Knowledge Management Systems: Action and Representation

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Abstract
Knowledge management systems can be regarded as a form of representation of the results of action and reflection in an explicit form. Users of such systems undertake readings of these representations as an input to their own action and reflection. These processes are theorised in the paper, drawing on some work of Polanyi and Giddens. The theory is illustrated by a particular case example. Some implications are also developed for practice with respect to knowledge management systems.

1   Introduction

Knowledge and its 'management' have been seen as important topics over the last decade, and much has been written in both the practitioner and academic literatures. A key figure in the early literature was Ikujiro Nonaka (1991, 1994). He popularised the distinction between 'tacit' and 'explicit' knowledge, and developed the well-known spiral of organisational knowledge creation drawing on the dynamic process of conversions between these knowledge types. Although Nonaka himself was concerned with individual and group communication processes, it is arguable that his view of knowledge as an object, able to pass between different states, contributed to the idea that 'knowledge management systems' could be used to 'externalise' and 'combine' tacit forms of knowledge. It is somewhat ironic that Nonaka drew the tacit/explicit distinction from the work of the philosopher Michael Polanyi, since the view of 'knowledge-as-object' is diametrically opposed to Polanyi's ideas, as we shall see later in this paper.

The knowledge-as-object approach is still influential. However, there has been an increased emphasis in recent years on practice-based theories of knowing and learning (Blackler 1995, Blackler et al, 2000), and the importance of context in designing and implementing knowledge management initiatives (Thompson and Walsham, 2004), including those involving information and communication technologies (McDermott 1999; Walsham 2001). One highly visible aspect of these approaches is work on 'communities of practice' (Lave and Wenger, 1991; Wenger, 1998: Brown and Duguid, 1998), or more generally knowledge communities (Barrett et al, 2004). Empirical evidence shows that these communities are formed within organisations, but also between people in different organisations, coming together across boundaries to learn and 'share' knowledge on particular topics (Anand et al, 2002), or to collaborate collectively on the development of artefacts such as software (Markus et al, 2000).

This emphasis on knowledge sharing within and between communities is welcome, and I will return to it later. However, I first wish to go back one step, in the next section of the paper, to look at more atomistic processes of knowing. In particular, I revisit the work of Polanyi to see what can be learnt about processes of action and representation that underpin human learning and communication. In addition, I draw on the work of the sociologist Anthony Giddens to further theorise the social processes involved. Following the theoretical section, I provide an empirical example of the use of a knowledge management system, and I analyse

the example using the theory developed. Finally, I derive some implications for practice, and draw some conclusions.

2   Action and Representation

2.1   A Theory of Knowledge

In discussing human beings' perception of the world, Polanyi (1966) introduced the notion of tacit power as the way in which we actively shape or integrate new experience to discover and believe new knowledge:

> 'I am looking at Gestalt (perceived organised whole that is more than the sum of its parts) … as the outcome of an active shaping of experience performed in the pursuit of knowledge. This shaping or integrating I hold to be the great and indisputable tacit power by which all knowledge is discovered and, once discovered, is held to be true.' (p6)

This tacit power produces the deep tacit knowledge that we have of the world in which we live, and this power is different for each individual due to our different initial dispositions and experiences.

In a later work, Polanyi (1969) defines tacit knowing as a triad:

> 'We may say … that the triad of tacit knowing consists in subsidiary things (B) bearing on a focus (C) by virtue of an integration performed by a person (A)' (p182)

Subsidiary things, according to Polanyi, include sights, events and words which, of themselves, do not contain meaning. The individual *creates* meaning from the subsidiary things by an act of integration, through tacit power. He argues that human beings have the capacity to integrate and endow with meanings things of which we possess only a subsidiary awareness. In discussing human acts of communication, Polanyi (1969) identified a distinction between attempts at sense-giving and sense-reading, both acts of tacit knowing:

> 'Both the way we endow our own utterances with meaning and our attribution of meaning to the utterances of others are acts of tacit knowing. They represent *sense-giving* and *sense-reading* within the structure of tacit knowing'. (p181).

