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Management Information Systems— Beyond the Current Paradigm

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ABSTRACT: The *Journal of Management Information Systems* will provide an integrated view of the entire discipline to both researchers and practitioners and will help communicate research and practical advances.

In order to define the focal points of the new journal, the developmental trends in MIS as a field of practice and as an academic discipline are analyzed. Support of less structured decisions under the condition of organizational dynamics is found to be of particular importance. At the same time, the environment of information delivery will be determined by cooperative computing, with the end users gaining in a large measure direct access to information.

The role of MIS as a crucial component in the evolving knowledge society is stressed. In particular, flexibility of information systems is a factor of social productivity at large.

KEY WORDS AND PHRASES: Evolution of management information systems, MIS as discipline, individualized decision support, MIS publications.

Introduction

TO INTRODUCE this new journal to serve the area of Management Information Systems, we would like to briefly consider MIS as a practical and scholarly discipline. Of course, no attempt at a complete review of the field can be made here. Rather, we will concentrate on the developmental trends and on the focal points we hope will determine the scope of the journal.

It is argued that the area of MIS is far from its maturity, if by the latter we are to understand adequate assistance of the decision-making process in management. We can expect to see the field move toward increased flexibility in support of organizational dynamics and assistance in less structured decision processes. Major environmental changes will also emerge, reflecting a closer interaction between the end user

and the information system. Further development of the field will result from the introduction of knowledge bases and partial processing of natural languages.

The purpose of the *Journal of Management Information Systems* is to provide an integrated view of this maturing, changing discipline that will meet the needs of researchers and practitioners alike.

The Role of MIS

MANAGEMENT INFORMATION SYSTEMS is a field of practical endeavor, as well as of academic inquiry, devoted to the investigation and development of information systems in support of management functions. A brief definition, in particular containing several notions whose definitions are themselves debatable, obviously would become a subject of at times heated controversy. These energies have been spent by now, though the demarcation of the new applied discipline will claim further effort. At this time hindsight tells us that we are discussing a field of some quarter-century standing in practice and a subject of academic research for more than fifteen years (see Davis [5]). In the apt phrase of Emery and Sprague, MIS is "the formalized marshalling of information to support the decision-making process" ([7], p. 6).

The recognition that information is a resource, to be managed accordingly, has far preceded, and in many respects is still ahead of, the wherewithal for such control. The recognition that integration of information flows in the organization is a paramount goal preceded any semblance of this integration to such an extent that, judging it to be a defining characteristic of the field, early on some scholars and practitioners refuted the basic premises of MIS.

Information systems now provide a principal organizing medium in any significant enterprise. What we may call the leverage of MIS is high: while a typical organization spends approximately 1.5 to 2% of its revenue on information systems (with financial companies spending far more), the variation in financial results due to the appropriate use of MIS has been judged to surpass 10 or even 20% [4].

In a larger dimension the development of MIS is a crucial component of the knowledge sector, analyzed in economic terms in the pioneering work of Machlup [9]. Providing the new form of infrastructure, this sector has played a formative role in societal development (a broad analysis of such social formation, called by him post-industrial, has been offered by Bell [2]).

In a knowledge society such as ours, approximately half of the total work-force effort is devoted to information handling. Thus social productivity is to a very significant degree tied to the effectiveness and efficiency of computerized information management. Not all is well here. Most of us realize that the promise and the full potential of MIS remain to be fulfilled.

Recent concerns about the productivity of U.S. industry led some analysts to state that the production of standardized goods, in which this country does not enjoy a competitive advantage, has to be in a large measure replaced by skill- and knowledge-intensive industries. Such "flexible-system production requires an orga-

nization designed for change and adaptability'' ([18], p. 49). Routinized information systems are an obstacle here rather than a support. When we talk about the "maturity" of information systems, we should mean maturity for sustained and goal-oriented change rather than a millenarian stasis.

A fundamental component in this development ought to be cooperation between practice and academe. The outlines of MIS as an academic discipline have been formed (see, for example, McLean and Swanson [11]); it is supported by the undergraduate and graduate curricula [17], and a growing body of research has been accumulated. The express purpose of the *Journal of Management Information Systems*, then, is to serve as a medium of communication between MIS researchers and practitioners.

