Integrated Modeling

Thomas Hädrich
Martin-Luther-University Halle-Wittenberg, Germany

Ronald Maier
Martin-Luther-University Halle-Wittenberg, Germany

INTRODUCTION

Modeling is a key task in order to analyze, understand, and improve business processes and organizational structures, and to support the design, implementation, and management of information and communication technologies in general and knowledge management systems (KMSs) in particular. Process-oriented knowledge management (Maier, 2004; Maier & Remus, 2003) is a promising approach to provide the missing link between knowledge management (KM) and business strategy, and to bridge the gap between the human-oriented and technology-oriented views (e.g., Hansen, Nohria, & Tierney, 1999; Zack, 1999). However, existing modeling approaches for business processes, including their extensions for KM, still lack concepts to support knowledge work, which is often unstructured, creative, and learning and communication intensive. Recently, the activity theory has been proposed to provide concepts to analyze knowledge work (e.g., Blackler, 1995), but it has not yet been integrated with business process modeling for designing KM initiatives and KMSs. The following sections analyze the characteristics of knowledge work, distinguish important perspectives for modeling in KM, and discuss extensions of process modeling approaches including activity modeling. Then, the process-oriented and the activity-oriented perspectives on knowledge work are compared and connected by means of the concept of knowledge stance.

BACKGROUND

Knowledge work can be characterized by a high degree of variety and exceptions, strong communication needs, weakly structured processes, an increasing importance on teamwork in the form of project teams, networks, and communities, and it requires a high level of skill and expertise. Inputs and outputs of knowledge work are primarily data, information, or knowledge. Knowledge comprises observations that have been meaningfully organized and embedded in a context through experience, communication, or inference that an actor uses to interpret situations and to accomplish tasks (based on Maier, 2004). Knowledge work consists of a number of specific practices, for example, expressing or extracting experiences, monitoring, translating, and networking (Schulze, 2003).

From an ICT perspective, the main changes in the requirements posed by knowledge work occur due to the considerably higher complexity of data and the focus on organization-wide and interorganizational communication, cooperation, and mobility of knowledge workers. The storage, handling, and sharing of semistructured data require additional ICT systems, such as document , content, and knowledge management systems. Modeling has focused largely on data (entity relationship modeling), objects and classes (object-oriented modeling), and business processes (business process modeling). Knowledge work requires content-, user-, and communication-oriented modeling techniques that show what persons, communities, topics, tools, rules, and other activities and processes are involved, and thus demands concepts and modeling techniques that extend business process modeling to cover these aspects.

PERSPECTIVES FOR MODELING IN KM

Models are representations of a selected portion of the perceived reality of an individual or a group of observers. The design of KM initiatives requires modeling concepts for (a) processes that describe the organizational design, that is, knowledge tasks, flows, roles, and resources, (b) persons by capturing facts about people, that is, their skills, communication, and cooperation in networks and communities, (c) products, that is, the type of knowledge, structures, taxonomies, ontologies, and metadata, and (d) productivity tools, that is, the architecture, functions, and interaction of ICT tools in support of KM (see Figure 1).

A large number of modeling approaches, methods, and techniques have been developed in the literature (e.g., Balzert, 2001). Each of these approaches predominantly focuses on one of the dimensions in Figure 1. For pro-

Figure 1. Perspectives for modeling in knowledge management (based on Maier, 2004)
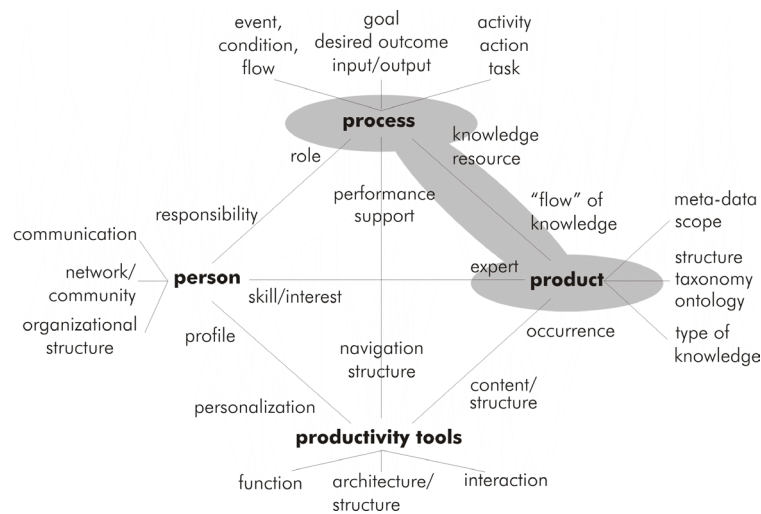
cess-oriented KM, concepts are needed that combine process modeling with the other perspectives, especially with knowledge products and the knowledge-intensive tasks being part of knowledge work.