In order to illustrate his philosophical ideas regarding tacit power and acts of communication, Polanyi tells a story. He asks us to suppose that we are travelling in a country we have not visited before. By the end of the first morning, we will be full of new experiences and may report them by letter to a friend. In Polanyi's view, this involves three 'integrations', or the holistic blending of experience through tacit power as defined above. The first is an intelligent understanding of the sights and events in the new country, the second is the composing of a written account of this experience, and the third is the interpretation of this account by our friend.

Polanyi discusses the different types of integration involved in this example. He argues that the first triad is mainly cognitive and involves a sense-reading. The second triad, which puts the results of the first into words, resembles more the performance of a practical skill of the sense-giving type, while the third returns to the cognition type of sense-reading, which integrates written and other clues to a meaningful experience. However, although the first

and third triads both involve cognitive sense-reading, Polanyi notes that they are different in character:

> 'We may say that the observed meaning of an experience differs structurally from one conveyed in a letter … the first meaning is *immediately experienced*, while the second is *only present in thought*.' (p189)

Finally, in this short description of Polanyi's theoretical ideas, it is worth noting his views on 'explicit knowledge', such as the contents of books for example or even a single word. Polanyi is clear that there is no objective explicit knowledge independent of the individual's tacit knowing:

> 'The ideal of a strictly explicit knowledge is indeed self-contradictory; deprived of their tacit coefficients, all spoken words, all formulae, all maps and graphs, are strictly meaningless. An exact mathematical theory means nothing unless we recognise an inexact non-mathematical knowledge on which it bears and a person whose judgement upholds this bearing.' (1969, p195)

He argues further that all knowledge falls into two classes. It is either tacit or, if subsidiary aspects are made explicit in a book for example, then its meaning remains rooted in tacit knowledge.

2.2   An Adapted Model of Communication

Polanyi wrote the theoretical material outlined above before the days of modern information and communication technologies. His example of the traveller describes a direct sensory experience of events and its communication to a friend by letter. However, I wish to argue that his theories provide a very valuable basis for thinking about communication in the contemporary world, involving any form of technology. I will illustrate this with a real-life example in the next section of the paper, but in this sub-section I wish to adapt Polanyi's ideas to derive a basic model of communication shown in Figure 1 below.

Figure 1: A Model of Basic Communication
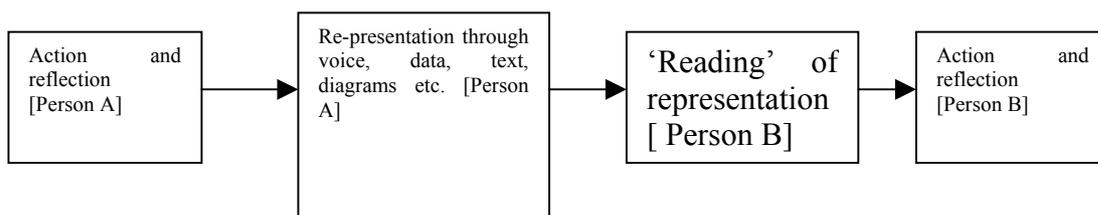
This four-stage model, like the story of the traveller, starts with action and reflection on the part of a particular individual, Person A. This person may be travelling to a new country, or carrying out some standard business activity such as a meeting. Regardless of the specific type of action they are undertaking, they are engaged in a whole range of sense-reading activities, reflecting on the action that they are taking, and absorbing subsidiary sights, sounds, and events. They perform integrations, based on their tacit power, to create sense out of what is happening to them and around them.

