The Knowledge in Knowledge Management

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5/29/2010

This paper was commissioned for and appears in the Knowledge Management Yearbook 2000-2001. The paper integrates four terms used in relation to knowledge – explicit, tacit, declarative and procedural – and it introduces an additional category: implicit knowledge.

Introduction

My aim in this brief paper is to clarify some terms commonly used in discussions about knowledge management. These include the following:

- Explicit knowledge
- Tacit knowledge
- Declarative knowledge
- Procedural knowledge

Along the way we will touch on the meaning of the root term, knowledge, as well as a couple of related terms, specifically, implicit knowledge and strategic knowledge.

You might well ask, "Why bother?" After all, doesn't everyone know what these terms mean? Don't we all agree on what they mean? The answer, of course, is "No." There are different meanings at play. We will examine some of these and attempt to reconcile and integrate them.

Again, you might ask, "Why bother?" After all, what difference does it make? Well, if claims are being made that knowledge can be managed and if the term knowledge management is to have any credence, we must be clear about what we mean by the knowledge in knowledge management. For this reason, once the basic terms have been defined and related to one another, we will examine some of their implications for practice.

Knowledge

In general, we seem to mean three things by our use of the word "knowledge." First, we use it to refer to a state of knowing, by which we also mean to be acquainted or familiar with, to be aware of, to recognize or apprehend facts, methods, principles, techniques and so on. This common usage corresponds to what is often referred to as "know about." Second, we use the word "knowledge" to refer to what Peter Senge calls "the capacity for action," an understanding or grasp of facts, methods, principles and techniques sufficient to apply them in the course of making things happen. This corresponds to "know how." Third, we use the term "knowledge" to refer to codified, captured and accumulated facts, methods, principles, techniques and so on. When we use the term this way, we are referring to a body of knowledge that has been articulated and captured in the form of books, papers, formulas, procedure manuals, computer code and so on.

In *Working Knowledge*, Tom Davenport and Laurence Prusak (1998) draw distinctions among data, information and knowledge. Data and information fit within the third category above, that is, the notion of a body of knowledge that exists apart from people. Their view of knowledge is that it is "broader, deeper, and richer than data or information." They offer this "working definition" of knowledge:

> "Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms."(p.5)

Thus it would appear that although Messrs. Davenport and Prusak distinguish among data, information and knowledge, their working definition of knowledge incorporates information, accommodates the notion that knowledge is a state of being and, at the same time, accommodates the view that knowledge exists apart from the knowers. It also accommodates the notion of knowledge as the capacity for action.

From all this it does seem safe to conclude that there are two basic kinds of knowledge: (1) the kind that is reflected in a person's internal state as well as in that same person's capacity for action and (2) the kind that has been articulated and frequently recorded. This brings us to the concepts of explicit, implicit and tacit knowledge.

Explicit, Implicit and Tacit Knowledge

The diagram shown in Figure 1 offers a useful way of teasing out the distinctions between and among explicit, implicit and tacit knowledge.

Explicit Knowledge

Explicit knowledge, as the first word in the term implies, is knowledge that has been articulated and, more often than not, captured in the form of text, tables, diagrams, product specifications and so on. In a well-known and frequently cited 1991 *Harvard Business Review* article titled "The Knowledge Creating Company," Ikujiro Nonaka refers to explicit knowledge as "formal and systematic" and offers product specifications, scientific formulas and computer programs as examples. An example of explicit knowledge with which we are all familiar is the formula for finding the area of a rectangle (i.e., length times width). Other examples of explicit knowledge include documented best practices, the formalized standards by which an insurance claim is adjudicated and the official expectations for performance set forth in written work objectives.