In recent years, many organizations have applied concepts of business process reengineering (e.g., Davenport, 1993; Hammer & Champy, 1993), and a number of methods and techniques to support business process modeling have been proposed in the literature. Approaches for process modeling distinguish between three levels of granularity that are interconnected: (a) Value chains (Porter, 1985) arrange value-adding activities, (b) business processes connect functions, and (c) work flows orchestrate tasks. As process modeling is a complex task that requires computer support in order to be an economically feasible approach, most methods are applied with the help of a corresponding tool. Examples are ADONIS (Junginger, Kühn, Strobl, & Karagiannis, 2000), ARIS (Scheer, 2001), IEM (Heisig, 2002; Spur, Mertins, & Jochem, 1996), MEMO (Frank, 2002), PROMET (Österle, 1995), SOM (Ferstl & Sinz, 1994), UML-based process modeling (Oestereich, Weiss, Schröder, Weilkiens, & Lenhard, 2003), and the IDEF family of modeling methods (http://www.idef.com). Moreover, there is a number of frameworks and reference models for the definition of work flows that implement business processes (see, e.g., Kumar & Zhao, 1999; WfMC, 2001). The methods differ in formality, semantic richness, and understandability.

Recently, a number of authors have proposed extensions that model (some of) the specifics of KM. Examples are the extensions to ARIS (Allweyer, 1998), PROMET®I-NET (Bach & Österle, 2000; Kaiser & Vogler, 1999), GPO-WM (Heisig, 2002), KMDL

(Gronau, 2003), Knowledge MEMO (Schauer, 2004), and PROMOTE (Hinkelmann, Karagiannis, & Telesko, 2002; Karagiannis & Woitsch, 2003). The main extensions are the introduction of additional object types like knowledge objects, that is, topics of interest, documented knowledge, individual employees, and skills, as well as the introduction of model types like knowledge structure diagrams, communication diagrams, and knowledge maps. More detailed aspects of knowledge-intensive tasks have been implemented in tools for flexible workflow management (Goesmann, 2002). Examples are Bramble (Blumenthal & Nutt, 1995), KnowMore (Abecker, Bernardi, Hinkelmann, Kühn, & Sintek, 1998), MILOS (Maurer & Dellen, 1998, WorkBrain (Wargitsch, Wewers, & Theisinger, 1998), and Workware (Carlsen & Jorgensen, 1998).

The extensions can be classified according to whether they target the abstract level of KM-related organizational design, for example, ARIS and GPO-WM, or whether they target the detailed level of KM-related work flows, for example, PROMOTE and tools for flexible workflow management. None of the extensions provides concepts to model all four perspectives of persons, process, product, and productivity tools, and particularly their relationships. The added concepts describe a portion of the context of knowledge work, but they are not suited to model the often unstructured and creative learning and knowledge practices and their links to business processes.

For example, in the case of ARIS, the added object types "documented knowledge" and "knowledge category," as well as the model types "knowledge structure diagram," "knowledge map," and "communication diagram," give a rough impression of the knowledge needed

6 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/integrated-modeling/16958

Related Content

Optimizing Project Management Outcomes: Role of Strategies, Communication, and Technology Adoption With Reference to the Hotel Industry
Guldana Zhakupbekova, Ardak Turginbayevaand Laura Ashirbekova (2024). *International Journal of Knowledge Management (pp. 1-20).*
www.irma-international.org/article/optimizing-project-management-outcomes/356494

Knowledge Management for Healthcare: Using Information and Communication Technologies for Decision Making
Rajeev K. Bali, A. N. Dwivediand R.N.G. Naguib (2008). *Knowledge Management: Concepts, Methodologies, Tools, and Applications (pp. 1903-1917).*
www.irma-international.org/chapter/knowledge-management-healthcare/25230

Outsourcing, Knowledge, and Learning: A Critical Review
Ingi Runar Edvardssonand Susanne Durst (2017). *International Journal of Knowledge-Based Organizations (pp. 13-26).*
www.irma-international.org/article/outsourcing-knowledge-and-learning/176915

What Difference Does It Make: Measuring Returns of Knowledge Management
Abdus Sattar Chaudhry (2008). *Knowledge Management: Concepts, Methodologies, Tools, and Applications (pp. 2907-2918).*
www.irma-international.org/chapter/difference-does-make/25307

Information Quality in Participatory Systems: The Case of Abu Dhabi
Ahmed Bin Touqand Anthony Ijeh (2017). *International Journal of Knowledge-Based Organizations (pp. 19-31).*
www.irma-international.org/article/information-quality-in-participatory-systems/188497