

Chapter 10

A Conceptual Model of a Knowledge Warehouse

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ABSTRACT

A firm's capability to transfer its existing knowledge to various stakeholders and translate knowledge into action determines its success in today's volatile global business environment. However, while many firms systematically manage data and information, managing knowledge remains a controversial issue. One of the reasons for this is inconclusiveness about what knowledge is and whether it can be managed. In order to more precisely define knowledge and its management, a knowledge warehouse conceptual model (KW-CM) is proposed for practically and systematically assimilating of knowledge within organizational business processes. This conceptual model integrates aspects of knowledge that encompass business processes, stakeholders and other organizational information systems within the existing data warehouse (DW) conceptual model. In addition, the paper presents a formal architecture, definitions and guidelines that describe the KW components and processes for leveraging data and information into knowledge. The proposed KW-CM is demonstrated with an example of a DW which handles information regarding customer product usage.

INTRODUCTION

Both data warehouse (DW) and knowledge management (KM) facilitate decision-making processes. The DW makes it possible to carry out complex analyses of organizational transactions in order to provide decision makers with analyzed

information (Rizzi, 2007) while KM efforts are directed toward solutions that support decision-making processes. In addition, KM can provide organizational resources (Holsapple, 2001) to enhance decision-making processes and facilitate decision-sharing of decentralized strategic decisions taken by autonomous managers. These steps allow the organization to be more responsive to a volatile environment (Nicolas, 2004). In this

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regard, understanding the different aspects of information and knowledge is important, particularly in light of globalization, ubiquitous computing, and prevailing knowledge-centric views of the firm (Prusak, 2001). However, the distinction between knowledge and information is not always clear and frequently both are discussed as if they were one and the same thing.

“Knowledge management has inspired a shift from a transaction to a distributed knowledge management (DKM) perspective on inter-organizational information processing. [...] Each player in the network acquires specific knowledge from other players for decision support.” (Pedersen & Larsen, 2001, p. 139).

According to Stenmark (2002), knowledge is considered tacit while information is explicit and tangible. Knowledge practices involve reasoning about information and data for leveraging performance, problem-solving, decision-making, learning and teaching (Adamson & Venerable, 1998). In my proposed DW conceptual model I adopt Newell’s argument (1981):

“If a system has (and can use) a data structure which can be said to represent something (an object, a procedure, whatever), then the system itself can also be said to have knowledge, namely the knowledge embodied in that representation about that thing.” (p. 2)

Prusak (2001) claims that one of the challenges facing organizations today is managing knowledge that cannot be digitized, codified, or easily distributed. The DW conceptual model that is presented in this paper also deals with a decision-maker interface on a collaborative information technology that might connect various stakeholders during decision-making processes and foster sharing that kind of knowledge, that resemble tacit knowledge of decision makers.

This paper focuses on integrating KM perspectives within existing DW conceptual modeling methodologies, which deal mainly with operational information. Considerable research into DW systems is being carried out and major theories about DW design methodologies are being developed (e.g. Adamson & Venerable, 1998; Giorgini et al., 2005; Guo et al., 2006; Holten, 2003; and Kerschberg, 2001). However, research into KM systems has not yet evolved sufficiently to have developed systematic, sustained design methodologies, particularly in regard to applying knowledge aspects into information systems (IS) (Jongho et al., 2006). In this paper I present a methodology for modeling a KW, encompassing KM in relation to stakeholders, business processes and various organizational IS.

The paper is organized as follows: in section 2 the theoretical background of KM, DW, and the linkage between the disciplines are discussed. In section 3, the KW concept is presented, followed by its conceptual modeling entitled Knowledge Warehouse – Conceptual Modeling (KW-CM) in section 4. Finally, section 5 concludes and discusses future research directions. Throughout the paper the KW-CM concepts are demonstrated with a DW example which handles information regarding customer product usage.

BACKGROUND

The nature of knowledge and its representation have long been studied in the field of Artificial Intelligence (AI). Newell (2002), for example, realized that a structured symbolic form cannot solely represent knowledge; knowledge requires both structure and process representations. In addition, although knowledge is an abstract concept, a particular “piece” or “facet” of knowledge must be coupled with some formal level of representation to create a sufficiently viable view to justify regarding it as belonging to the knowledge level. In this spirit, the proposed KW-CM exhibits the

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