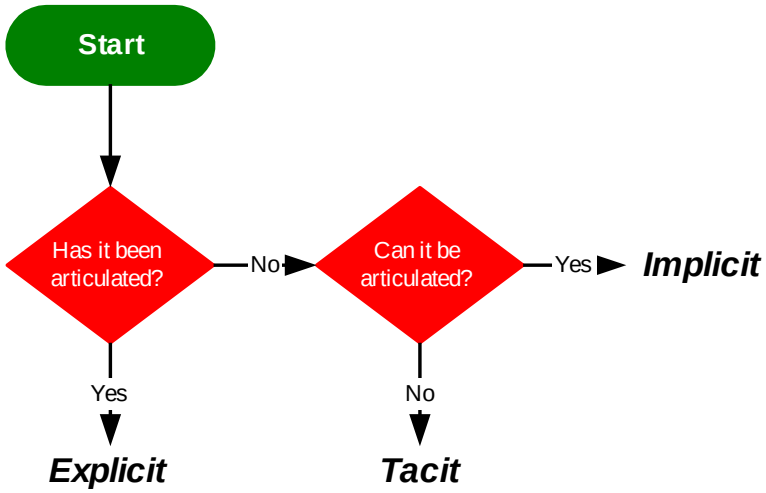

Figure 1 - Explicit, Implicit and Tacit Knowledge

Tacit Knowledge

Tacit knowledge is knowledge that *cannot be articulated*. As Michael Polanyi (1997), the chemist-turned-philosopher who coined the term put it, "We know more than we can tell." Polanyi used the example of being able to recognize a person's face but being only vaguely able to describe how that is done. This is an instance of pattern recognition. What we recognize is the whole or the gestalt and decomposing it into its constituent elements so as to be able to articulate them fails to capture its essence. Reading the reaction on a customer's face or entering text at a high rate of speed using a word processor offer other instances of situations in which we are able to perform well but unable to articulate exactly what we know or how we put it into practice. In such cases, *the knowing is in the doing*, a point to which we will return shortly.

Implicit Knowledge

Knowledge that can be articulated but hasn't is *implicit* knowledge. Its existence is implied by or inferred from observable behavior or performance. This is the kind of knowledge that can often

be teased out of a competent performer by a task analyst, knowledge engineer or other person skilled in identifying the kind of knowledge that can be articulated but hasn't. In analyzing the task in which underwriters at an insurance company processed applications, for instance, it quickly became clear that the range of outcomes for the underwriters' work took three basic forms: (1) they could approve the policy application, (2) they could deny it or (3) they could counter offer. Yet, not one of the underwriters articulated these as boundaries on their work at the outset of the analysis. Once these outcomes were identified, it was a comparatively simple matter to identify the criteria used to determine the response to a given application. In so doing, implicit knowledge became explicit knowledge.

Declarative, Procedural and Strategic Knowledge

The explicit, implicit, tacit categories of knowledge are not the only ones in use. Cognitive psychologists sort knowledge into two categories: *declarative* and *procedural*. Some add strategic as a third category. As before, we will use a diagram to aid in sorting out matters (see Figure 2).

Declarative Knowledge

Declarative knowledge has much in common with explicit knowledge in that declarative knowledge consists of descriptions of facts and things or of methods and procedures. The person most closely associated with the distinction between declarative and procedural knowledge is John Anderson of Carnegie-Mellon University. He has been writing about these two notions for almost 25 years (Anderson, 1976; 1993; 1995). Being able to state the cut off date for accepting applications is an example of declarative knowledge. It is also an instance of explicit knowledge. For most practical purposes, declarative knowledge and explicit knowledge may be treated as synonyms. This is because all declarative knowledge is explicit knowledge, that is, it is knowledge that can be and has been articulated.

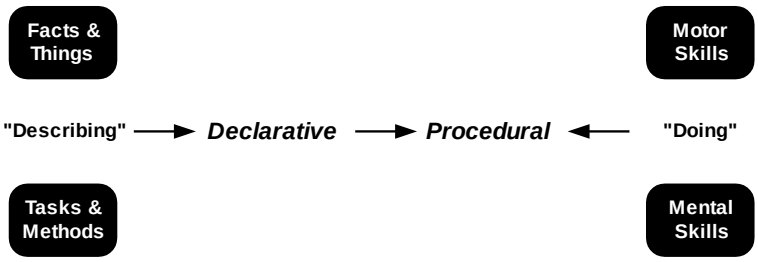

Figure 2 - Declarative and Procedural Knowledge

Procedural Knowledge

This is an area where important differences of opinion exist.
One view of procedural knowledge is that it is knowledge that manifests itself in the doing of something. As such it is reflected in motor or manual skills and in cognitive or mental skills. We think, we reason, we decide, we dance, we play the piano, we ride bicycles, we read customers' faces and moods (and our bosses' as well), yet we cannot reduce to mere words that which we obviously know or know how to do. Attempts to do so are often recognized as little more than after-the-fact rationalizations. This knowing-is-in-the-doing view of procedural knowledge is basically the view of John Anderson, the Carnegie-Mellon professor mentioned earlier.

Another view of procedural knowledge is that it is knowledge about how to do something. This view of procedural knowledge accepts a description of the steps of a task or procedure as procedural knowledge. The obvious shortcoming of this view is that it is no different from declarative knowledge except that tasks or methods are being described instead of facts or things.

