AAPG International Conference
Barcelona, Spain
September 21-24, 2003

Michael J.V. Suana[1], Joost C. Herweijer[2], Simon R. McGuire[2] (1) updip - ep consultancy, CH-5201 Brugg, Switzerland (2) ReservoirTeam Ltd, Rundle Mall / South Australia, Australia

Process Based Knowledge Management: Key to Effective Value Delivery

In recent years many industries, including EP, have begun to recognise the importance of people and (associated) knowledge as a strategic resource and a primary factor of production. Driven by ever increasing competitiveness on both, regional and global scales, it transpires that effective leverage of organisational knowledge is becoming as much a key success factor as managing capital, natural and human resources. A survey of CEO's attending the World Economic Forum 1999 found that 97 percent of senior executives see knowledge management as a critical issue for their organisations (Abramson, 1999).

The growing focus on knowledge management is leveraged by rapidly advancing information technology and, more importantly, driven by fundamental structural change and transformation towards information driven organisations (Drucker, 1988). Information and knowledge organisations are composed of specialists who direct and discipline their own performance by turning data into relevant information through knowledge. Such learning organisations are typically more agile and responsive to change compared to traditional command and control systems, where knowledge is more associated with hierarchy. Providing systems, which leverage personal and organisational knowledge is therefore critical for building competitive advantage (Daft, 2001).

This paper focuses on knowledge management in the EP industry, particularly on how process or work flow based knowledge management approaches add value in the context of exploration and production development planning projects. Such projects are the basis for significant investment decisions which can result in considerable technical, financial, commercial and often also in environmental risk exposure. Getting it wrong, or even suboptimal in the planning phase, will not only impact adversely on the project, it will eventually find its reflection also on the corporate bottom line. Hence, not knowing what could have been known prior to an important investment decision has simply become unaffordable.

EP Business Case

Multidisciplinary project teams are expected to deliver technically sound, economically robust and commercially competitive investments proposals in the shortest time frame possible. From a project management point there are two value driving knowledge aspects to be considered: (1) knowledge relating to the deliverable, e.g. how sound, robust and competitive is a given field development plan per se, and (2) work process related knowledge, i.e. how efficiently and at what cost has the deliverable been produced, how competitive is the project team itself?

One business requirement is to ensure that all relevant and up-to-date project related knowledge residing within (and outside) an organisation, in whatever form, flows into the project and is also adequately processed. At the core lies the challenge of identifying, accessing, selecting and using key knowledge which includes also non-technical aspects. What needs to be known to accomplish the task? What explicit (documented) knowledge exists? Who carries important tacit knowledge? Which is best practice? What are known pitfalls and where are key learnings?

Another requirement is efficient achievement of the set tasks. How quickly and with what degree of thoroughness is relevant knowledge accessed and processed? How can paralysis by analysis, unnecessary trial and error or reinventing the wheel be avoided? How quickly can a project be set up? How are workflow and task interdependencies structured? How does the team collaborate and interact with other knowledge reservoirs in the organisation? What is

the vulnerability to staff rotation and how is the resulting risk of knowledge leakage mitigated? How quickly can a project be closed out and new knowledge be fed back into the corporate knowledge system?

A further business requirement is to capture and retain organisational knowledge. As a result of a much increased reliance on contractor knowledge as well as the foreseeable demographically induced experience and knowledge drain (retiring baby boom generation) require companies to develop appropriate knowledge management strategies.

Approaches to Knowledge Management

Many companies have developed their own knowledge management systems and/or draw from a fast growing number of commercially available solutions. The observed approaches to knowledge management can be broadly grouped into two categories, namely 'people-to-documents' and 'people-to-people' strategies (Hansen, Nohria and Tierney, 1999).

The first approach deals primarily with the management of explicit knowledge. The corresponding knowledge management strategy is to provide high quality, reliable and fast electronic information systems which collect, codify, store and disseminate documented knowledge for reuse anywhere within the organisation. This approach, which relies on data warehousing, knowledge mapping and electronic library mechanisms, requires investment in sophisticated information technology systems.

The key advantage of 'people to document' approaches is the effective capture of knowledge, as individuals are encouraged to turn tacit personal knowledge into explicit organisational knowledge for consumption by the community. A drawback is that such approaches require also cultural change. Since knowledge gives power to people there is a natural tendency to hoard rather than to share knowledge (Daft, 2001). An important challenge is how to codify and interlink knowledge documents to avoid a 'Google' effect, i.e. the return of too much or too little information, respectively.

The 'people to people' approach, in contrast, focuses on leveraging tacit knowledge by connecting people face-to - face or through interactive media. The strategy is to develop networks for linking people such that tacit knowledge can be shared and individual expertise sought to gain advice. Information technology is primarily there to support and facilitate conversation. Mechanisms for knowledge sharing typically include dialogue, story telling, framing workshops, peer reviews and communities of disciplines / practice.

The key advantage of 'people to people' approaches is that it leverages tacit knowledge, which is difficult to capture in an explicit form. This includes professional insights, judgment, rules of thumb, intuition and understanding and the raising subtle issues which tend not to be formally documented. 'People to people' approaches are powerful because they allow to draw efficiently and effectively from a collective brain and to build new knowledge on the spot. Although much of the tacit knowledge sharing happens ad hoc a lot of it is actually explicitly written down through the use of E-rooms, intranet fora, emails and other informal means. A drawback is, that for the community as a whole, much of the developed knowledge becomes practically irretrievable once discussions are closed out. The tacit knowledge, though shared in pockets, remains largely tacit and will be lost upon departure of its carriers.

