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Recommended Citation
Clark, Paul Buddy (1995) "Management information systems professionals—The requirement to be true Renaissance people within the organization," Journal of International Information Management: Vol. 4 : Iss. 2 , Article 6.
Available at: https://scholarworks.lib.csusb.edu/jiim/vol4/iss2/6

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Management information systems professionals—The requirement to be true Renaissance people within the organization

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ABSTRACT

Management Information Systems (MIS) is not simply data processing, nor computer science, nor computer services, nor computer information systems, nor computer information services, nor information systems. Management Information Systems is a comprehensive, academic and business discipline requiring a knowledge of business operations as a whole, the human decision making cognitive process, plus automated processing of data into information.

This paper suggests that, as opposed to only being highly technical individuals as they are often viewed, MIS professionals must have a knowledge of various business functions and the nature of the related decision making time frames plus draw on and blend knowledge and skills originating in a number of academic areas. The paper discusses the breadth and depth of these facets.

INTRODUCTION

When asked, "What is the objective of a business organization?" many School of Business Administration students (and some faculty members) confidently state, "... to make a profit."

The dictionary definition of objective is "an end toward which efforts are directed." (Numerous sources) It logically follows that if the objective is to make a profit, once this event has occurred, there is no reason for the firm to remain in operation.

When the question is begged, the response may change to "... making a continuing stream of accounting period profits."

On one of those fortunate days that brighten the lives of those teaching in postsecondary business administration environments, someone with a puzzled look on his or her face will state, "Then, isn't the objective to ensure that the firm continues?"
Yes! The objective for the business organization is continued viability. Making a series of annual profits is just an effect of succeeding along a path toward this end, an end that can never be reached, an end that can only "not occur." The term "continuation" in relation to a private business firm rarely, if ever, includes the parameter "until."

How does the firm do this? How can "continuation" be ensured? Only by obtaining and maintaining competitive advantage, being "better" than those attempting to do the same thing for their own benefit and survival. This is the "macro" view.

The "micro" view looks at the work done by individual managers, the decision makers within the firm. The aggregate of the work done by these persons will determine the competitive level of the total organization, and therefore, whether or not competitive advantage is achieved and maintained.

As an academic discipline, Management Information Systems (MIS) is the study of the development and use of systems (computerized and other) designed to supply management information (i.e., information with which to make decisions and with which to solve problems).

MIS, in the practical sense, is that operation within the firm charged with the responsibility of delivering needed information to those whose task it is to ensure the viability of the business entity, to ensure superior decisions when measured in comparison to competition. The quantity and quality of these decisions is the measure of the individual manager's productivity.

To this end, the application of support from management information systems permeates the entire organization. The MIS professional must have knowledge of the workings of the total operation in order to communicate effectively with those charged with the responsibility of managing the various facets of the business and be able to develop and implement information system "tools" that truly assist them, the ubiquitous "users," to that end--assist them in making more and better decisions.

"Instead of arguing about the definitions of various systems, [MIS practitioners] need insight into the nature of the discipline as a whole; insight into what [they] program about; insight into nature ... the world supported by such systems." (DeGrace & Stahl, 1990, pp. 5, 8)

In this light, the exhibit presented on the next page provides a view showing MIS's academic theoretical roots. The discipline is depicted as a triangle whose apexes, sides, plus enclosed area represent components of this field of study.

