# ADVANCES IN CONVERTING TACIT INFORMATION TO EXPLICIT INFORMATION

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## Abstract

The advantage of being able to convert tacit knowledge into a more codifiable and storable commodity is becoming more recognised as organisations deal with the implications of globalisation, downsizing and outsourcing. However a successful method of conversion, technological or otherwise, has not been sufficiently developed and tacit knowledge remains an elusive and unquantifiable commodity that presents a gap in organisational intelligence. This paper reviews tacit and explicit knowledge in the context of their role in organisational knowledge. It then examines five methods being applied to identify and convert tacit or soft knowledge into explicit codifiable knowledge.

#### 1. Introduction

A key element in the growth of organisations is their ability to apply modern information technology to knowledge management. As the workforce shrinks because of a combination of economic downturn and efficiency driven by a better understanding of information technology, a corporation's ability to harness its intellectual capital becomes more important.

The technology has enabled business to access and store more information and modern work culture demands faster deliverability and retrieval at anytime from anywhere. But organisation knowledge (Dignum, 1999) is often divided between several experts and documents in different, possibly geographically disperse locations.

The concept of the separation of two different types of knowledge that corporations deal with was introduced by scientist turned philosopher Michael Polanyi in the 1950s. The central point of his argument was that "we know more than we can tell...tacit knowing is the fundamental power of the mind, which creates explicit knowing, lends meaning to it and controls its uses."

He argued that a sharp division between tacit and explicit ("capable of being clearly stated") knowledge did not exist. "Tacit thought forms an indispensable part of all knowledge. All knowledge is either tacit or rooted in tacit knowledge," he wrote. A wholly explicit knowledge, he argued, was unthinkable.

Today's knowledge management systems raise important questions about the nature of knowledge and challenging fundamental assumptions about its commodification.

This nature and the application of modern systems are explored in this paper which is written in an early 21<sup>st</sup> century business environment where firms that consciously invest in the creation of new knowledge and the revival of embedded corporate knowledge tend to do well.

## 2. Tacit v Explicit – The Distinctions Not Always Clear

Intellectual and knowledge-based assets fall into one of two categories, tacit or explicit. This is the basis of Nonaka's (1991) two-types-of-knowledge notion, which expands on Polanyi's (1966) work. Tacit, or implicit, knowledge is highly personal, hard to formalise and therefore difficult to communicate to others; explicit knowledge is externalised tacit knowledge, formal and systematic and easily communicated and shared.

Any information that can be presented as "hard copy", such as marketing research, business plans, customer lists, archives, tailored data bases and patents is explicit knowledge.

Tacit knowledge - the know-how contained in people's heads - is not as readily quantifiable and the challenge to business is to work out how to recognise, capture, codify, share and manage it. Once it is identified it becomes part of the organisation's intellectual base the same way as explicit knowledge.

The distinction between the two, however, remains ill-understood and, simplistically, has been referred to as little more than whether an item of knowledge can be set down on paper or not.

Nonaka and (later with) Takeuchi (1995) defined tacit knowledge as "personal knowledge embedded in individual experience (which) involves intangible factors such as personal belief, perspective and value system". They contrast this to explicit knowledge which "can be articulated in formal language including grammatical statements, mathematical expressions, specifications, manuals and so forth". They state it is "hard to formalise and communicate to others".

Hedesstrom and Whitelely (2000) maintained that the first use of the term tacit knowledge is associated with knowledge that has not yet been formalised. Thus tacit knowledge is a subset of all knowledge consisting of those items that have not (yet) been made explicit. A second use of the term is associated with knowledge that cannot be formalised and there are two sub-categories here. The first argues that some knowledge cannot be formalised because the knowledge is embodied. The second argues that it cannot be formalised because of fundamental characteristics of the nature of the knowledge.

Tacit knowledge comes in three quite distinct variants (Boisot, 1998):

1. Things that are not said because *everybody* understands them and takes them for granted.

2. Things that are not said because *nobody* fully understands them. They remain elusive and inarticulate.

3. Things that are not said because while some people can understand them, they cannot costlessly articulate them.

There are four basic patterns for knowledge creation in an organisation (Dignum, 1999, expanding Nonaka, 1991):

• <u>Socialisation</u>: Sharing of tacit knowledge between individuals. In this way knowledge moves from tacit to tacit. Thus knowledge doesn't become explicit and cannot easily be used by the organisation as a whole.

