EDITORIAL: ICT SUPPORT FOR KNOWLEDGE MANAGEMENT IN CONSTRUCTION

Abdul Samad (Sami) Kazi, Senior Research Scientist,
VTT - Technical Research Centre of Finland
Sami.Kazi@vtt.fi http://www.vtt.fi

Matti Hannus, Chief Research Scientist,
VTT - Technical Research Centre of Finland
Matti.Hannus@vtt.fi http://www.vtt.fi

1. INTRODUCTION

Welcome to this special issue of ITcon on "ICT support for knowledge management in construction".

The terms knowledge and knowledge management have been "the hype" for quite some time now. The simple (and much used) argument that knowledge management is "the step after" information management leads to certain delusions. If we expect otherwise, then it may not be long before someone coins the term "wisdom management" and this becomes the focal point of future research and development. On the contrary, one needs to see knowledge management not only as "the step after" information management, but on its own as well. This in itself is a major task considering the number of definitions one comes across in both literature and public debate. Though it is not our intention here to define knowledge or knowledge management, we do present a well appreciated quote from Dr. Jari Puttonen, Senior Advisor, Fortum Engineering Ltd., who on the objectives of knowledge management said the following, "sort the wheat from the chaff and then sieve out the real drops of wisdom".

2. KM MENTAL MODELS

A simple insight into the process of knowledge management is perhaps best understood through some simple mental models. One such model has been provided by the American Productivity and Quality Centre (APQC, 1996) and is shown in figure 1 below:

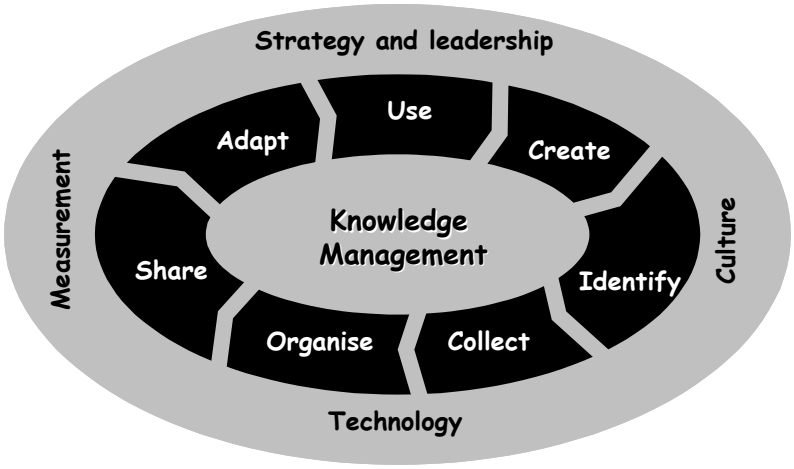

Figure 1:Knowledge management model [APQC]

The mental model (figure 1) can be broken down (from an IT centric viewpoint) in terms of knowledge management enablers and processes as follows:

Knowledge management enablers:

- *Culture:* Identification of key cultural barriers and enablers (incentives)
- *Technology:* Identification and adaptation of IT standards and tools

- *Measurement:* Definition of performance indicators and metrics
- *Strategy and Leadership:* Vision and strategy for knowledge management in virtual construction enterprises

Knowledge Management Processes:
- *Identify:* Methods for the identification of best practices and re-usable knowledge
- *Collect:* IT tools for knowledge capture
- *Organize:* IT tools for knowledge systematization and consolidation
- *Share:* IT environment for knowledge dissemination, search and retrieval
- *Adapt:* Organizational guidelines for business processes, task descriptions and organization
- *Use:* IT environment for knowledge reuse
- *Create:* Computer aided engineering application for knowledge use and exploitation

Observing things from a different perspective (translation of unprocessed to processed knowledge), Kazi, et al. (2001) defined the "palm tree model". In its simplest form, it is quite self explanatory as shown in figure 2. The same has been shown (figure 3) for Fortum Engineering Ltd., a lead player in the Nordic market for providing engineering, procurement and construction services to the energy sector.