Within the triangle's enclosed area, the various functions of business are partially listed (e.g., Research and Development, Finance, Personnel, etc.). Conceptually, these business functions can be considered MIS's "field of play." Though there is some obvious overlap as would be the case of manufacturing and marketing both being interested in the status of finished goods inventory, each independent function has information requirements that are unique to its own nature.
Management Information Systems (MIS) — Theoretical Roots

**MANAGEMENT ECONOMIC THEORY:**

Process of Effectively Combining Scarce Resources to Meet Some Set of Objectives

- Risk
- Reward
- Cost
- Benefit

**MANAGEMENT DECISION THEORY:**

- Problem Solving Process
  - Identify Problem
  - Analyze Problem
  - Generate Alternatives
  - Evaluate Alternatives
  - Develop Solution
  - Implement Solution

**MANAGEMENT PRACTICE THEORY:**

- Management Focus
  - Strategic
  - Tactical
  - Operational

- Business Functions
  - Finance
  - Personnel
  - Purchasing
  - Manufacturing
  - Marketing
  - Logistics
  - Accounting
  - Etc.

**INFORMATION THEORY:**

- Cognitive Domain
  - Left Brain Function
    - Logic
  - Right Brain Function
    - Creativity

**INFORMATION SYSTEMS THEORY:**

- Creating Implementing Using
  - System
  - User — Data Environment

**GENERAL SYSTEMS THEORY:**

- Input
  - Process
  - Output
  - Feedback
  - Control
  - Synergy

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Business functions' information requirements have multiple, simultaneous, time-dimensional views. In 1965, Anthony stated a taxonomy defining three categories of management focus. In the strategic view, information related to long-range goal and policy development plus resource allocation planning is required. The tactical view deals with mid-range (usually considered to be 3 to 5 years) management control issues; specifically, the acquisition and efficient utilization of resources in the accomplishment of organizational goals, implementation. The operational view is in the present tense and requires information supporting efficient and effective execution of specific currently required tasks (Anthony, 1965).

MIS's mission is to provide those charged with the above responsibilities with accurate and timely information required to deal with a spectrum beginning with today's operations and ending on the distant strategic horizon.

Therefore, those working in the field of MIS must first of all have a basic knowledge of various business functions and the nature of the related decision making time frames.

Furthermore, to effectively accomplish the task of providing needed information, the MIS professional draws on and blends knowledge and skills originating in six academic areas, management information systems' theoretical roots.

Each of the triangle's apexes represents one of the primary root disciplines: Management Economic Theory, Information Theory, and General Systems Theory.

Concurrently, the sides of the triangle represent the areas that incorporate the adjacent primary components: Management Decision Theory, Information Systems Theory, and Management Practice Theory.

MANAGEMENT ECONOMIC THEORY

In 1776, Adam Smith stated that those in management are charged with the responsibility of effectively combining scarce resources to accomplish some set of objectives (Smith, 1776). Within this regard, there are risk/reward (cost/benefit) ratios which must be considered. Management economic theory and its sibling, financial theory, results from this classical economic theory root.

Those providing MIS services must be knowledgeable of economic and financial theory and principles. They must understand that in order to be successful, their client (ultimately, the total business organization) must obtain a benefit greater than the cost from all that they do. Management information systems cannot simply be developed for the sake of developing systems. All system development projects undertaken must be able to be cost justified. There are three adjectives that can be used to describe any information system development and implementation project—good, fast, and inexpensive. When any two are present, the third usually can't be (e.g., if the project is good and fast, it won't be inexpensive, etc.)
MIS professionals must provide the requesting "user" with accurate cost estimates including all phases of the project, now and in the future—analysis, design, programming, documenting, training, implementing, and maintenance. With this type of accurate communication from MIS, the business function manager can perform time-series, cost/benefit analysis to determine if the requested information system project should be pursued.

INFORMATION THEORY

In the seventeenth century, Francis Bacon "made a classification of 'Idols' which, as idols often do, lead the mind astray" (Burton, Kimbel, & Wing, 1960, p. 210).

These 'Idols' (of the Tribe; of the Cave or Den; of the Market Place; of the Theater) precondition an individual's thought process and direct it into or along subconsciously predetermined routes based on individual environmental conditioning to the exclusion of other routes (Bacon, 1620).

This root of information theory recognizes that things have various meaning to different individuals based on other factors.

In 1948, Claude Shannon produced a classical paper "leading to the technical conceptualization of the idea of information" (Zwass, 1992, p. 24).