Let us know suppose that Person A wishes to communicate some of this experience to Person B. Unlike the story of the traveller, this re-presentation of the experience could be through media such as data, text, or diagrams, and through technologies such as a database, mobile phone, or a videoconference.   Nevertheless, regardless of the media and the technology, the

process of representation has the same basic characteristics as that of Polanyi's traveller. This is primarily an effort at sense-giving, with the focus being on the content of the communication output, based on the subsidiary awareness that Person A has of their experience, but the meaning of the output to Person A remains rooted in their tacit knowing.

We now look at the third stage where the explicit output is looked at, or listened to, by Person B. As noted by Polanyi, this stage is also of the cognitive type, but is of a different form to that experienced by Person A in the first stage. The 'reading' by Person B of Person A's representation of their experience, is rooted in the tacit power of Person B, and is present only in thought, rather than being based on immediate experience. The integrations performed by Person B with respect to the representations of Person A will also include their subsidiary awareness and knowledge concerning Person A. Finally, to complete the model, Person B will then engage in action and reflection of their own, influenced by the change in their tacit power brought about by their interaction with Person A's representation of their experience.

2.3 A Sociological Complement

Polanyi's theories, and my adaptation above, are philosophical and psychological in nature, dealing with processes in the human mind and the nature of cognition and knowledge. I wish to complement this perspective with some elements drawn from the structuration theory of Giddens (1979, 1984). This deals more directly with forms of social interaction, and can be used to ask sociological questions about the nature of the communication processes discussed so far.

First, it is worth noting that Giddens' model of individual human knowledge is quite close in spirit to that of Polanyi. Giddens argues, as does Polanyi, that we can know more than we can tell. Giddens talks of 'practical consciousness' as being our ability to do things, whether that be riding a bike, or sensing the motivations of another person. He distinguishes this from 'discursive consciousness', which is the ability to express our knowledge in explicit forms, for example through verbal or written communication. Giddens and Polanyi both see a distinct difference between acts themselves, based on highly-intuitive practical consciousness, and their re-presentations through words, based on the skill of discursive consciousness.

However, what I would mainly like to draw from Giddens for the purposes of this paper is his three modalities of human agency/structure, namely interpretive schemes, norms and power relations. I believe that these can be used to ask some sociological questions about the nature and reasons for particular re-presentations (or deliberate misrepresentations) made by human actors. Interpretive schemes relate to how things are represented, whether through databases, reports, or verbal communications. Norms relate to what is normally represented and for whom. A focus on power relations implies questions about who requires particular representations, for what purposes, and what incentives (or disincentives) are provided for specific representations.

3 Case Example: Compound UK

Compound UK is the pseudonym for the UK selling division of a multinational pharmaceuticals company. The company is concerned primarily with selling products, such as drugs, to hospitals and general medical practices. The company implemented Lotus Notes, the leading groupware technology at that time, to enable improved knowledge sharing and team-working. Fuller descriptions and analyses of the case can be found in Hayes and Walsham (2000a, 200b). My purpose here is to select one example of a knowledge management system from the case, and analyse this from the theoretical standpoint developed

above. The specific example I have chosen is the system to to record details of the visits made by employees, particularly salespeople, to doctors in clinics and hospitals. The details included structured information such as the date of the visit and the name of the person visited, which were stored in a contact-recording database. However, salespeople were also encouraged to record less-structured observations about the contact person or people, the context in which they worked and the outcome of the visit in terms of business prospects. Such details were stored in a strategic-selling database. The purpose of the latter was to bring together different employees' knowledge of the client organisation in order to complete a successful sale.

3.1   An Analysis of Communication

Looking first at the basic model of communication in Figure 1, I argue that it fits well to the Compound UK example. In the first stage, the salesperson visits the doctor's clinic or the hospital, and brings their tacit power to bear to make sense of this experience. In this case, unlike Polanyi's traveller example, the re-presentation of the visit in the second stage is stored in a computer system, as a contact record or a strategic selling sheet, but the theoretical principles are the same as for a letter. The representation is an effort at sense-giving, but the meaning of the explicit output to the salesperson is rooted in their own tacit knowing, and in no sense fully reflects their knowledge of the customer. They know more than they can tell.

