

# Knowledge Management - an Approach Tailored to Knowledge-based Organizations

**Roy Page-Shipp,**

CSIR, P O Box 395, Pretoria, South Africa

e-mail: rpshipp@csir.co.za

## Abstract

The focus of much of the current development in Knowledge Management is on extracting knowledge from the normal operations of the organization. This may take the form of a range of actions, from intelligent analysis of the processing of a large number of transactions, to careful documentation of project experiences for re-use. The well known Create - Capture - Organize - Access - Use cycle is employed to 'manage' the knowledge. But in knowledge-based organizations the creation of new knowledge, or its conversion into technology in the innovation cycle, is the core business of the organization. In principle, one could employ the above cycle in such organizations, but in practice the jump is often directly from Create to Use. The 'within-and-between minds' knowledge, while being the most precious organizational asset, staunchly resists the Capture - Organize - Access stages. A different approach is required. Against this rationale, the paper explores the issues particularly relevant to knowledge management in knowledge-based organizations, based on experience in the CSIR (the "National Technology Lab") in South Africa. These include:-

- The implications of the trend from knowledge generation in Mode 1 to Mode 2
- Obstacles to knowledge capture, including protectiveness towards personal Intellectual Property
- A value proposition for an innovation business
- Promoting the identification of existing tacit knowledge and its re-use to improve efficiency

It is concluded that the most precious and current knowledge is "within and between ' the minds of knowledge workers. A programme is in hand to put project leaders in touch with this knowledge by following the 'traces' of this knowledge to be found in the explicit digital records made in the course of normal business in the organization.

**Keywords:** Knowledge management, 'within and between minds' knowledge, knowledge-based organizations,

## Introduction

For many organizations, knowledge management is a relatively new concept, because they are discovering the knowledge value in their operations and putting it to good use. Examples would include transaction-based organizations such as insurance companies or banks, which can analyse the transactions performed on behalf of customers and extract new value from the patterns observed. Or one could look to management consultancies that perform many similar assignments for clients in approximately similar circumstances and can extract, store and disseminate examples of best practice to

improve overall performance. In all these cases we see the application of the Create - Capture - Organize - Access - Use cycle so well illustrated in Figure 1, which is a modified version of the GartnerGroup (Bair, 1998) illustration of the transaction structure due to Nonaka & Takeuchi (1996).

Figure 1 “Create – Use” short-circuit of the normal cycle (after Gartner and Nonaka)

But for innovation organizations, such as the CSIR, whose core business is the creation of new knowledge or its conversion into technology via the innovation cycle, another process tends to dominate – the creation and *immediate use* of the knowledge, as indicated by the vertically downward arrow superimposed on the diagram at the left. The Capture – Organize – Access steps are omitted. Typically the knowledge that was accumulated in the production of the technology output is significantly less than is reflected in the report, or visible in the product, nor is it collected in a data-base or other knowledge repository. This means that this precious knowledge, often accumulated at great effort and expense, is not readily accessible for re-use. Clearly this calls for a special approach to knowledge management.

### **Knowledge Generation at the CSIR**

The CSIR is one of the major sources for technological innovation in South Africa. A statutory Science Council, the CSIR has autonomous status and is the largest technology organization on the African continent, with a staff complement of over 3000 and a turnover per annum of about 150 million US dollars. The CSIR undertakes contract research and development projects and provides technology

and specialist consultancy services to a variety of local, other African and international users. Both the vision and mission, see below, affirm the organization's commitment to innovation.

**The Mission of the CSIR** - The CSIR is a uniquely South African organisation, committed to innovation. It provides technology solutions and information to support sustainable development and economic growth in the context of national priorities.

**The Vision of the CSIR** - To be the best in technology, leadership and partnering, and – through our people – to fight poverty, build global competitiveness and make an enduring difference in people's lives.

The prevalent form of knowledge generation in the CSIR derives from its mission. Because of the focus on technology outputs, relatively little of the knowledge generation takes place in Mode 1, viz where the output is a peer-reviewed paper setting out details of the approach and findings of the work, usually based on the traditional scientific method. For a technology company, Knowledge can be defined as “the Capacity for Informed Action” and efforts on behalf of a client are generally aimed at increasing this capacity in the client organisation. The more complex the problem, the more likely that a multi-disciplinary team will be set to work on it, and Mode 2 knowledge generation will come into play.

In Mode 2, the emphasis is on teams, contributing multi-disciplinary skills to provide a customized, innovative solution to a real problem, with all its breadth of complexity, rather than the highly selective attention characteristic of Mode 1. This has both cultural and practical implications.