As a concise definition, information is any marginal difference in the results from processing data into a form that makes a difference to the information user (i.e., adds to the user's knowledge and/or understanding of the situation).

Inherent in information theory is the concept of cognitive domain which focuses on left brain versus right brain dominance in the thought process.

Edward deBono initially addressed this idea in 1970 in his advocating of management being more creative in their thought processes (deBono, 1970).

In 1976, Henry Mintzberg, in his paper entitled "Planning on the Left Side, Managing on the Right Side" supports the concept that left brain functions are analytic and logical while right brain functions are intuitive and creative (Mintzberg, 1989).

MIS understanding of information theory and the fact that output presented in a certain manner may be quality information to one individual but less useful or have no meaning to another, plus the fact that individuals have different cognitive domains, is critical to the success of the discipline's efforts.

It is the task of the MIS professional to not only determine what information the client requires but, also, to determine the best format and method to present such information to the individual.
GENERAL SYSTEMS THEORY

Albert Von Bertalanffy first proposed the concept of a general systems theory in 1950. Subsequently, the discipline has been well researched and much of the theory developed to the point of being defined as principles do to work such as that performed by Kenneth Boulding in 1956 and C. P. Snow in 1959 (Luchsinger & Dock, 1977).

The concept of a system module having input, process, output, feedback, and control is well established. The idea that all systems are comprised of subsystems plus the fact that all systems are subsystems of other systems is also in place. Likewise, the notion that the value of the whole may be greater than the value of the sum of its parts, or synergy, is understood.

In general, most MIS practitioners have a firm grasp of the basic concept of the system module. Knowledge of the broader general systems theory aids in the understanding that no individual system should be developed as a stand alone "island unto itself" functioning in a vacuum.

Maximum benefit is offered when systems are overtly developed in an open fashion allowing them to receive inputs from other systems in a flexible manner as the need arises plus be able to provide output to other systems in the same manner. This idea is at the hub of the logic behind employing object oriented programming (OOP). Individual objects are system modules which are closed as to process and data but are open to receiving input (calls) and providing output (returns) from and to other systems.

MANAGEMENT PRACTICE THEORY

Conceptually, in their effort to perform their management mission, individuals use inputs that are the outputs of decisions to plan, budget, organize, schedule, direct, coordinate, report, and control. These are the management functions inherent to all business functions whether operating at a strategic, tactical, or operational level. This is what managers do even though many cannot conceptualize the idea as such.

Knowledge and understanding of these functions allows the MIS professional to be of maximum benefit in service to the management "user" community.

It is not inconceivable to envision a manager coming to an MIS practitioner to discuss the development of a system to assist in the control of some business entity. How the practitioner approaches the problem and the resulting proposed system solution can be dramatically affected by whether or not the MIS individual recognizes that management also has responsibility for that entity's planning, budgeting, organizing, scheduling, etc. It is often possible to easily design other features into a system while it is being developed that will support additional management functions beyond the initial request. Contrarily, it is often very difficult and costly to incorporate additional functionality into a system which has previously been developed and implemented.
MANAGEMENT DECISION THEORY

In performing the mission leading to an effective combination of scarce resources to meet some set of objectives, managers must solve problems using available information.

Herbert Simon stated, "The secret of problem solving is that there is no secret. It is accomplished through complex structures of simple elements" (Mintzberg, 1989, p. 62). "... managers will find better solutions to complex problems — and therefore, make better nonprogrammed decisions — when they follow an orderly process ... The purpose of making a decision is to solve a problem, but you must analyze the problem prior to making the decision" (DuBrin, 1990, pp. 100-101).

Simon's (1965) classical decision making process follows (Simon, 1977):

1. Recognize that a problem exists
2. Identify the problem
3. Identify alternatives for solution of the problem
4. Select the 'best' set of alternatives for implementation ('best' does not imply 'optimal')
5. Implement the selected alternative set

Edward deBono takes exception to the exclusive use of such an orderly, structured process.