It is evident that both approaches are complementary and likely to add most value when applied in combination. This drives a trend towards 'informatizing' tacit knowledge management approaches. Sophisticated software, designed to automatically harvest knowledge of both worlds for subsequent integration into complex data repository systems is finding increasing demand (Kontzer, 2003).

The Case for a Process Based Knowledge Management Approach

From an information management point of view the development of information storage and retrieval software is fully justified and necessary. However, it is argued that the fundamental problem of being instantaneously presented with key knowledge exactly where and when it is needed in a working process, is not adequately resolved. This is a key deficiency of many knowledge management strategies, approaches and systems.

Experience shows, that project teams, confronted with a considerable effort to gather knowledge in conjunction with

pressure to deliver timely, tend to choose to draw primarily from personal expertise and experience of its team members and their immediate knowledge vicinity. However, for all knowledge that may exist in such a relatively small group, it will always represent only a subset of the potential knowledge base that exists within an organisation. As such this bears the intrinsic risk of introducing error, incompleteness as well as inefficiencies. The tendency for doing 'your own thing' appears to increase the more empowered and self managed a team is and the less corporate guidance there is.

Corporations are aware of this issue. The response is a strong trend towards establishing standardised work processes and best practices and the control mechanisms that project teams adhere to it. At this point, it is important to realise that such standardised work flows, processes and best practices are nothing but condensed corporate knowledge and as such strategic corporate assets.

This leads to the conclusion that knowledge is better associated with work process management rather than with data management systems. In such a work and results oriented approach, the owners and administrators of knowledge are the experts themselves, organised in discipline communities, whose responsibility it is to ensure that relevant and up to date knowledge flows continuously into established best practice work flows and processes.

Structural Concept

The underlying concept of a process based knowledge management system is to modularly build multidisciplinary work processes from basic components, i.e. discipline based building blocks. The purpose of the building blocks, also referred to as knowledge nodes, is to act as principal reservoirs for knowledge associated with the specific task in question. These can contain explicit knowledge such as best practice instructions, risks, pitfalls, learning from previous experience and possible opportunities to be aware of as well as links leading to sources and carriers of tacit knowledge associated with the task.

Under such concept the overall knowledge management goal for each discipline, which reflects the collective brain for a certain field of expertise, is to build and maintain an entire set of knowledge nodes. This results in a suite of discipline knowledge trees, which can be amended with regional knowledge trees, entailing specific knowledge pertinent to geographic areas of expertise and / or process knowledge trees embracing critical project management knowledge.

The rationale for such a modular knowledge base is to provide the capability to build work flow plans maps for new projects or to modify active project plans with minimal effort. The concept is that by 'clicking and dragging' knowledge nodes from shared knowledge trees into a specific project map this will result also in dragging along the associated knowledge. Hence, when project team members arrive to a specific work task they will be automatically prompted with the appropriate knowledge and the assurance to accomplish the task well by leveraging available organisational knowledge.

Documentation Centre

In addition to their knowledge reservoir role, knowledge nodes act also as recipients of project documentation of any kind and nature. This may include narratives and supporting working files, which are tagged and codified for appropriate storage and retrieval in a supporting data and documentation management system of choice. The captured information puts the overall work flow related activities into context and, moreover, in a reproducible manner. In addition to providing an audit trail, it also reduces vulnerability to staff rotation significantly.

Collaboration Platform

The IT application supporting a process based knowledge management system provides also an open platform for team collaboration and knowledge sharing. Team members can oversee the entire work process, progress and status at anytime and simultaneously. This facilitates interdisciplinary work, especially when addressing project tasks which require collaboration among and contributions from various disciplines.

Work Efficiency

The capability of constructing virtually any workflow from pre-existing shared knowledge building blocks reduces project set up to times and prevents repetitive inefficiencies significantly. Furthermore, the nodal structure allows and encourages on-the-fly reporting directly into knowledge nodes following preset formatting. In conjunction with automated contents selection and reporting features such an approach results in considerably reduced final reporting and project close-out time. Interface capabilities with commonly used office, project management as well as scientific applications further enhance work efficiency.

Knowledge Recycling

From an active knowledge management perspective the most important feature is perhaps the concept of feeding back newly created knowledge into the same work flow (knowledge) nodes. New knowledge is created by applying existing information and knowledge to new project work. Team members have the opportunity to alert, formulate, tag and codify new insight and to feed it back into to system. Such knowledge, though entered through an active project specific knowledge node, will be available to the concerned discipline community as a whole through incorporation into the shared knowledge trees. This ensures that new knowledge is brought to place of use almost instantaneously.

Conclusion

Many existing knowledge management initiatives disregard the importance of associating knowledge with work flows and best practice processes in comprehensive and flexible way. A key deficiency of many systems is that they fail to deliver relevant and only relevant knowledge at the right place in the right time. This results in a tendency to under-exploit collective knowledge existing in an organisation. The discussed process based knowledge management concept addresses such key requirements effectively. It automatically prompts and simultaneously provides the opportunity to consume and to feed back knowledge when and where it is needed and created, respectively. In conjunction with the discussed work efficiency enhancement, the value contribution of process based knowledge management approach is self evident.