The CSIR approach to Knowledge Management described in this paper thus takes into account the cultural factors peculiar to innovation organisations and presents a solution that recognises that the ‘within and between’ minds knowledge is the most valuable. Knowledge Management effort is directed to locating the ‘minds’ with current knowledge, so that they can be engaged in new projects and this knowledge can be brought to bear most effectively.

### **Knowledge and Mode 2 Knowledge generation**

The key transactions (in the Nonaka sense) involved in Mode 2 knowledge generation are set out in Fig 2.

The transactions that take place during the process are indicated by the dashed lines, but the more interesting ones are the dotted lines, denoting the outputs. These include examples of the obvious client-focused outputs – Advice, System, Code of Practice or Widget. But the more interesting suite of outputs, from the knowledge management point of view, is the ‘Learning’ pair of arrows, denoting:

- The learning that accrues to each member of the team as an individual
- The learning that develops ‘between the minds’ of the team, giving them a ‘Capacity for Informed Action’ that does not exist when the team is not functioning as a team.

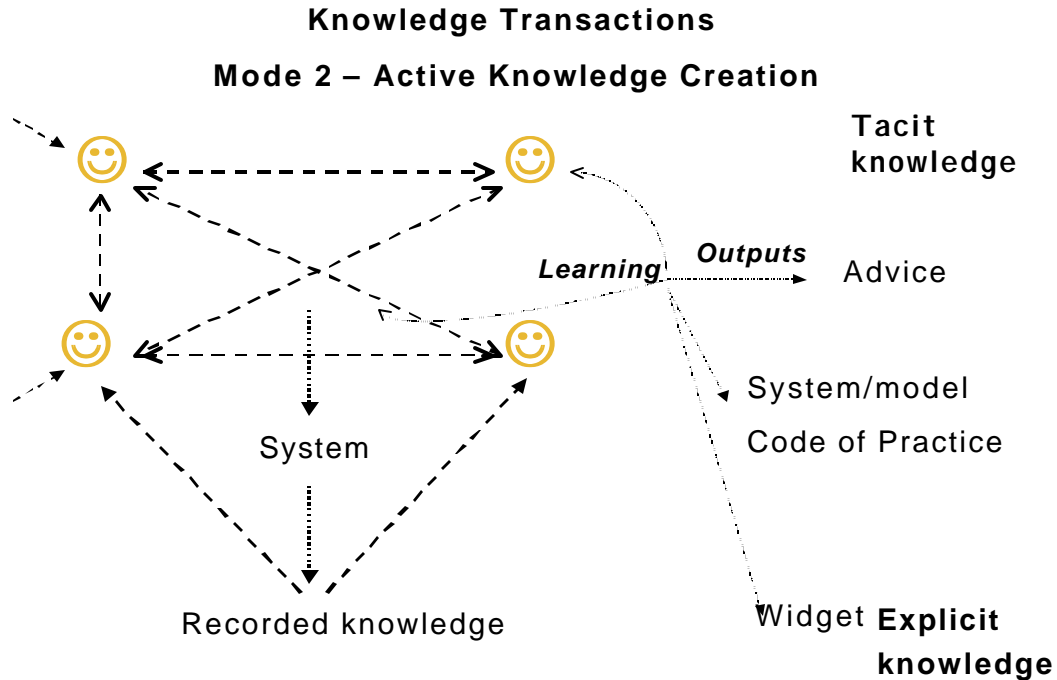


Figure 2 Transactions in Mode 2 Knowledge generation

The dotted downward arrows might represent the capturing of the accumulated knowledge in a system for re-use. In practice, this is rare in our organisation. Most often the team disperses, or else immediately turns its attention to a new challenge. The implication is that the most precious, ie current and innovative, knowledge assets in the organisation are to be found, not in any IT based repository, but ‘within and between the minds’ of the knowledge contributors, which calls for a special approach if the knowledge is to be accessed and re-used..

### Obstacles to Knowledge Capture

In a market-oriented innovation organization such as the CSIR, the knowledge worker is the production unit, and the expenditure of staff time is closely monitored. Since knowledge capture is not revenue earning, there is a tendency to prefer more directly rewarding contract work. Many staff also avoid recording their knowledge in the mistaken belief that this confers job security. This includes those whose natural instincts to contribute to the solution of a problem are overwhelming in a task situation. Various arguments need to be deployed by management to dispel this notion – most especially the observation that knowledge is the one personal asset that appreciates as it is shared!