Developmental Trends

THE CURRENT paradigm in organizational computing is the transition to information resource management by gaining control of this resource, essentially via database management systems. The primacy of the data element over the procedural component in information systems has been, of course, recognized for a long time. We will argue that pronounced trends already at work in the field of MIS and in its cognate disciplines of practice and scholarship demand that we look beyond this paradigm. These trends lead to the increased flexibility of information systems and to the individualization of decision support.

The environment of management information systems changes by the accretion of new modes of service and partial replacement of previous ones, rather than by a total rejection of a foregoing mode. Thus interactive computing did not entirely displace batch processing, database management does not obviate the use of files, and personal computing complements centralized service delivery. However, the availability and cost effectiveness of a new technology are enabling factors for an environmental change in MIS. It is precisely the goal of MIS to provide an environment mix appropriate for the support of various hierarchical, functional, and ultimately, individual actors in the decision-making process.

The nodal developments in the shaping of information systems are at present decision-support systems, distribution of the computing function, including personal computing, and office automation. Of course, the three are intertwined; together they lead to the delivery of ad hoc service to the individual end user. The transition from the producer-consumer (MIS department-end user) mode of information delivery to cooperative computing by the end users and MIS in their behalf is also taking place.

Compatibility between the system and the end user (often termed, all too inclusively, user friendliness) is of crucial import. Here the appropriate interfaces (e.g., graphics, icons, windowing, etc.) are only a superficial tenet. Compatibility of semantic domains between the individual users or user groups and the system, or system adaptability to the cognitive styles of its users, is what is actually required.

Systems for decision support will have to acquire these capabilities.

It needs to be stressed that we do not mean anything like the total formalization of decision-making. The concern lies rather in determining the nature of adequate support for management functions. Following the early work of Simon [20], the distinction has been drawn between programmed decisions and nonprogrammed ones, better described as structured and unstructured decisions. The first type lends itself to an algorithmic approach, and thus to full computerization; the second requires what has been thought of as uniquely human insight. It is valuable to recognize that the decision-making process actually spans a spectrum of elements ranging between the two.

Decision support systems as we know them today are a step in the direction of actually supporting the entire process of decision-making. In their present form these systems are only the beginning of a long path. Personalized status reports, early warning subsystems, and support of group decision-making can be expected to come rather soon. Support for less formal decisions will be slower in coming.

The unreasonable early hopes for a total computerization of information flows have been replaced by a recognition that "information problems do not necessarily require information systems" (Earl and Hopwood [6]). Indeed, taken in a broader perspective, informal relationships and decision-making processes "produce much of the background social capital without which . . . major institutions of society could not function nearly as effectively as they do" (Sowell [21], p. 30).

However, the axis of development in MIS points from the processes that were considered supportable by formalized information systems to ones that early on were not judged to be such. The current factor is, of course, the adoption of artificial intelligence approaches, in particular expert systems, and systems for the partial understanding of natural languages. In both cases the essence is knowledge representation coupled with an inference subsystem. The crucial component that would have to be put in place for the well-known and would-be paradigmatic Japanese Fifth Generation Computer Systems Project to succeed is indeed what is hopefully called knowledge engineering [13].

The pervasiveness, mode of delivery, and degree of control over information systems in organizations have been evolving continually. An influential theory of this growth comes from Nolan. Originally encompassing four stages of a sigmoid growth curve terminating in integration [15], later extension [16] brought two additional stages, to terminate this growth in "maturity." The importance of this theory appears to lie in the determination of the preconditions for a takeoff into sustained growth rather than the description of the features of a mature MIS (such as, for example, technology benchmarks or the composition of the application portfolio specified in [16]). The nature of MIS maturity remains to be determined. Systems operating at the knowledge level, postulated by Newell [14], or even approximating this mode of operation, would create a novel environment altogether.

Indeed, the future should bring systems adaptable to the cognitive styles of individuals. Only such systems can be truly supportive of the decision-making process, with its very significant individual variations (Benbasat and Taylor [3]).

The need for such individualization is pointed up by the investigation reported in the paper by Grudnitski in the present issue. Nomothetic (to borrow a term from the description of sciences) systems, that is, systems serving the broad category of "average" users, will not disappear, of course. As said before, MIS develops by accretion. An idiographic system for decision support, grounded in a knowledge base (where most of the information is inferred rather than stored, as it is in a database), a part of which will be user profiles, will come close to a true support of thinking and learning.