Moving to the third stage of the communication model, we need to consider how another employee of Compound UK will 'read' the representation. The first obvious thing to note is that they will bring their own tacit power to bear in order to create meaning from the computer records, and thus the meaning to them will not be the same as for the creator of the representation. As noted by Polanyi, their reading is also of a different type, not being based on immediate experience, but being only present in thought. The tacit power the 'reader' brings to bear on the computer records will take account of their knowledge of the creator of the records, and their own knowledge of the customer if any.

In the final stage of the process, the 'reader' will take their own actions based partly on the meaning they have created from the records. As we shall see in a moment, this meaning can be highly diverse. Even a simple numerical statistic such as the number of visits recorded by a particular salesperson in a specific period can be used to create different meanings for different people. A simple analogy of the four-stage process is a form of 'Chinese whispers' in which the original 'message' goes through a series of distortions. We start from the ontology of the clinic or hospital itself, and end up at the action taken by the reader of the salesperson's representation.

3.2   Sociological Analysis

I argued in the earlier theoretical section that the adapted model of communication based on Polanyi's ideas could be usefully complemented by some sociological analysis based on the work of Giddens. I suggested a series of questions about the nature of and reasons for particular re-presentations made by the human actors. Let us now apply these questions to the Compound UK example.

Why was the particular form of representation chosen? The first thing to note is that both the contact-recording system and the strategic-selling system were implemented top-down i.e. senior management required that salespeople entered data into them. There was, however, some ambiguity as to the motives behind this. Some senior managers suggested that Notes should be viewed as 'empowering', and that members of the sales force should only input

contacts that they deemed relevant to future sales situations. Other senior managers suggested that salespeople should input a significant number of contacts to prove that they were working hard. Hayes and Walsham (2000a) describe this as competing discourses of empowerment and control.

What types of representation were perceived as valuable by the salespeople themselves? An example of this is the clear distinction that was made by many salespeople about the strategic-selling sheets for primary care clinics versus hospitals. The former was often perceived as of little use, since primary care is not inherently complex and the pharmaceutical products are fairly standard. In contrast, strategic selling sheets were normally perceived as more useful in the complex hospital setting. Thus, in the language of Polanyi, sense-giving attempts in the former were not necessarily criticised for their sincerity, but those attempting sense-reading of the same context found them of little value to a deepening of understanding.

What knowledge of the sense-giver is helpful in order to aid the reader's sense-creation process? A specific example here is provided by one of the senior medical advisors, charged with providing medical advice to the salespeople, who were not qualified doctors themselves. His approach was to form relationships with individual salespeople by harnessing opportunities to meet them in person, for example at training and induction sessions. Electronic interaction, for example through inputting and reading strategic selling sheets, was then thought to be rather more effective due to the face-to-face relationships that had been built. Sense-reading of another person's electronic sense-giving efforts is facilitated by tacit knowledge of the sense-giver.

Who required all this to happen and for what purpose? I have touched on this already in talking about competing discourses of empowerment and control. This example can be extended by looking at the statistic of the number of contacts recorded by a salesperson. One interpretation of this measure is that it reflects how hard a particular person is working for the company. However, an alternative 'reading' is that what matters is whether sales are made, and that the number of contacts does nor reflect this at all. Even a simple numerical measure in a database can thus be interpreted very differently by different readers.

What incentives (or disincentives) were provided to encourage sense-givers and sense-readers to use the knowledge management system? I have described some of the incentives already in terms of the value of strategic selling sheets in hospitals or, more darkly, a salesperson's fear of disapproval from senior management if their contact numbers were low. More generally, Compound UK demonstrated an ambiguity that is fairly common in contemporary business organisations. Senior management rhetoric encouraged team-working behaviour, but financial reward systems were largely on individual performance. This brings us to the question as to what incentives there are for people to participate in knowledge communities, which forms part of the focus of the next section.