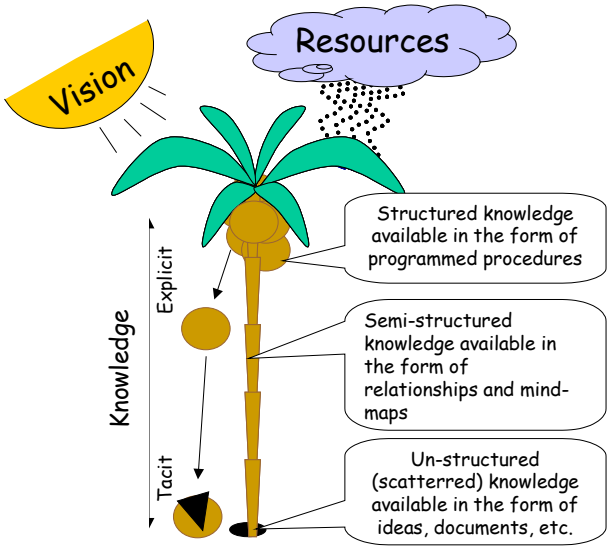

Figure 2: Palm tree model

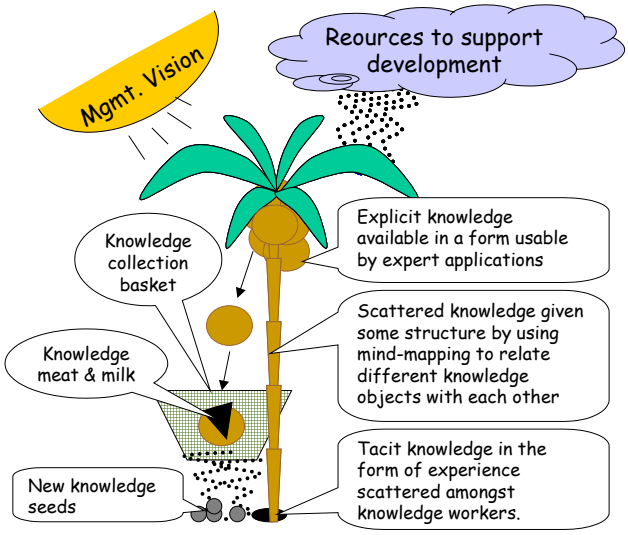

Figure 3: Fortum Engineering Ltd.s palm tree model

3. POSITIONING FRAMEWORKS

A key element in any knowledge management exercise is the arrangement of information in accordance with some understandable classification or framework. We present here two such positioning frameworks that we have developed.

- Concept positioning framework (e.g. may be used to describe set-up of "communities of practice")
- ICT positioning framework (e.g. may be used to position ICTs for KM in construction)

3.1 Concept positioning framework

The concept positioning framework consists of a set of inter-related building blocks that describe the core elements of discovery needed to address a particular concept, vision, or idea.

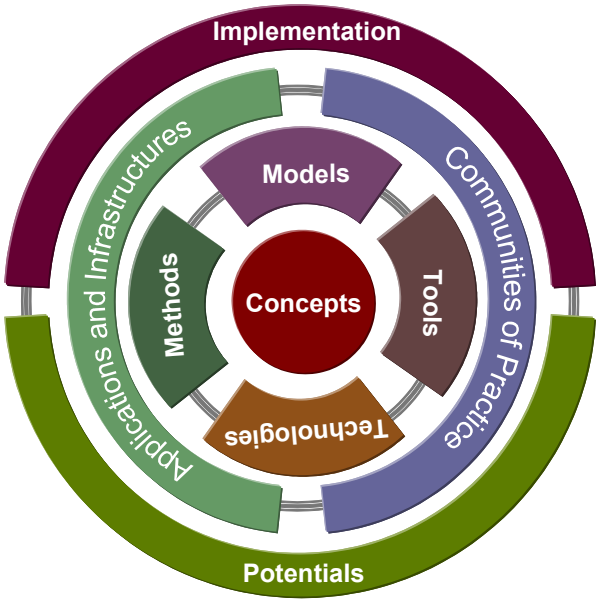

Figure 4: Concept positioning framework

Concept: Establishment of communities of practice at both sector specific and cross-sector levels

Methods: Methods for the instantiation, deployment, and sustenance of communities of practice

Models: Models for communities of practice (e.g. social model, mosaic model, etc.)