"In dealing with situations or problems, many things have traditionally been taken for granted or assumed. ... the restructuring of more complex patterns may prove impossible unless one breaks through" these self-imposed boundaries (deBono, 1970, p. 103).

"Man owes his success to his creativity ... Creativity involves breaking out of established patterns ... [It] is not only concerned with generating new ideas but with escaping from old ones. Continuity is the reason for survival of most ideas; not a repeated assessment of their value" (deBono, 1971, pp. 1-2).

Interestingly, a debate in the form of letters took place for a decade between Herbert Simon and Henry Mintzberg wherein Mintzberg supports the notion of utilizing both logical and creative decision techniques in combination. In an article published in 1987, Simon finally softens by stating, "There is some evidence for the very plausible hypothesis that some people, confronted with a particular problem, make more use of intuitive processes in solving it, while other people make relatively more use of analytic processes" (Mintzberg, 1989, pp. 61-67).

The importance of management decision theory to MIS is twofold. The first is related to the area of supporting clients requesting information to solve problems. Often the needed information is of an ad hoc nature. Given this, all systems development work should be approached in a manner allowing future flexibility. When given the choice and resources, systems "tools" should be chosen which provide capability in the future to meet ad hoc requests in a timely manner.
The second involves the thought expressed by deBono related to the survival of old ideas due to their not being reconsidered. To remain vibrant and provide maximum benefit, management information systems must be a dynamic discipline. Old methods of doing anything must be questioned at each opportunity to do so and, definitely, every time a client's request requires revisiting something previously developed and implemented. The basic question, "Is there a better way to do this?" must always be one of the first asked.

**INFORMATION SYSTEMS THEORY**

In the concept of information systems theory, the idea that raw data (facts) can be used as input into the hardware/software process producing information as output is fundamental.

The vast majority of present day computers used to perform this task use von Neumann architecture having a control unit, arithmetic processing unit, logic unit, memory, plus input and output facilities.

Application programs functioning within the von Neumann machine work with the provided data to produce the desired informational output.

Information systems theory deals heavily with the creation, implementation, and use of such software in the hardware environment available.

The goal is to provide the "user" the information required via a functional interface with the data and system given the current environment (Andriole, 1986).

Although listed as the sixth and last theoretical MIS root in this writing, the average management information system practitioner, if asked, is very likely to state that this is the most important area in which to have in-depth knowledge.

The management information systems professional, on the other hand, is more likely to cite a set of academic theoretical MIS roots as being equally important and, though it probably would not be excluded, may place information systems theory at a lower priority. This is probable as those charged with the responsibility for the total MIS operation within an organization fully realize that the in-depth technical knowledge and expertise needed to staff the information systems area can be hired from the general employment market.

**CONCLUSION**

Management Information Systems in organizations is a multi-disciplined function. The breadth and depth of theoretical roots involved and required is more than rich enough to argue for the elevation of MIS to a level equal to all other business functions, not subordinate to any.

MIS is not data processing, is not computer science, is not computer services, is not computer information systems, is not computer information services, and is not information services.
systems. Management Information Systems (MIS) is a comprehensive, academic and business discipline requiring a knowledge of business operations as a whole, the human decision making cognitive process, plus automated processing of data into information.

An understanding of the multi-disciplined nature of the management information systems field will aid in guiding those in colleges and universities who are charged with the task of developing curriculum, those in businesses responsible for developing professional staff training, and those in organizations responsible for MIS personnel recruitment — finding and attracting the rare, but very valuable, renaissance person.

Though MIS uses computer technology extensively to deal with the magnitude of data often present in today's organizational environments, it also teaches that there are times when the best way to generate information is in another manner, and that sometimes, the best way to deliver information is to post a note on the kitchen refrigerator door.

REFERENCES


