Chapter 1.13
Taxonomies of Knowledge

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INTRODUCTION

Knowledge management has become a major application of information technology (IT) and a major focus of IT research. Thus, it becomes increasingly important to understand the nature of the knowledge object and knowledge engineering processes. The assumption underlying this article is that in order for knowledge to be managed by technological means, it must first be represented in the relevant technology. As Sowa (1999) puts it:

Knowledge engineering can…be defined as the branch of engineering that analyzes knowledge about some subject and transforms it to a computable form for some purpose.

The purpose assumed here is the management of knowledge for organizational aims. The other key term is "analyzes knowledge"; to analyze an object, one must first describe it, and taxonomies are intended to facilitate description and analysis. A useful analogy is that of taxonomies of living creatures which employ multiple characteristics such as size, number of legs, blood temperature, and many more to assign specimens to categories.

As different kinds of knowledge require different modes of representation, taxonomy becomes the central link between knowledge engineering and knowledge management. For example, accounting data are represented as data records; routine manipulation of the data is performed employing accounting knowledge embedded in programs. Organizational use of accounting data may be mediated by expert systems, which are generally realized as a special form of rule-based programs. Thus, in order to effectively design a knowledge management system, one must first classify the types of knowledge to be embedded in it. Hence the importance of a taxonomy of knowledge. A definition of knowledge is itself knowledge; thus, this article deals essentially with knowledge about knowledge—that is, meta-knowledge.

Knowledge is a highly multidimensional phenomenon and can be studied from many points of

view. Thus, Sowa's (1999) book titled Knowledge Representation is subtitled Logical, Philosophical, and Computational Foundations. The approach taken here is largely a computational one, since knowledge management is generally discussed, though not necessarily in the context of computer-based systems. Given a computerized knowledge management system, questions also arise of eliciting the knowledge to be embedded in the system; some of these are also addressed here.

BACKGROUND

Attempting to understand the nature of knowledge has been a major theme of philosophical enquiry for thousands of years. Thus, Aristotle (384-322 BC) argued that knowledge objects are made accessible to thought by assigning them to categories. This approach still underlies much of knowledge management in specific areas. It applies especially to library classification systems—for example, The Dewey Decimal Classification (Dewey et al., 2003) for organizing all published knowledge. The classic Yahoo search engine was based on the same principle.

However, not all knowledge management relates to knowledge by content area; many other classifications are possible, and it is the purpose of this article to elaborate those. Because of the multidimensionality of knowledge, many taxonomies are possible. A well-known attempt to

Table 1. Knowledge taxonomies and examples (Alavi & Leidner, 2001)

Knowledge Types	Definitions	Examples
Tacit	Knowledge is rooted in actions, experience, and involvement in specific context	Best means of dealing with specific customer
Cognitive tacit:	Mental models	Individual's belief on cause- effect relationships
Technical tacit:	Know-how applicable to specific work	Surgery skills
Explicit	Articulated, generalized knowledge	Knowledge of major customers in a region
Individual	Created by and inherent in the individual	Insights gained from completed project
Social	Created by and inherent in collective actions of a group	Norms for inter-group communication
Declarative	Know-about	What drug is appropriate for an illness
Procedural	Know-how	How to administer a particular drug
Causal	Know-why	Understanding why the drug works
Conditional	Know-when	Understanding when to prescribe the drug
Relational	Know-with	Understanding how the drug interacts with other drugs
Pragmatic	Useful knowledge for an organization	Best practices, business frameworks, project experiences, engineering drawings, market reports