wanted and needed by management for problem solving. The information should be in a form that can be easily understood and used by management. The determination of what is useful and usable to management is a key part of the analytical process.

The analytical process can be broken down to two fundemental stages: the gathering stage and the thinking stage. The information gathering stage is a process involving data definition, data collection and data transformation. This is the first and basic step in trasforming data into information. However, more important is the second step - the thinking stage. This stage requires the analyst to acquire a full understanding of the problem; selection of the proper information to be given to the user; and the determination of the perspective of the information required. In analyzing data for management, the majority of the time is utilized in the first stage, but very little or no time is devoted to the second stage.

It is clear that each analysis has its own set of requirements. The analyst must have an understanding of the data, the problem, and what transformations are necessary to change data into usable information. When he does , he can provide management with what they really need, rather than what they may have perceived as their wants. This ability is acquired after many experiences of trial and error with users.

As analytical requirements of different levels of management are unique, the successful analyst must spend equal amounts of time in both the gathering and thinking stages. When he or she does this, it becomes strikingly apparent that different parts of management have entirely different thinking processes.

In the 1970's, Brahmsen developed a model which describes the various styles of thinking. He breaks down these styles into the following categories:

1) Synthesist
2) Idealist
3) Pragmatist
4) Analyst
5) Realist

Brahmsen contents that each individual has some degree of each of the five categories in his/her own thinking style. In 1980, he studied the major job categories and made some interesting correlations. (See figures 1,2,3 and 4

for a grahical representation of the findings for chief executives, physical science and math, and programmers.) It is clear from these findings that if the analyst has been trained in either the math/physical science or computer science fields that his/her thinking styles are distinctly different from the chief executive. Because of this difference and similiar differences, the analyst must be able to effectively alter the type of information presented to suit the audience. This does not mean change the results, only but change the type of information which is presented.

PRESENTATION

The art of executive presentations is one which must be mastered by anyone who wants to be a successful analyst. The successful presenter should be knowledgeable of the data,and have a good understanding of the cause and effect of the events presented. The presentation should follow a well-defined agenda and should be presented with the proper visual and tabular information. For example -executive briefings should always be limited in time and scope, and the use of graphics is essential. It should be noted, though, that research has shown that the human mind can comprehend a maximum of 7 to 8 concepts at one time under ideal conditions. Normal conditions allow for comprehesion of 3 to 4 concepts. Under a heavy stress condition, it has been shown that only one concept can be comprehended at a time. Therefore, if one is confronting a group in a crisis, the presentation of graphics, which are a two dimensional concept, is not recommended. On the other hand, it would be highly recommended that the information be presented in a positive and solution-oriented manner.

CONCLUSION

The key to analysis of information is the understanding of the user, the problem, and the data which must be used to provide the correct information. Information needs are different for various levels of management. Therefore, it is extremely important that the analyst understand these needs when he/she designs management information systems.

REFERENCES

Anthony, R.N. *Planning and Control Systems: A Framework For Analysis*. Boston, Harvard University Graduate School of Business Adminstration,1965.

Gorry, G.A. and Scott Morton, M.S. "*A Framework for Management Information Systems*," Sloan Management Review, Volume 13, Number 1. pp. 55-70.

Harrison, A.F. and Bramson, R.M. *Styles of Thinking*, unpublished research on occupational norms at University of California-Berkley.

