Chapter 25
Medical Practical Knowledge Circulation Based on Purpose–Oriented Service Modeling

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ABSTRACT

This chapter presents a method of obtaining practical medical knowledge toward supporting on-the-job training that is related to the quality of medical service implementations or service-providing activities from medical experts in clinical-pathway design activities. First, an interview methodology for the acquisition of practical knowledge is presented based on goal-oriented service task modeling. Next, a method of externalizing the intentions of medical service designers is described.

1. INTRODUCTION

Knowledge engineering is widely expected to serve as a basic support technology for both the intelligence cycle and value creation. In this chapter, the author shows a new system to support practical-knowledge circulation to convey medical information and knowledge with respect to individual patient conditions where medical professionals provide medical services (hereafter "practical knowledge"), as an application of knowledge engineering for medical services.

High-quality medical services require implicit knowledge. This practical knowledge is developed and shared through work practice. In addition, high-quality medical services need the sharing of a sense of worth with service stakeholders. A study on the Mayo clinic by Berry articulates reasons for the importance of a shared sense of worth. The health-care services are labor-intensive. Case-by-case services, which are humane and kind, are largely attributable to the discretionary efforts of staff members. The services come not from external instruction but from the sense of worth

of each medical staff member (Berry and Seltman, 2008); this sense of worth is also cultivated through work practice.

In recent years, information technologies such as medical records systems have begun to penetrate into hospitals, and the technologies are expected to support practical-knowledge sharing on the medical front.

On the other hand, the introduction of information technologies can sometimes be detrimental to knowledge circulation. Brown (Brown and Duguid, 2000) asserted that the cause of the problems arising from new information technology is that the application of these technologies are designed focusing only on information that should be processed, while not considering social resources such as communities and organization. Furthermore, Norman noted, "Technology is not neutral. Each technology has properties– affordances–that make it easier to do some activities, harder to do others," and, "Each technology poses a mind-set, a way of thinking about it and the activities to which it is relevant, a mind-set that soon pervades those touched by it, often unwittingly, often unwillingly. It impacts upon the thought patterns of those who use it, and upon all of society. Technology is not neutral; it dominates." (Norman, 1993)

Hence, if we develop support systems for the sharing of practical knowledge, we need to foster a deep understanding about how practical knowledge is shared on the job and what issues arise due to such sharing.

Ontological engineering (Mizoguchi, 2004) has some features that are effective in meeting these needs. Ontology is understood to serve as a kernel theory and as building blocks for content-oriented research. Gruber gives the definition:

Ontologies are agreements about shared conceptualizations. Shared conceptualizations include conceptual frameworks for modeling domain knowledge; content-specific protocols for communication among inter-operating agents; and agreements about the representation of particular domain theories. In the knowledge-sharing context, ontologies are specified in the form of definitions of representational vocabulary (Gruber, 1992).

Mizoguchi also provides a definition:

An ontology is an explicit specification of objects and relations in the target world intended to share in a community and to use for building a model of the target world.

We can enjoy several merits from ontology. Those benefits are a common vocabulary, explication of what has often been left implicit, systematization of knowledge, standardization, and meta-model functionality (Mizoguchi, 2004).

The author focuses on the meta-model functionality. There are several previous studies that are examples of this ontology usage. An organizational learning theory has been ontologized and used as a meta-model in a knowledge-management support system (Hayashi, 2002). In this research, the ontology gives a reference model to design the system's functions, such as the identification of meaningful events, to understand the progress of the knowledge-sharing process. In other research, the concept "function" of artifact is defined as an ontology (Kitamura et al., 2004), and the ontology gives consistent descriptions in CAD systems. Prior to this research, there was some confusion in descriptions of function knowledge between "function" and the "way of function achievement." The research identified these two concepts and provided a consistent way to describe the function knowledge of artifacts. These works show the effectiveness of the meta-model functionality of ontologies.

In this chapter, the first part is about the practical-knowledge acquisition interview based on goal-oriented service task modeling. In the second part, a method to externalize the sense of value of medical service designers (or medical experts) is described.

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