Modeling Knowledge Intensive Processes: Concepts, Methods, and Applications

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As we move further into the information age, knowledge is increasingly becoming a critical component in the competitive success of firms. As markets shift, technologies proliferate, competitors multiply and products acquire rapid obsolescence, successful companies rely on their ability to consistently create new knowledge, disseminate it quickly, and embody it in new products and services. As firms shift from a product centric form to a knowledge centric form, it becomes essential to support various dimensions of knowledge as a critical asset.

This is the second year of the minitrack. The minitrack focuses on process knowledge, i.e., the processes involved in developing models, artifacts and decisions in complex organizational problem solving. This includes research on the concepts, rationale and methods that underlie the effective capture and dissemination of process knowledge. Our objective in organizing the minitrack is to provide a continuing forum for emerging research on process knowledge, with particular emphasis on how diverse aspects of the problem can be integrated.

Generally speaking, research on process knowledge is quite fragmented, and has primarily focused on tools and techniques for the capture and use of design rationale in software development. However, researchers are increasingly converging on multiple facets of the problem, e.g., models for capturing and retaining implicit knowledge or organizational incentives for the creation and use process knowledge. In selecting papers for this year’s minitrack, we have attempted to encourage this aspect. Of the five papers accepted for this year’s minitrack, two focus on methodologies. Two papers describe applications. The fifth paper deals with the problem of managerial incentives for capturing and disseminating process knowledge.

In their paper, Lévine and Pomerol argue that problem of managing knowledge in a firm, particularly for design tasks, is closely linked with models of the firm. Their paper proposes a methodology titled Approach Based on Contract (ABC) that takes the contract of the firm with its clients as the starting point. The overall contact is progressively disaggregated to the level of the Design Team. The disaggregation is accomplished through a combination of top-down and bottom-up approaches. The exposition of the methodology is formal, and its principal utility lies in facilitating the management of knowledge in the firm.

Massey et al also propose a methodology, but in a considerably more specific context: the front-end of new product development. The quality of front-end analysis is critical to the development of new products. However, the analysis is usually characterized by lack of structure, and is often not managed well. The methodology, titled Performance Centered Design (PCD), seeks to provide structure to the front-end through the simultaneous structuring and development of processes and implementation techniques. The functioning of the methodology is illustrated through a case study.

The paper by Jarke et al focuses on information brokering in information-rich domains. The twin challenges of such domains are, on the one hand, an overload of information, and on the other hand, the need to access quality information for effective decision making. Their solution is to propose a shell for structuring knowledge contextualized to the needs of the user. The shell provides personalization of information structures and user interfaces. The utility of the shell is illustrated through two applications. The first application manages knowledge about research programs, and the second enables companies to monitor the web pages of competitors, suppliers and customers.

Sniezek et al also describe a system for a very different application. Their domain of interest is in decision making during crises. Since crises are rare, it is difficult for decision makers to obtain expertise through experience. Moreover, decisions during crises are made under conditions of acute stress. In order to deal with these challenges, the authors propose a trainer for ship damage control. The trainer has three components: a simulator for scenario generation, an immersive multimedia interface for replicating decision overload, and a critiquing expert system for real-time and post-session feedback on performance. Experimental results show that the trainer incorporates realism suitable for allowing trainees to practice.

Surysekar and Ramesh focus on the problem of incentives for knowledge workers. Based on a review of accounting and economic literature on managerial incentives as well as empirical studies, the authors identify hypotheses and recommendations for structuring incentives. They also discuss mechanisms for implementing the incentive structures in the context of process knowledge.