Pending the resolution of this disparity, we are left to resolve this for ourselves. On my part, I have chosen to acknowledge that some people refer to descriptions of tasks, methods and procedures as declarative knowledge and others refer to them as procedural knowledge. For my own purposes, however, I choose to classify all *descriptions* of knowledge as declarative and reserve procedural for application to situations in which the knowing may be said to be in the doing. Indeed, as the diagram in Figure 2 shows, declarative knowledge ties to "describing" and procedural knowledge ties to "doing." Thus, for my purposes, I am able to comfortably view all procedural knowledge as tacit just as all declarative knowledge is explicit.

Some reading this will immediately say, "Whoa there. If all procedural knowledge is tacit, that means we can't articulate it. In turn, that means we can't make it explicit, that is, we can't articulate and capture it in the form of books, tables, diagrams and so on." That is exactly what I mean. When we describe a task, step by step, or when we draw a flowchart representing a process, these are representations. Describing what we do or how we do it yields declarative knowledge. A description of an act is not the act just as the map is not the territory.

Strategic Knowledge

Strategic knowledge is a term used by some to refer to what might be termed know-when and know-why. Although it seems reasonable to conceive of these as aspects of doing, it is difficult to envision them as being separate from that doing. In other words, we can separate out strategic knowledge only in the describing, not the doing. Consequently, strategic knowledge is probably best thought of as a subset of declarative knowledge instead of its own category. For this reason, strategic knowledge does not appear in any of the diagrams in this paper.

Integration

Figure 3 integrates the diagrams from Figures 1 and 2 and illustrates the "fit" between and among explicit, implicit, tacit, declarative and procedural knowledge. These relationships are reasonably clear and, with two exceptions, warrant no further discussion.

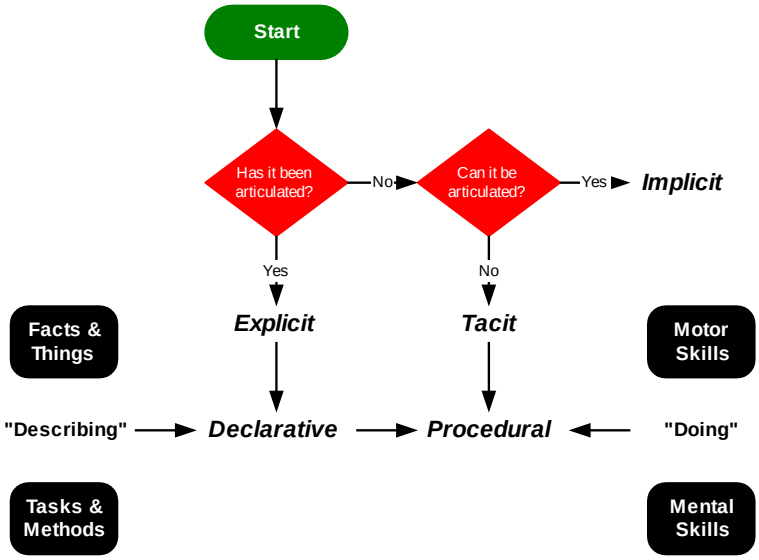

Figure 3 - Integration

The arrow connecting declarative and procedural indicates that we often develop procedural knowledge or the ability to do something as a result of starting with declarative knowledge. In other words, we often "know about" before we "know how."

The arrows connecting explicit with declarative and tacit with procedural are meant to indicate the strong relationships that exist between these terms.

On to More Practical Matters

So what? Why are these concepts important? What are we to do with them? How can we put them to practical use? A few thoughts follow.

First off, it is important to recognize that the acquisition of declarative and procedural knowledge occurs in very different ways. Second, although tacit knowledge cannot be reduced entirely to words, it is quite possible to acquire tacit knowledge through means other than verbal descriptions. Third, if "knowledge management" is to have any meaning and any credence at all, we must say what we mean by knowledge – in all its variations and permutations – and we must do so in ways that are as free of conflict and overlap as we can make them. Otherwise, we run the distinct risk of appearing to not know what we are talking about.

