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Management Information Education

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Abstract

According to the development of IT(information technology), it is one of the recent focused topics how to utilize IT in business scenes. And the concept of "Management Informatics", which includes how to utilize information technology in order to solve the managerial problems faced with, has been born recently. The discipline is quite newly advocated, however, there are more than twenty university departments on management informatics in japan.

It is our standpoint that it is necessary at first to characterize management informatics as a discipline if we consider a curriculum of it. In this paper, we first characterize management informatics in comparison with other related discisplines including management, information science and industrial engineering. Then we provide a framework to construct a curriculum of management informatics based on our characterization.

1 Introduction

According to the development of IT(information technology), it is one of the recent focused topics how to utilize IT in business scenes. And the concept of "Management Informatics", which includes how to utilize information technology in order to solve the managerial problems faced with, has been born recently. The discipline is quite newly advocated, however, there are more than twenty university departments on management informatics in japan. And the chance of education for the discipline is getting increased rapidly even in industries.

With this background, there are several SIG(special interest group)s that study on the curricula on management informatics or information systems in the world as well we in japan[1, 2, 3].

It is our standpoint that it is necessary at first to characterize management informatics as a discipline if we consider a curriculum of it. In this paper, we first characterize management informatics in comparison with other related discisplines including management, information science and industrial engineering. Then we provide a framework to construct a curriculum of management informatics based on our characterization. Finally, we will propose a model curriculum on management informatics.

2 From Control To Support

It is said that the twentyth century can be named by "the century of control". In this context, the concept of "control" is that of scientific management by Taylor. That is, it is how to control units in order to achieve the overall objective and it denotes the superiority of the whole to individual parts.

On the contrary, the first characteristic of management informatics is that the concept of "support" is at the central position in the discipline while the concept of control is now at the position in the traditional management science. It is needless to say that the quality of the products made in japan gets better and is accepted in the world owing to the success of quality control and production control. And the success of the control paradigm represented by those practical activity is of course the backborn of our industries in our country.

Though the concept of control gives us success from the viewpoint of overall objective for it includes the superiority of the whole to individual parts, it often obstructs us to show originality and creativity. We cannot organize our society if each individual insists his own right and freedom. In this sense, the concept of control is at the opposite side of freedom and originality and it is incompatible with the concept of creativity. Adding that, we human beings lose our motivation if we feel to be under control.

Recently it is necessary for the companies to have the method ology to extract originality and motivations from their members so as to survive in such a chaotic social situation. Therefore we shift our attention from control to support for individuals to show their originality and their own ability. One of the target of support is information usage and therefore management informatics should intend to approach not in the way of the traditional control science but of the support science.

3 From Tacit Knowledge To Articulable Knowledge

According to the information paradigm in organization theory, the central issue in business activity is problem solving. Therefore it is quite important how to formulate problematic situation into an explicit problem which can be solved.

According to figure 1, the traditional management can be considered as a discipline focusing on the tacit knowledge or knowledge which may not be the object of being processed by computers. On the contrary, we point out that formalization is the second characteristic of management informatics. Formalization is necessary in order to link problem solving with information technology including computers and it also important to design some artificial constructs based on the knowledge obtained in management informatics. That is, it is necessary to generalize experience obtained in several types of information technology utilization in different business scenes and formulate it as public knowledge. It is of course true that knowledge on systems including human activity cannot become as public knowledge in real sense, we should proceed our research towards to organize knowledge in order to design something based on them. The suggestion by IFIP/BCS also insists on the importance on formalization and abstraction[1].

The word, "design", here is of course used to imply to design some artificial constructs including organization systems as well as information systems. That is, formalization is necessary to construct basic blocks for concrete/abstract artificial

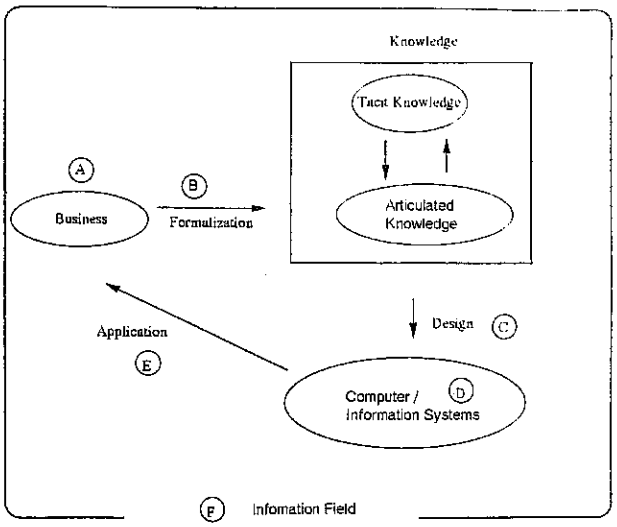

Figure 1: Overview of Management Informatics

Then what methodology is appropriate to formalize knowledge in management informatics in order to construct public knowledge in the discipline. Of course we have several alternatives. In this paper, we propose a formal approach taken in mathematical systems theory. The approach is to formulate the hidden structure of phenomena with set theoretical notions and abstract mathematics. It is clear that the concept of "structure" and "homomorphisms" between them are one of main topics in systems theory from its origin. And the concept of structure is also a philosophical characteristic in this century as found in linguistics, cultural anthropology, phonetics, mathematics and so on. The concept of structure can be defined in several ways. In mathematics, it is defined as "an object which consists of underlying sets with operations and predicates defined on them".