Tools: Tools for the set-up, configuration, and management of communities of practice. This could even include some standards if relevant. (Note that tools are not necessarily technology driven)

Technologies: Social, and technological technologies for communities of practice, for example narrative databases, web services, etc.

Applications and Infrastructures: Technological solutions that could drive the communities of practice, e.g. portals, shared databases, etc.

Communities of Practice: Organisations, groups, and individuals that form a community of users.

Implementation: Some real instances of communities of practice established based on the core concept, methods, models, tools, and technologies.

Potentials: Future of how communities of practice will evolve. This may be seen as the "visioning" block.

3.2 ICT positioning framework

The ICT positioning framework consists of distinct blocks that may be used to position various ICT issues such as ontologies, applications and infrastructures, etc.

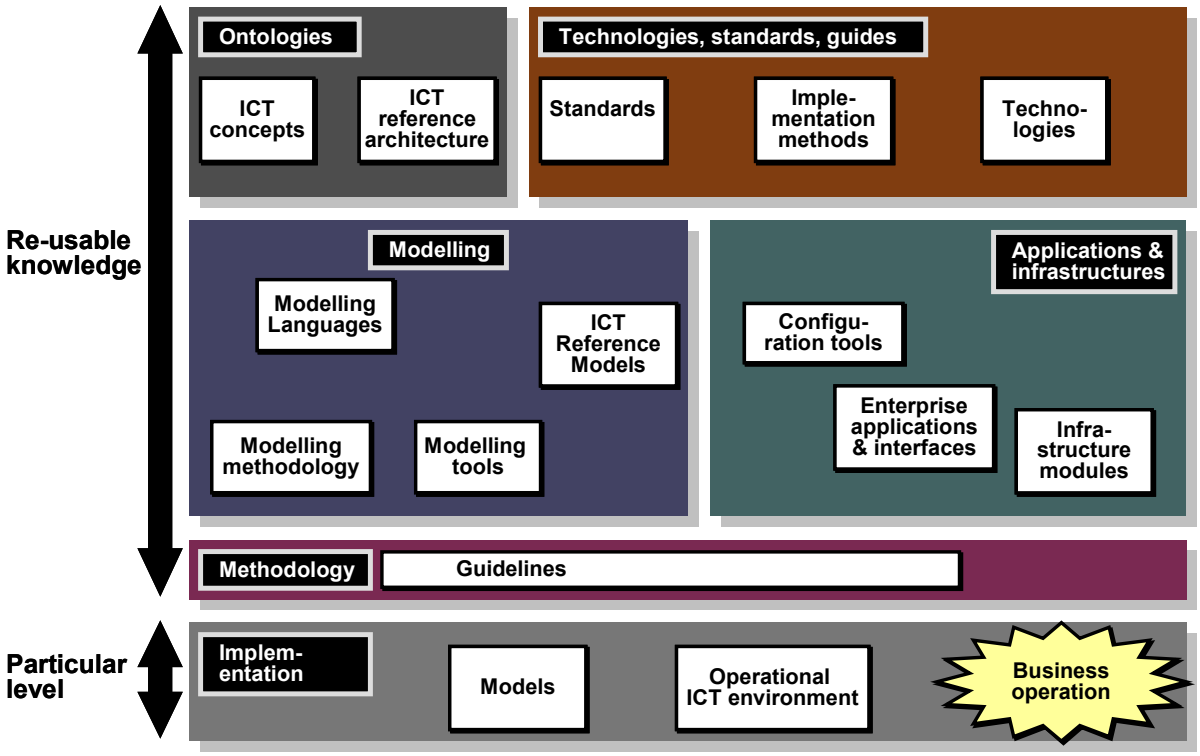

Figure 5: ICT positioning framework

Ontologies: This box, presenting ICT in construction concepts and a generic reference architecture of the same, focuses on a description of shared concepts related to ICT in construction for the purpose of enabling shared understanding and communication. It may be seen as a conceptual information model that describes "the things that exist" in an ICT driven construction environment (e.g. construction virtual enterprise) namely: concepts, properties, facts, rules and relationships.