• <u>Articulation</u>: An individual succeeds in formulating the fundaments of his/her own tacit knowledge in a way that can be communicated to others. This process of making tacit knowledge explicit allows it to be shared within the organisation.

<u>Synthesis</u>: An individual can combine several pieces of explicit knowledge into a new whole. Knowledge changes from explicit to explicit, but does not really extend the 'total' knowledge of the organisation.

<u>Internalisation</u>: Individuals use explicit knowledge to broaden, extend and reframe their own tacit knowledge.

Sveilby (1997) asserts that business managers need to realise that unlike information, knowledge is embedded in people, and knowledge creation occurs in the process of social interaction. Tacit knowledge is about feel, embodiment, anticipation, agility, cultivating instinct, learning from experience and through failures, understanding context and fast adaption. This is costly, takes a long time, cannot be reliably measured or assessed, is risky and uncertain. It is fuzzy and involves people to people interactions. There are no shortcuts!

However as complex as it can be, the substantial investment put in to capturing and distributing (tacit) knowledge is worth the effort (Davenport and Pruzak, 1998). Having access to knowledge only when its "owner" has time to share it, or chancing to loose it completely if he or she leaves the organisation are problems which threaten the value of an organisation's knowledge capital.

#### 3. Conversion Captures More Knowledge

A lot of intellectual capital resides in the minds of IT workers. Companies such as Anderson Consulting, Ford and Monsanto encourage employees to put "tacit" knowledge, the know-how in their heads, into "explicit" form, such as written reports or video presentations. The captured knowledge is then stored in repositories such as databases and intranet Web servers, all of which users can search (McCampbell *et al*, 1999).

Because knowledge management systems are computer-based, they require the knowledge that they are to manage to be computerised. This means that the knowledge has to be formalisable and commodifiable. However, not all knowledge can be commodified in this way and the knowledge that lies outside the system is tacit knowledge.

The embeddedness of know-how, that which makes it strategic, creates its own problems (Devinney, 1997). For a company to fully capitalise on the advantages of know-how it must be able to create and transfer it. However the sheer act of transferring know-how will, by definition, take away much of its strategic advantage. The object of growth and expansion requires that the tacit understanding of how to do something must be made explicit so that it can be communicated to others.

#### 4. Knowledge Formalisation Success Problematic

As mentioned earlier, Nonaka and Takeuchi (1995) believe tacit knowledge is "hard to formalise and communicate to others". This is supported in the knowledge management literature and the advancement of methods applied to convert tacit to explicit knowledge outlined later in this paper.

In addressing day-to-day responsibilities, employees develop skills and expertise that through repetition eventually become nearly instinctive (Eisenhart, 2001). An employee who is no longer conscious of the individual steps in what he or she does probably won't be able to explain the task to a newcomer.

Boisot (1998) identifies that the passage from tacit to codified and abstract knowledge incurs a cost. Whether they are aware of it or not, senders always know more than they can say. They will inevitably retain in their memories a great deal of tacit knowledge that will not be available to receivers.

Hansen *et al* (1999) suggest that if much of the knowledge in an organisation is tacit then it is not worth trying to make it explicit. The organisation should instead enable all component parts to have access to the experts with the tacit knowledge. Alavi and Leidner (1999) argue that knowledge becomes tacit once it is processed in the mind of an individual and becomes explicit again "once it is communicated to others in the form of text, computer output, spoken or written words, or other means".

Feigenbaum *et al* (1988) believe all knowledge can be formalised in computer-based systems with any difficulties simply being implementation problems. Dreyfus (1992) says the problems commodifying all knowledge are indications of the complex nature of much knowledge.

A common occurrence has been for the knowledge management technology to "alter the structure of our interests: the things we think about" (Postman, 1992) so that only knowledge that can be formalised in computer systems becomes important. In so doing, the technology takes on a life of its own (Winner 1977), becoming an autonomous actor (Hanseth and Braa 1998) and driving the actions of the organisation.