Therefore the present decision-support metaphor is only the beginning of the process of MIS deroutinization. Specialized, and later individualized, channels of information will go further than prevention of information overload or user friendliness. The goal is a symbiotic relationship between the individual manager in some situations, or a group of decision-makers in other circumstances, and the information system.

The Journal and the Field of MIS

MANAGEMENT INFORMATION SYSTEMS is an eclectic discipline. Reflecting roughly the agents involved—user, developer, and the organization, as well as the nexus of their relationship, the information system itself—the discipline lies at the confluence of several established fields of study. This fact is, in turn, reflected by the research and publication activity in the field.

Thus the human component of MIS is the object of studies by behavioral sciences, the technological component—by computer science, and the organizational component—by management sciences. These are the referent disciplines undergirding the relatively new discipline of MIS. In particular, structural similarity and large overlaps of concern exist between MIS and computer science [22].

For a long time research interest in the field concentrated in the area of organizational analysis. A number of important and well-known conceptual studies resulted, to create the currently operative conceptual framework (for a general discussion, see, for example, [1]).

Recently a large measure of attention, and rightly so, has been given to the investigation of both the active (as a producer) and passive (as a consumer) behavior of the end user (the studies of Rockart and Flannery [18] and Marcus [10] are of note) and to empirical studies of the environment. Such studies are of importance at the current stage of MIS evolution, and it is hoped they will be represented in this journal. From the foregoing look at the developmental trends of MIS, one may conclude that cognitive science has a significant contribution to make to the future of the discipline.

The development of information systems, of paramount concern to the largest segment of practitioners, has not been satisfactorily covered by the existing publications in the field.

After a careful look at the scene, we discovered a need for a new journal devoted explicitly to MIS research (research reported by Hamilton and Blake [13] seconds this conclusion). The *Journal of Management Information Systems* has been designed to respond to this requirement.

As an independent refereed publication, *JMIS* is intended to provide a forum for research and for communication of practical advances in the development of information systems. It will serve those investigating new modes of information delivery and the changing landscape of information policy making, as well as practitioners and executives developing and managing the information resource.

The journal will accept research, technique, case study, survey, and tutorial submissions in the entire field of MIS, aiming to provide an integrated view of the area.

The following is a sample of issues which present themselves as important at the current stage of MIS evolution:

- integration of information system planning into general business plans;
- the human element in organizational computing;
- decision-support systems;
- systems development methodologies, automation of systems development, prototyping;
- artificial intelligence approaches in MIS;
- management of technological evolution in information delivery;
- integration of office automation and personal computing into MIS;
- end-user involvement in the information system development process;
- MIS control techniques.

This Issue of *JMIS*

THE INTENDED scope of the journal is to an extent illustrated by the present issue.

As we said above, it is expected that MIS will evolve toward meeting the individual cognitive styles and critical success factors of individual users. Gary Grudnitski presents a methodology for ascertaining the principal requirements of individual decision-makers vis-à-vis an information system.

“One cannot really use ‘facts’ unless they are accompanied by information on how to use them,” noted Marvin Minsky and Seymour Papert [12]. This line is pursued in the paper by David Maier, where a scheme is offered for the inclusion of semantic data in databases: an original step toward knowledge bases. Semantic enrichment of databases is also the content of the Matthias Jarke–Jacob Shalev piece: their goal is to develop a system architecture founded on domain-specific databases, supported by generalized services for transaction processing.

Abe Lockman and Naftaly Minsky, drawing on a powerful protection mechanism developed by them within the computer science paradigm, offer a general control and auditing mechanism for information systems. Their work is an excellent illustration of the importance of computer science in MIS research.

James Cox and Steven Clark analyze in some detail the information systems for manufacturing resource planning, a crucial, though often neglected, MIS variety. Responsive MRP systems are paramount in raising the quality of decision-making in manufacturing, thus contributing to overall industrial productivity growth.

The workmanlike paper by Morton Norman and Amador Muriel substantiates the oft-repeated but seldom exercised proposition that customized productivity tools are within the reach of every development project.

The papers to appear in the forthcoming issues investigate, among other topics, such problems as the relationship between organization size and the use of information systems (with rather surprising results), design of distributed databases for decision support, and integrated planning of information systems.

As does any journal, we will depend on the cooperation of readers, contributors, referees, and the editorial board. We hope that all of us will be rewarded in the process.

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