Technologies, standards, guides: This box presents standards for ICT in construction, implementation methods and tools, and technologies. These contain and define the factors that affect the way a construction virtual enterprise is put into operation. It contains a rather broad set, ranging from technologies to legal aspects. Some of these factors could potentially lead to different contingencies in the use of ICT in construction, while other factors could lead to different implementations of ICT in construction.

Modelling: The different elements of this box allow enterprises to analyse and re-design the business processes of that use of ICT could impact. Both during the implementation and even reconfiguration of an ICT system, enterprises may acquire knowledge of current business processes by means of modelling. This knowledge is needed in order to analyse the existing processes and communicate about them. It should be noted that the focus is on modelling to support application-application and service-service interaction in an inter-enterprise setting.

Applications and infrastructures: This box defines the different components that perform or support the business processes as identified in the modelling box. As such, they provide the (technological) realisation of those business processes, enabled by the technology as defined in the technologies, standards, and guides box. The applications and infrastructures box focuses on the execution or support of the implementation of ICT in construction.

Methodology: This box focuses on the concretisation of the findings of the previous boxes in the form of a set of implementation guidelines as applicable to ICT in construction implementation. The guidelines cover the entire life-cycle showing what happens when, how, where, by whom, using what means, etc. A collection of identified good practices is also provided.

Implementation: This box is at a particular level, for the formation, instantiation, operation, reconfiguration, and decommissioning of an ICT system or set of wrappers/interfaces. Focus here is on the specific business process model and operational ICT environment for the enterprise (or enterprises) in question.

4. THE PAPERS IN THIS SPECIAL ISSUE

The initial call for expressions of interest in the form of extended abstracts yielded more than 25 responses. Of these some were rejected while others retained and authors invited to submit papers. A total of 18 papers (including one invited paper) were received and subject to the normal ITcon review process. In some cases, more than one iteration of the review process was required to ensure a certain level of quality. Of these 18, we have only retained 10 full papers and 1 invited one.

In the invited paper, Hearn, et al., talk of building communities: organisational knowledge management within the European Commission´s Information Society Technologies Programme.

In the 10 full papers:

- Al-Ghassani et al, describe a tool for developing knowledge management strategies;
- Al-Jibouri and Mawdesley, present a knowledge based system for linking information to support decision making in construction;
- O'Brien, et al. discuss enterprise information integration across heterogeneous sources;
- Egbu and Botterill, discuss the use and effectiveness of technologies that are currently used to manage knowledge in the construction industry;
- Koivu, presents a technology foresight study on the future of product modeling and knowledge sharing in the FM/AEC industry;
- Moore, discusses perception "noise" in the cognition of visualised construction process concepts;
- van Leeuwen and Fridqvist, discuss supporting collaborative design by type recognition and knowledge sharing;
- Wetherill et al., present a generic knowledge management process model supported by a specification of tools to support it;
- Whelton, et al., present a knowledge management framework for project definition; and
- Lehto and Himanen, present their findings on multidisciplinary information management in the construction industry with an example of facilities management.

We hope you enjoy this special issue as much as we did editing and compiling it.

Abdul Samad (Sami) Kazi & Matti Hannus

(Guest editors, ITcon special issue on ICT for knowledge management in construction)

5. REFERENCES

APQC (1996) Knowledge Management: Consortium Benchmarking Study. American Productivity and Quality Center: Houston.

Kazi A.S., et al. (2001) Knowledge Creation and Management: The Case of Fortum Engineering Ltd., In: Coakes, E., Willis, D. and Clarke, S. (editors), Knowledge Management in the Sociotechnical World: The Graffiti Continues, Springer: UK.