Chapter 3
Types and Examples of Knowledge Models

Gilbert Paquette
LICEF Research Center, Canada

ABSTRACT

- Basis for a Classification of Models
- Factual Systems
- Conceptual Systems
  - Taxonomies
  - Component-based systems
  - Hybrid conceptual systems
- Procedural Systems
  - Sequential procedures
  - Parallel procedures
  - Iterative procedures
- Prescriptive Systems
  - Definitions, standards, and constraints
  - Laws and theories
  - Decision Trees
  - Control structure of processes
- Processes and Methods
  - Processes
  - Methods and Techniques
  - Collaborative systems

With only a few object and link types, it is possible to construct representations of complex knowledge systems such as the taxonomies, theories, processes, or methodologies used to describe various fields of knowledge. In this chapter, we will present a taxonomy of knowledge models and provide examples of each model type. Our goal is to demonstrate the generality of the MOT representation system by modeling a wide variety of situations usually modeled by other representations, or in some cases, not at all. In so doing, we will develop a library of models from which designers can choose to adapt

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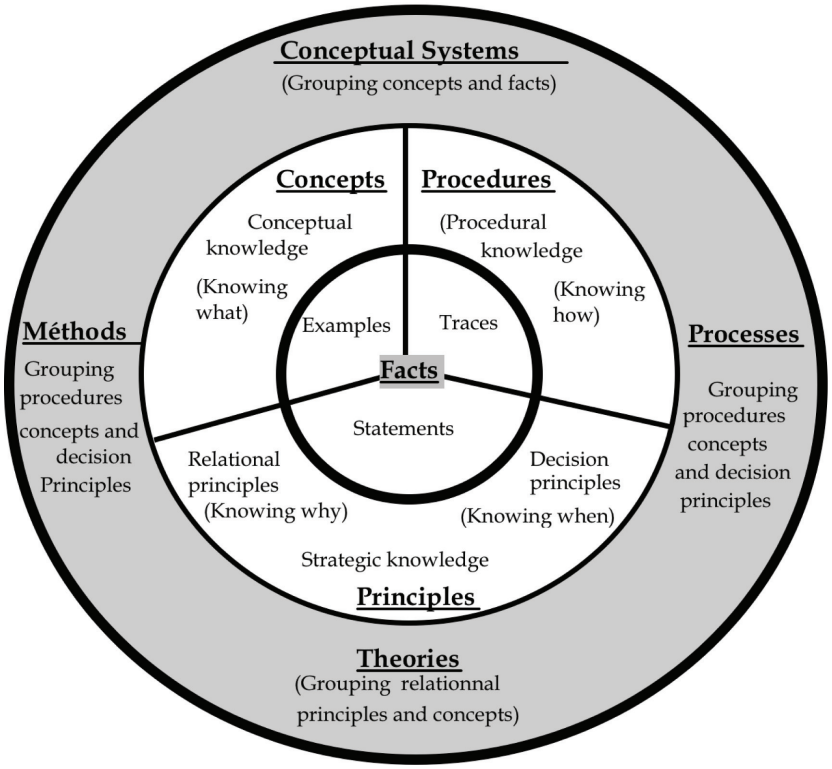
Figure 1. Taxonomy of knowledge: Facts and abstract knowledge



to their own areas of concern.

3.1 BASIS FOR A CLASSIFICATION OF MODELS

A representation system using object types can be used to model a diversity of knowledge systems far greater than the few examples presented so far. The basic knowledge types (concepts, procedures, and principles) and the three fact types can be combined into increasingly complex systems of structured knowledge.

Complex Knowledge Models

Figure 1 identifies four types of composite systems—conceptual systems, theories, processes, and methods—which can be found in all areas of knowledge and to which we can give precise meanings and representations within a classification of knowledge models.

Conceptual systems consist of a relatively large number of concepts connected through a semantic network. Each concept possesses a number of attributes that are themselves connected through links of generalization, composition, etc.

Conceptual system can be found in all fields of knowledge. In the natural sciences, Linnaeus's taxonomy of plants, though now abandoned, is a well-known example, as are his descriptions of thousands of animal species. In human physiology, the major body systems (respiratory, cardiovascular, skeletal, muscular, and hormonal) their components, and their interrelationships are conceptual systems. In science, the classification and description of three-dimensional solids, the periodic table of chemical elements, and the