O'Brien, J.A, *Computers in Business Management*, Homewood,Illinois, Richard D. Irwin, 1985.
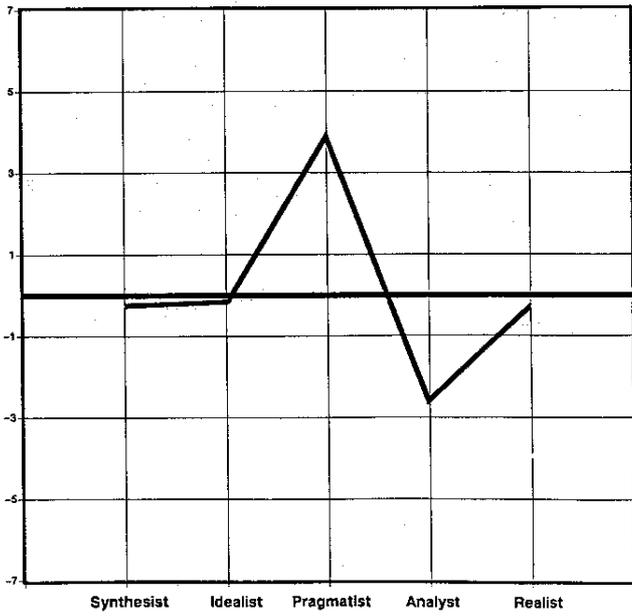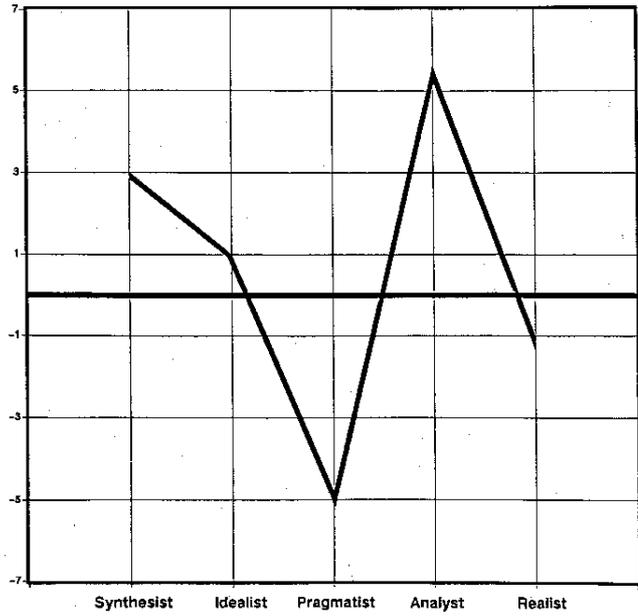
FIGURE 1

Chief Executive Officers

Synthesist   Idealist   Pragmatist   Analyst   Realist

FIGURE 2

Physical Sciences and Math

Synthesist   Idealist   Pragmatist   Analyst   Realist

FIGURE 3
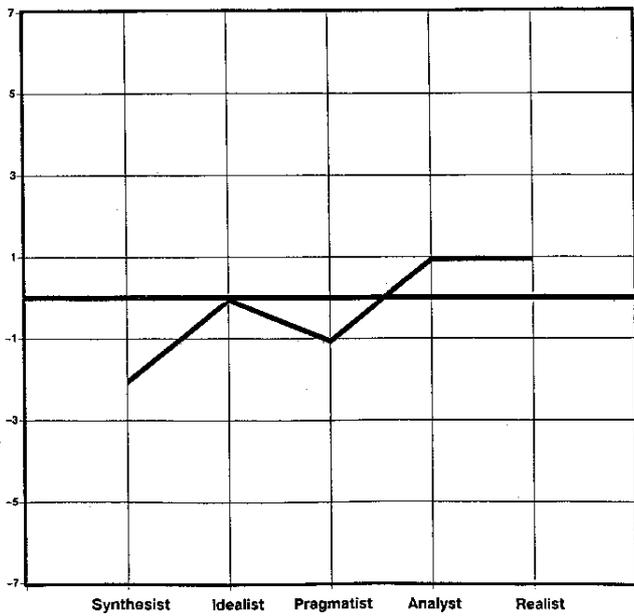
Computer Programmers

Synthesist   Idealist   Pragmatist   Analyst   Realist

FIGURE 4

Chief Executive Officers and ...

Physical Sciences
and Math

Synthesist   Idealist   Pragmatist   Analyst   Realist