Nonaka addresses the important issues of knowledge transfer and knowledge creation in his 1991 article. He cites four such transfers or creations:

1. *Tacit to tacit*. Acquiring someone else's tacit knowledge through observation, imitation and practice. The example Nonaka uses is that of a product developer, Ikuro Tanaka, who apprentices herself to a hotel chef famous for the quality of his bread. She learns how to make bread his way, including an unusual kneading technique.
2. *Explicit to explicit*. Combining discrete pieces of explicit knowledge to form new explicit knowledge, for example, compiling data and preparing a report that analyzes and synthesizes these data. The report constitutes new explicit knowledge.
3. *Tacit to explicit*. Nonaka cites here the product developer's subsequent conversion of her acquired tacit knowledge into specifications for a bread-making machine. However, as defined by Polanyi, who coined the term, tacit knowledge cannot be articulated. Thus, although Nonaka's product developer was clearly able to devise a set of product specifications based on what she learned while apprenticed to the chef in question, it seems doubtful that she actually articulated the chef's tacit knowledge or her own. It seems more likely that she articulated some rules or principles or descriptions of procedures, that is, she created some declarative knowledge that subsequently proved useful in the design and development of the bread-making machine.
4. *Explicit to tacit*. Internalizing explicit knowledge. Here, Nonaka indicates that the product development team acquired new tacit knowledge; specifically, they came to understand in an intuitive way, that products like the home bread-making machine can provide quality, that is, they can produce bread as good as that made by a professional baker. That Nonaka (or anyone else) knows of this suggests that whatever knowledge was acquired has been made explicit and that means it might have been implicit knowledge at one point but was never truly tacit knowledge because that cannot be articulated.

On my part, I will focus on three aspects of knowledge capture, sharing and transfer:

1. The process of capturing explicit knowledge, that is, of making implicit knowledge explicit.
2. The development of procedural knowledge (in the sense that the knowing is in the doing).
3. The transfer of tacit knowledge from one person to another without resorting to verbalization.

In all three cases, we will be talking about the systematic or facilitated acquisition of knowledge, not simply learning from experience.

Making Implicit Knowledge Explicit

This is a process of articulation, of making implicit knowledge explicit. Sometimes we are able to do this on our own and sometimes it requires the assistance of someone like a performance analyst or a knowledge engineer. When a performance analyst documents the work of insurance claims examiners in the form of adjudication algorithms, those algorithms represent implicit knowledge that has been made explicit.

Developing Procedural Knowledge

We are talking here of skill development, specifically, the acquisition of explicit, declarative knowledge as the basis for skill development. Often this works as follows:

1. We are presented with a description of a way to perform a task.
2. We practice it, perhaps haltingly at first but our proficiency improves with continued practice and it benefits from feedback.
3. Finally, we reach the point at which our ability to perform the task is automatic, we no longer have to think about it.

Over time, we might even forget the original task descriptions that enabled our early attempts to perform the task.

Transferring Tacit Knowledge

The key here is to remember that tacit knowledge cannot be articulated but it can be communicated or transferred. Remember Polanyi's example of being able to pick a face out of a crowd? Although we might not be able to adequately articulate how we do that, or even to describe facial characteristics in such a way that someone unfamiliar with the face in question could pick it out of similar looking faces, we can develop the ability to recognize that face by presenting pictures and developing the ability to recognize that face from several different angles.

Conclusion

Knowledge management seeks to manage knowledge. Knowledge itself is a very slippery concept with many different variations and definitions. The nature of knowledge and what it means to know something are epistemological questions that have perplexed philosophers for centuries and no resolution looms on the horizon. Are we therefore to throw up our hands and turn away? Or do we simply acknowledge that we are in an ambiguous area and do the best we can? We must each make these choices in as informed a way as we can manage. There are no unequivocally correct answers, only theories and opinions. In the last analysis, we must decide for ourselves. Consequently, we owe it to ourselves to do two things:

1. Become as knowledgeable as we can about the choices and issues facing us, including the nature of knowledge and knowing and what it means when we use terms like "knowledge management."
2. Muster up as much clear thinking as we can because shoddy, muddy thinking will do us no good at all, whether in relation to knowledge management or any other area of endeavor.

This article represents an effort on my part to share some of what I think I know about knowledge, knowing, different categories of knowledge and how they relate to one another. I wrote it because I believe it is important for an aspiring area of professional practice such as knowledge management to develop a professional language that is as precise and stable as we can make. If we fail to do this, we are faced with the prospect of conversations dominated not by substantive issues but by repeated requests for definitions of the terms being used. If knowledge management is to become an area of professional practice, there must some traces of a standard language and I hope this article is a step in that direction.

In closing, and to turn what I've said on itself, this article is itself explicit and declarative in nature. Some readers might conclude that I possess some implicit knowledge and that would be consistent with what I've written. There is, however, not one whit of tacit knowledge contained in this paper; there can't be because tacit knowledge can't be articulated. Nor is there any procedural knowledge in this article, unless you are of the mind that descriptions of methods or procedures count as procedural knowledge. I don't but you might. Nor is there any strategic knowledge in this paper; indeed, I take that construct with a large grain of salt. But, then, who's to say? You might *know* better than I.

References

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