In traditional natural science, especially physics, formalization is done with analysis and so called continuous mathematics. While we consider that it is appropriate to use discrete mathematics in the formalization in management informatics. An example of formalization using discrete mathematics is formal specification on information system design. It is an approach to describe specification of information systems by set theoretical notions in order to reduce ambiguity and bury the gap between users and systems designer in the stage of requirement analysis. And we also can verify and validate the design using the concept of logical proof.

The example shows the usefulness of formalization to link information technology to problem solving. And another aspect of formalization which generalizes knowledge obtained in management informatics should also be mentioned. For example, game theoretical approach to organizational structure can be classified into this category.

According to this argument, the second characteristic of management informatics is formalization of phenomena or experience from the viewpoint of strucuture. It is of cource needless to say that the results obtained in the theoretical or formalized world should be interpreted into the real world so as to solve a real wolrd problem.

4 From System Side To User Side

The target of information science may be considered as a research focused on the representation and utilization of information from the viewpoint of computer and/or information technology(hardware and software). While the main target of management informatics is on the formalization of semi-structured or unformalized problematic situation and how to solve the formulated problems and utilize the results obtained by information processing.

According to the waterfall model(life cycle approach) in software development, management informatics mainly focused on the upper part in the lifecycle, that is, analysis of business and construction of a specification of information systems appropriate to the analyzed system. In this sense, we propose user oriented approach as the third characteristic of management informatics.

Traditionally, usage of information technology is discussed mainly from the side of computer software and hardware. It is , however, necessary to discuss it from the view point of how our problems to be solved. And we consider management informatics is the discipline responsible for it.

5 Framework for Education

Based on the three characteristics of management informatics mentioned in earlier sections, we next provide a framework of a curriculum of management informatics. According to figure 1, we can divide the area covered by management informatics into the following categories.

1. Management
2. Formalization
3. Design and Problem Solving
4. Computers and Information Systems
5. Business Application

In the above categories, the following topics can be considered appropriate in education.

1. **Management**
   - (a) Principles of Management
   - (b) Accounting and Finance
   - (c) Micro and Macroeconomics
   - (d) Marketing
   - (e) Civil and Commercial Law
   - (f) Business Policy
   - (g) Production and Operations Management
2. **Formalization**
   - (a) Modelling and Decision Systems
     - Modelling and Simulation
     - Data Analysis
     - Managerial Statistics
     - Operations Research

- Mathematical Programming
- Decision Analysis

(b) Systems Thinking

- Systems Philosophy
- Systems Approach
- Soft Systems Methodology
- Systems Theory

3. **Design and Problem Solving**

   (a) Systems Analysis and Design

   (b) Information Systems Development

   (c) Algorithms

   (d) Formal Specifications

   (e) Programming Concepts

4. **Computers and Information Systems**

   (a) Management Information Systems

   (b) Software Engineering

   (c) Fundamentals of Computer Systems

   (d) Business Database Systems

   (e) Decision Support Systems

   (f) Expert Systems and Artificial Intelligence

5. **Business Applications**

   (a) Information Systems for Management

   (b) Implementation Theory

   (c) Managing Organizational Behaviour

   (d) Strategic Use of Information Technology

6. **Information Field**

   (a) International Business Transaction

   (b) Information Ethics

   (c) Public Policy

   (d) Sociology

The above list is not an exhaustive one and it is necessary to arrange them systematically.

6 Conclusion

As information technology has been penetrated in business organization, the structure of organizations and society change and a new paradigm for management is needed. The mission of management informatics for our society is to provide a new paradigm for our society by reconsidering the traditional way of management from "information" as a key concept.

In this paper, we characterized management infromatics from the three points in comparison with other related disciplines such as industrial engineering, management and information science. The three characteristics are as follows:

1. from control to support
2. from tacit knowledge to articulable knowledge
3. from system side to user side

Based on the characteristics, we proposed a framework for a curriculum of management informatics.

This paper is based on the discussion in the SIG on the curricula of management informatics in JASMIN(the japan society of management information). We are grateful to the members of the SIG.

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