Malhotra (1998) supports Svieby's (1997) contextual premise in defining tacit knowledge. Any attempt to make the tacit knowledge explicit, or elicit what is tacit, would be circumscribed by some context, according to Malhotra. Assuming that the key object was to communicate or to (attempt to) develop shared meaning, the same tacit knowledge could be expressed in different ways: via spoken words, written words, schematics, etc.

He cites an example of tacit knowledge being made explicit in the performance of Beethoven's Fifth Symphony by different artists using different musical instruments. The effect of most of these performances (on an audience member) would be different depending upon the ability of the artists with the instruments, their own "sense" of the score of the symphony, the specific performance that occurs, as well as the appreciation of the listener.

The process of conversion of tacit into explicit may be considered as a process of making sense of (or giving structure to) the unstructured "messes" that reside in one's mind as assumptions, feelings, ideas, biases, thumb rules, memories, etc. What emerges as "explicit" from the process of sense making is both facilitated and constrained by the context and the medium within which it is translated.

## 5. Five Approaches to Converting Tacit to Explicit

The available literature revealed the following approaches being taken in attempts to convert tacit information to explicit. The literature review was wide-ranging and while some of the approaches were clear-cut in their intent to develop means of conversion others were not as much so. The approaches represent available examples of the degree of attention being paid to embedded organisational knowledge and as the conclusion mentions, more research work is justified in this area, particularly into the relative merits and limitations of the methods.

## Method 1: Managing "soft" knowledge

Hildreth *et al* (1999) include tacit knowledge in their list of what can be included in "softer" types of knowledge, as recognised by Nonaka (1991) and Kogut and Zander (1992). Other examples of such knowledge include internalised experience and automated skills, internalised domain knowledge and cultural knowledge, embedded in practice. They contend that soft knowledge is acquired through the praxis of work and consequently when an organisation loses staff, the soft knowledge that is lost cannot easily be replaced.

Lave and Wenger (1991) suggest that soft knowledge is created, sustained and shared through communities of practice by a process called Legitimate Peripheral Participation (LPP). They describe how in-coming newcomers regenerate groups and eventually replacing existing members. The newcomers learn from "old-timers" through co-practice that is graduated, permitting them to undertake more central and critical tasks. In so doing, they not only learn the domain skills associated with the practice but they also learn the language of the community, its values and its attitudes.

Hildreth et al (1999) discerned three trajectories of soft knowledge construction in technological communities:

- Firstly, the gathering of domain knowledge (for example, how to solve a particularly tricky diagnosis problem)
- Secondly, the construction of knowledge of work practices specific to a community (for example, knowledge of an individual machine's idiosyncrasies and how they are catered for)
- Thirdly, the knowledge that the community constructs about the competencies of its members.

Essentially, soft knowledge is embedded in the practices of, and relationships within, the group. Secondly, the source of the legitimacy of the knowledge differs from hard knowledge. "Hard knowledge" is accepted as legitimate by virtue of the formal authority of the designer of the system or the author of the procedure. Soft knowledge becomes accepted by virtue of informal authority and consensus within the group.

#### Method 2: Eliciting Tacit Knowledge

Dignum (1999) writes about requirements engineering (RE) which involves discovery, development, analysis, negotiation and formalisation of knowledge in constructing the requirements' aspect of a project for it to evolve from initial development to a more encompassing model. The process draws on the experiences of stakeholders (customers), the developers and the organisation, among others, and is dynamic by involving collaborative negotiations as well as being knowledge intensive.

While adopting the definitions of tacit and explicit knowledge and the four basic patterns for knowledge creation, i.e. socialisation, articulation, synthesis and internalisation (Nonaka and Takeuchi, 1995), she also identifies situations where knowledge has not yet been internalised and must still be readily available.

The author describes a knowledge management tool called Wisdom<sup>™</sup> developed by Arthur Anderson's Knowledge Services Practice in the Netherlands that provides facilities for collecting, coding, processing and distributing knowledge. Wisdom<sup>™</sup> is placed with a new system called KARE, (Knowledge Acquisition and sharing for Requirements Engineering) which is designed to be a workbench for RE. The knowledge module within this system consists of three parts: knowledge acquisition, knowledge sharing and knowledge warehouse.

