Chapter 55
Knowledge in Innovation Processes

Marco Paukert
Fraunhofer Institut für Integrierte Publikations–und Informationssysteme, Germany

Claudia Niederée
Fraunhofer Institut für Integrierte Publikations–und Informationssysteme, Germany

Matthias Hemmje
FernUniversität Hagen, Germany

Category: Organizational Aspects of Knowledge Management

INTRODUCTION

The success of industrial and scientific research has always been dependent on new discoveries and innovations, but tighter budgets and increasing global competition push the pace with which innovation must happen nowadays. Bringing new products to the market before competitors do constitutes a crucial competitive advantage for many companies and organizations. Accelerating discovery and innovation is increasingly dependent on the use of advanced information and knowledge technology for building environments that support the innovation process systematically and efficiently (cf. Specht, Beckmann, & Amelingmeyer, 2002; Amidon, 2002). Such environments depend on a number of advanced knowledge management technologies and have to adapt to the wide variety of innovative practices, innovation cultures, organizational context, and application areas where innovation takes place. It is essential that the functionalities of such are aligned with the needs of innovators and their context.

Innovation starts with an adequate identification of goals including an appropriate problem description and ends with the successful exploitation of the problem solution. Therefore, innovation is understood as dealing with complex problem-solving processes in whose activities knowledge of different types is applied and created. Systematic support of innovation processes requires efficient management of knowledge with respect to activities like acquisition, creation, enrichment, retrieval, reuse, and combination of such knowledge.

DOI: 10.4018/978-1-59904-931-1.ch055

When taking a closer look at innovation activities in different areas, a common core innovation process can be identified that consists of six overlapping but distinguishable phases. The specific characteristics of the innovation process imply an innovation-specific, multi-stage knowledge lifecycle and knowledge management support that reflects the dependency on the innovation environment and the characteristics of the innovation process.

BACKGROUND

Innovation is the successful exploitation of new ideas which can be products or processes. It happens in the scientific domain (development of new scientific approaches, theories, methodologies, etc.) and organizations (new products, processes, marketing campaigns, etc.). Innovation is used by many scientific disciplines in many different shades. Nevertheless the core understanding of innovation can be identified as mentioned above (cf. Specht et al., 2002; Rogers, 1998; OECD, 1997).

Independent of the domain, innovation is a knowledge-intensive process. This means that proper knowledge management is necessary to support the innovation process successfully. To achieve a basis for this, a knowledge lifecycle model can be applied as a means of supporting externalization and application of innovation process and resource knowledge while following the general baseline of all approaches of knowledge management that knowledge is more useful if it does not reside in the minds of individuals, but is applied and made available to others (c.f. Alavi & Leidner, 1999), and that this is even crucial for the creation of new knowledge (Borghoff & Pareschi, 1998; Spiegler, 2000). Revisiting KM theory, several models for knowledge flow and knowledge lifecycles have been proposed that capture the dynamics of knowledge, its transformation and relationship to the respective application context (e.g., Nonaka & Takeuchi, 1995; Borghoff & Pareschi, 1998; Fischer & Ostwald, 2001). In the case of this article, the specific application context in the focus of our work is innovation processes. Therefore, the knowledge lifecycle model discussed here focuses on the specific needs of innovators with regards to managing their innovation resources in an appropriate way. The research work in which this model was developed was almost entirely performed in the context of the European project INNOVANET (IST-2001-38422).

Innovations lead to problem solutions which can differ in the degree of novelty of the solution and the amount of change implied. The terminology of TRIZ (Theory of Inventive Problem Solving, an algorithmic approach for solving difficult technical and technological problems) suggests five levels of innovation (Shulyak, 1977). This ranges from small evolutionary changes implementing improvements of existing systems or products on the lowest level to revolutionary changes on the highest level that offer solutions outside the confines of contemporary scientific knowledge. As discussed later, the partition into an evolutionary and a revolutionary type of innovation has an important impact on the activities in the knowledge lifecycle and on adequate process support.

In the remainder of this article, the innovation knowledge lifecycle model is introduced and framed as a representation medium supporting a conceptual basis for externalization, management, and optimization of application of knowledge and knowledge resources in the context of innovation processes. The model is based on a thorough study of the state of the art in both innovation management and knowledge management theory. Within this article, an innovation-focused approach to represent and apply a knowledge management methodology is implemented. However, readers can also benefit from the general discussion around the proposed view of knowledge management activities and practices, while considering innovation as one contextual condition within which