4   Some Implications for Practice

I noted at the start of this paper that the literature on learning in knowledge communities, including communities-of-practice, has gone beyond the 'knowledge-as-object' school of thought. Viewed from the perspective of this paper, knowledge communities are a complex network of sense-readers and sense-givers, taking action, reflecting on it, making re-presentations based on their tacit knowing, 'reading' others' representations, and taking further action in turn. Knowledge management systems contain representations. How can we improve our construction and understanding of such representations in order to support

more effective knowledge communities in practice? This is, of course, a very large question that I can only touch on here. However, I can at least suggest a few areas for practical intervention and action, and indeed for future research also.

Firstly, an organisation should look at what incentives (or disincentives) there are for workers to represent effectively, and for other to use those representations. It is no good espousing the rhetoric of teamwork if attempts at sense-giving to others are not encouraged by an individualistic reward system. A question from the point of view of potential sense-readers is whether the topic being addressed is sufficiently important to them and whether new insights are likely by taking the time and effort to read others' representations. It was the failure of this for strategic selling sheets in primary care in Compound UK which led this system to be criticised by its potential users.

What forms of representation should be chosen? Both media and technology choice should be regarded as open questions to be addressed directly by knowledge community members. A blended approach is often the most effective where representations through electronic databases or web sites are complemented by other forms of interaction such as face-to-face meetings. The precise form of representation, and how these are aggregated, is a further question. Compound UK may have been sensible to ask for contact records from their salespeople, but less wise to aggregate the numbers of these as a representation of effectiveness.

Members of knowledge communities can be helped to make better representations. This is not merely a matter of language, although this is important, but also a question of finding out what is valuable to others, and how this should be delivered. The salespeople in Compound UK often found the strategic selling sheets for hospitals valuable, but as far as I am aware no formal training was provided as to how to make more effective inputs to the sheets. Feedback mechanisms can be one approach here, where community members are encouraged to comment positively on the sense-giving efforts of others when they find them valuable.

Sense-reading is greatly helped, as discussed earlier, if the sense-reader has some knowledge of the represeter and his or her context. Our tacit understanding of people is an example of Polanyi's deeply intuitive integration processes, where we see subsidiary details such as the person' physical characteristics and body 'language', but form tacit judgements about their personality as a whole. There is no replacement for this by electronic means, although video contact does offer some value here. Virtual teams, trying to work with others across time and space, understand well the value of face-to-face contact, even if only occasional.

I shall end this section with a more general comment about the potential practical value of an approach to knowledge management systems which emphasises the complexity of sense-reading and sense-giving processes within knowledge communities. My appeal is for a change of language. Knowledge is not an object which can be captured, stored and transferred. We should stop using phrases such as 'knowledge repositories', 'knowledge transfer', and even 'knowledge sharing' if the latter is viewed as two or more people having identical viewpoints. Instead, we should focus on how to support sense-reading and sense-giving processes, how to facilitate knowledgeable action, and how to enable effective interaction between people with different tacit power and understanding.

5   Conclusions

In this paper, I have developed a theoretical model of basic communication, drawing from the work of Polanyi. I have supplemented this with a sociological analysis of communication behaviour, drawing on some concepts from Giddens. It will be clear to the reader no doubt, as it is to me, that the theory in the paper could be developed further. Nevertheless, I believe that its focus on sense-reading and sense-giving in knowledge communities, and the view of knowledge management systems as representations within this context, is valuable. The subtlety of the ideas of both Polanyi and Giddens contrast starkly with some of the cruder knowledge-as-object views in the knowledge management literature.

I have illustrated the theory with a short case example of a knowledge management system in use, and I have drawn some implications for practice. Knowledge management, and knowledge management systems, will not go away in the foreseeable future, although they may be 're-branded'. The core issue of the effective use of information and communication technologies to support knowledgeable actions and interaction in communities will remain a key area for theoretical and practical work. The purpose of this paper was to offer a small contribution to this area.

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