Knowledge Acquisition is defined here as the process of gaining knowledge and representing it in some computer-usable way. It corresponds to the process of extracting tacit knowledge and making it explicit using some knowledge representation software (e.g. Wisdom<sup>TM</sup>). Through a negotiated process, knowledge is elicited and analysed. The process then moves to knowledge sharing via a knowledge warehouse where catalogues carry information about the contents and organisation of each knowledge base.



Fig. 1 Knowledge Engineering Module (Dignum 1998)

## Method 3: Knowledge Harvesting

Knowledge harvesting is a term applied to the process of eliciting the tacit insights and intuitive knowledge of experts or top performers and converting it into specific, actionable know-how that is easily accessed and used by others (Snyder and Wilson, 1997)

Conceived by Karl-Erik Sveiby, the process is undertaken through a software product, which supports procedural knowledge-based tasks by providing the learner with expert guidance on an "as needed" basis.

- The harvesting process is proprietary, however it is a set of methods for:
- 1) finding valuable know-how
- 2) getting inside the mind of the expert performers to uncover the processes involved
- 3) optimising and deploying know-how to individuals and teams as software applications, and,
- 4) evaluating and improving applications.

Developed by LearnerFirst, the software is designed so that an individual can simultaneously understand, learn, perform and record the performance of a single action.

Wilson believes the dichotomy of tacit and explicit is not authentic and must include a third concept, implicit knowledge. The latter includes that which the individual knows he knows, as well as that which the individual does not know he knows because he has not experienced a genuine opportunity to express this knowledge. Both tacit and implicit knowledge is embedded in the mind of the individual but only implicit knowledge can be made explicit. By definition, tacit knowledge is impossible to verbalise.

## Method 4: Group Memory System

Earlier theorists (March and Simon, 1958) postulated that an organisational memory is embodied in standard operating procedures.

Vasconcelos *et al* (1999) used Kuhn and Abecker's (1997) definition of *organisational memory* in their long-term work to design a group memory system using ontology's. The definition explained OM as a comprehensive computer system that captures a company's accumulated know-how and other forms of knowledge assets to make them available to enhance the efficiency and effectiveness of knowledge-intensive work processes.

One of the main objectives of their work is to test and implement knowledge modelling techniques using ontologies (a formal and explicit specification of a shared conceptualisation), particularly to represent less tangible knowledge assets within a business organisation.

The eventual aim is to develop and test a prototype Group Memory System (GMS) that can be used to support business activities and knowledge dissemination between employees.

It is proposed that the system will adopt an Intranet access model and will provide a view of the group knowledge that is embedded in processes or developed in teamwork. It will provide access to different sources of knowledge such as business objectives, business cycles, stakeholder properties and group competencies.



Fig. 2 Vasconcelos' Theoretical Taxonomy Knowledge

### **Method 5: Formal Concept Analysis**

Busch and Richards (2000) have refined a technique for graphically measuring tacit knowledge at the individual level as well as a qualitative textually based alternative, which in turn handles graphical visualisation of tacit knowledge.

The first makes use of survey questionnaire returns then applies formal concept analysis as a means of assessing individuals in terms of their tacit knowledge similarities. This is based on the work of psychologists such as Sternberg's (1995) group at Yale that seek to test tacit knowledge differences in individuals by means of expert-novice comp arisons.

The second approach to tacit knowledge modelling was to attempt to define how to model definitions of what such knowledge may constitute. This involved a qualitative approach with software that permits coding of literature dealing with tacit knowledge, the codes then being used to form network maps. The maps were successful in that they provided visual support for what was discussed textually.

## 6. Conclusion

With all the computing power available, the process of knowledge management is moving forward in being able to convert tacit knowledge to codifiable explicit knowledge for use in corporate environments. As systems develop and more companies recognise the value of that which we don't tell, more attention will perhaps be focussed on extracting the embedded knowledge of the "experts". The five applications examined above go only part of the way to mining this acknowledged rich vein that exists in all organisations. Further research is needed, however, to measure their progress and effectiveness.

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