

# Chapter VI

## Improved Experience Transfer by Semantic Work Support

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### INTRODUCTION

Active Knowledge Support for Integrated Operations (AKSIO) is a work process-enabled knowledge management system that supports experience transfer in operations of offshore oilfields. The system provides timely and contextual knowledge for work processes. Experience reports are processed and annotated by experts and linked to various resources and specialist knowledge networks. The system allows retrieval of experience reports through the support of a domain ontology. Core functionality of the system is provided by careful application of Semantic Web technology, including ontology-based annotation and contextual ontology-driven retrieval of content. The purpose of this chapter is to demonstrate how Semantic Web technology is an effective enabler of improved knowledge management processes in corporate environments.

### KNOWLEDGE MANAGEMENT IN THE DIGITAL OIL FIELD

The international oil and gas industry has long recognized the critical importance for their industry of effective Knowledge Management (KM). KM is the discipline that establishes processes and tools for capture, assessment, preservation, reuse, and improvement of knowledge and experience that matter for the value creating capabilities of the organization. Economic as well as safety-related issues mandate strict attention to KM in the industry, in order to “not make the same costly error twice.”

Industry actors have been pioneers in applying advanced IT to support KM. For example, British Petroleum developed a “holistic model” for KM integrating work processes, social networks, and knowledge repositories (Collison & Parcell, 2005), and most other major oil companies have

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run similar KM programs. Still, KM challenges have not been solved in a generally satisfactory manner. Remaining challenges (to be explored in more detail later) include:

- Unsystematic and insufficient registration and quality assurance of new experience, in spite of an overabundance of information
- Lack of common terms for discussing and describing experience, hindering meaningful experience transfer
- Insufficient tools to search for relevant experience, due to the two factors above as well as limits of current technology
- Inadequate linking of “tacit” and “explicit” knowledge, that is, between social networks and IT-supported knowledge bases

The net result of not properly addressing those issues is that the industry suffers losses every year due to the lack of solid support for experience transfer. It is hard to quantify those losses, but most observers agree that they are substantial. In most cases, local experience transfer at a team or group level occurs satisfactorily. However, interdepartmental and cross/interorganizational KM is largely insufficient and in many cases nonexistent.

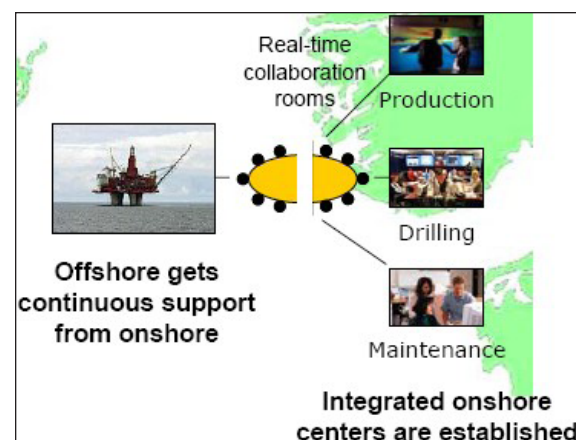
AKSIO, the system that is the topic of this chapter, attempts to meet some of the challenges above (Fjellheim & Norheim, 2006). Of course, not all KM issues can be solved by addressing those issues—there are other parameters of a more non-technical nature, such as work load, uneven competence levels, and so forth. However, by specifically tackling the challenges listed, AKSIO is able to make a significant contribution. Its use context is the Norwegian oil company Statoil-Hydro, the largest operator on the Norwegian Continental Shelf (80% of the production). Norway is the world’s third largest exporter of crude oil (ca. 3 million barrels/day or 4% of the world’s oil production), The petroleum resources are located in the North Sea, a challenging environment for oil

and gas production with harsh climatic conditions, resources located at deeper water depths than in most other oil regions, and so forth.

Oil companies have deployed advanced technology to increase output and reduce cost under the general heading of “the Digital Oil Field.” The latest twist of the ongoing technology development is the concept of *Integrated Operations* (Langeland, 2007). In IO, the offshore oil platforms are connected by high-speed data links to on-shore control centers, where multidisciplinary teams collaborate to optimize operations and rapidly solve any problems, see *Figure 1*. The ultimate goal of IO is to maximize value created from petroleum resources, which can only be ensured by a continuous stream of right decisions made at the right time.

Through massive use of IT for online monitoring, analysis, and decision tasks, knowledge transfer within projects are satisfactory, but still fail between projects, resulting in costly repeated failures. In the drilling process, downtime costs around \$1 - \$2 million day, which calls for systems that focus on knowledge-enabled work processes, and use of semantic technologies to facilitate reuse of knowledge from the drilling process. Appropriate and timely knowledge has to be presented to decision-making processes both in planning and subsequent drilling operations.

Figure 1. Integrated operations



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