Other approaches to undermine this reluctance include:-

- The observation that most knowledge, once reduced to the explicit form, tends to become more like information. The professional judgement that makes knowledge most effective can typically not be packaged with each knowledge output. As an example, the score of a piece of chamber music contains all the knowledge that the composer was able to commit to the explicit format. However, without the ability to read music and to play an instrument well, and lacking familiarity with the centuries old tradition of ensemble playing, one would be unable to participate with others in rendering the piece.

- The ‘mind’ that contains the knowledge is always more valuable than the knowledge itself, being able to respond to context, provide nuance and adapt the knowledge to alternative situations.

The recurrent theme is of the importance of the ‘within and between minds’ knowledge.

### **A Value proposition for Knowledge Management in Knowledge-Based Organizations**

Introducing Knowledge Management systems always implies a change in behaviour and three established principles of change management organizations apply, viz:

- Make as much use of existing practice as possible, with minimal ‘extra work’ required from production staff
- Use existing energy streams to drive the process
- Make sure that those involved understand the value/cost situation.

A clearly defined ‘value proposition’ is thus required. Currently in the CSIR we focus on

*Helping staff to leverage their creative ability to deliver better client value and personal growth by:*

- *Ensuring that all projects benefit from the accumulated knowledge and depth of expertise of all staff in the organization and our networks*
- *Fostering collaboration and re-use of knowledge*
- *Stimulating innovation and learning*
- *Preserving Intellectual property.*

*The value addition would also be reflected on the income statement as an improvement in margins with minimal effort.*

In principle, the first focus should be on the knowledge generation process, specifically the investment of resources in the creation of knowledge capital. However this is already an established practice in the CSIR, under the heading of Technology Management (Paterson and Kfir, 1997), and needs no new initiatives.

## **Better exploitation of the ‘within and between minds’ knowledge**

At the heart of this is a need to ensure that any project leader, in planning a project, should be able, with minimal effort, to identify the best possible of the relevant knowledge inputs available to the organisation and access them to add value to the project. In one sense it reverts to the ‘Knowing What we Know’ challenge common in knowledge-based organisations. It also exemplifies the ‘personalization’ approach to Knowledge Management. (Hansen et al, 1999)

The rationale adopted at CSIR is to assume that all ‘within and between minds knowledge’ available is traceable, in principle, through the digital records that are continually laid down in our systems, both in a structured format (databases, project management systems and report repositories) as well as the unstructured (correspondence, e-mails, discussion notes). If one could use these traces to identify the mind(s) housing the knowledge, the project leader can negotiate directly with the identified colleague(s) to

- Verify that the knowledge available is appropriate in content and quality
- Establish the availability of the ‘knower’ to participate in the project.

This obviously avoids the need to spend effort up front to qualify the knowledge contributions, which characterizes the “codification” approach. The qualification would take place in the discussion between project leader and potential contributor, and thus be fully in context.

The search and retrieval technologies available to undertake these scans are presently being evaluated and seem to present no technical obstacle. The security protocols governing access to various types of information do presently protect some such ‘traces’ from scrutiny, but the benefits of gaining access to the relevant knowledge could well justify relaxing some of these

On the ‘input’ side there is the opportunity to allow or persuade knowledge workers to ‘showcase’ their current knowledge contributions on a personal web-site. This would enable immediate access, without the delays inherent in publication of client progress and final reports. If this can be coupled with an ‘on-line’ peer review system, this would constitute an incentive to spend the small amount of additional energy required to populate the web-site.

## **Conclusion**

The most precious, ie current and innovative, knowledge available to an innovation business is to be found ‘within and between the minds’ of its knowledge contributors. Access to this knowledge by all project leaders is essential if its value is to be made available to clients in all project outputs and a special approach to this task is needed.

The traces of the knowledge that are laid down in structured and unstructured information in the organisational digital systems can be used to put a project leader in ready contact with all potential contributors.

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### **Author's Autobiographical Sketch**

Roy Page-Shipp is Director: Strategy Support at the CSIR in Pretoria, South Africa, where his current assignments include the management of the Knowledge Management strategic initiative. Trained as a physicist (M Sc (Natal) 1963) he worked in Occupational Hygiene in the mining, nuclear and steel industries before joining the CSIR's National Building Research Institute in 1975 as Head of Environmental Engineering. In 1987 he was appointed Director of the newly formed Division of Building Technology and in 1992 assumed his current role.