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Frameworks for knowledge: a contribution towards conceptual clarity for knowledge management[1]

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ABSTRACT

Knowledge management has emerged as a growing field of practice and research in response to the recognition that knowledge is a potent force in the economy, and for competitive advantage. The concept of knowledge itself, however, remains vague and unsatisfactory, a situation that may well hinder the development of knowledge management theory and practice.

Several perspectives on knowledge are outlined in this paper, including empiricist, rationalist, autopoietic, connectionist, and situated cognitivist. The latter perspective in particular is discussed in detail, as it provides the useful conceptual distinction between knowing-in-action as a transactional process, and knowledge representations.

The implications for these perspectives for knowledge management practice are discussed. It is concluded that on any definition of knowledge, the management of people in its broadest sense must be a central feature. From the perspective of situated cognition it is argued that knowledge management practice in fact focuses on management of knowledge representations. Knowledge itself cannot be managed, only the conditions of its use-in-action, which necessarily centres on people. Knowledge management practice, if it is to remain distinct from information management, which also focused on knowledge representations, must give pride of place to the management of people.

1. INTRODUCTION

The importance of 'knowledge' for the economy and business has been discussed since at least 1945, (Hayek 1945; Boulding 1966), if only sporadically, and received growing attention from the 1960s (Lamberton 1971). The idea that knowledge could and should be managed, however, seems not to have been seriously considered until a decade or so later. Since the mid-1990s, 'knowledge management' has emerged as a rapidly growing field of management activity, enquiry, writing and research (Scarborough et.al. 1999; Hedlund 1994; 74; Nonaka and Takeuchi 1995; Drucker 1993), and has been described as involving a 'paradigm shift' in business management (Nonaka 1994, Nonaka et.al. 1996).

Contemporary interest in knowledge management is due to a number of developments including:

> 1) an evolution of ideas around information processing and 'information management' that have been around since at least the late 1960s;
>
> 2) companies' experiences of difficulties in the aftermath of downsizing which were due to the loss of expertise and 'knowledge' previously (but unknown to them) held by the very middle managers who had been made redundant;

3) attention to 'the market' and the realisation that employees low in the organizational hierarchy are likely to have access to important customer information that could usefully be captured and shared to facilitate competitive success;

4) current pressures for organizations to innovate in both product and process if they are to remain competitive. This has also been expressed in terms of the increased prominence of themes of dynamism and innovation in business strategy thinking.

5) advances in computer based information and communications technologies that facilitate access to and processing of information on hitherto unheard of scales, together with the appreciation that this information might constitute a source of competitive advantage;

6) the development of the resource based perspective on organizational strategy that emphasises companies' internal organizational capabilities, or core competencies, among which is the knowledge held by employees individually, and in organizational social networks;

7) the increasing economic significance of information intensive products, and consequently of 'knowledge workers' (based on Covin & Stivers, 1997).

The field of knowledge management is currently dominated by writers and practitioners from the information systems and related disciplines (Scarborough et.al. 1999). Recent studies of knowledge management projects (e.g. Davenport et.al. 1998), however, and other related writing (e.g. van der Spek and Spijkervet 1997; von Krogh 1998; Snowden 1997) point to the critical significance of the human dimension, and allied management techniques.

One key problem in this field is that little attention has been paid to what would appear to be a central concept - 'knowledge'. In this paper several perspectives on knowledge will be outlined, with particular attention being paid to situated cognition. On this basis some observations will be made about the character of much knowledge management activity, and about the significance of 'people management' to knowledge management.

2. KNOWLEDGE MANAGEMENT

Hedlund (1994: 74) pointed out that it is not clear precisely what 'knowledge management' means. A recent review suggested it is a multi-faceted, multi-layered concept definable as: 'any process or practice of creating, acquiring, capturing, sharing and using knowledge ... to enhance learning and performance in organizations.' (Scarborough et. al. 1999:1). Lank (1997:73) suggested that knowledge management involves 'collecting, connecting, creating and applying knowledge for short term and long term sustainability.' Myers viewed it as predicated on the capture and storage of knowledge in organizations' systems, processes, products, rules, and culture (Myers 1996: 1-2), while Lank (1997: 76) emphasised making possible connections between people, and argued that effective knowledge management ensures people with needs can find people who know within an organization. Mackintosh et.al. (1999: 551) claim that knowledge management is concerned with managing both 'knowledge assets' ('knowledge regarding markets, products, technologies and organizations') and the processes that act upon those assets.

If the word 'knowledge' as in 'knowledge management' is to meant to indicate the management of something other than what has traditionally occupied managers' attention, as most writers on the subject would probably claim, then designation of the field of knowledge management is likely to rest on how that word is defined. Nevertheless, some writers have suggested that it is not productive to attempt to define knowledge (Snowden 1997:17), or that it is of little use to practitioners to engage in conceptual analysis (Davenport et.al. 1998: 43).

Yet if managers are not clear about what they are trying to manage, we cannot evaluate knowledge management practices, understand the effects of actions taken in the name of knowledge management, assess the relationship of knowledge management to other management activities, or evaluate the claim that knowledge management is just another fad of consultants and academics.

Some authors have provided definitions. Hedlund, for example, used 'knowledge' and 'information' interchangeably and although he acknowledged that they should be distinguished, he did not do so, and his use amounts to treating them as identical (Hedlund 1994: 75). Myers (1996: 2) called organizational knowledge 'processed information', while Davenport and his colleagues (1998:43) defined knowledge as 'information combined with experience, context, interpretation and reflection. ... a high-value form of information ...'. Nonaka and his colleagues describe knowledge as 'a meaningful set of information that constitutes a justified true belief and/or an embodied technical skill' (Nonaka et.al. 1996: 205). In contrast, Bonaventura (1997) took a different approach, and defined 'commercial knowledge' as 'an explicitly developed network of imperatives, patterns, rules and scripts embodied in some aspect of an organisation, and distributed throughout that organization' (Bonaventura 1997:84).

Equating knowledge with information does not get us very far. Nothing is said in these accounts about how 'processing' or 'combination' transforms 'information' into 'knowledge', or how information acquires 'meaning' or becomes 'constituted' as a belief. One abstract concept, knowledge, is defined in terms of another equally abstract concept, 'information', and since this is left undefined a common-sense understanding is implicitly assumed. This, however, will not do: Stamper (1996) has shown that information is a vague and elusive concept susceptible of being understood in a variety of ways. The idea that 'knowledge is justified true belief' was criticized by Plato on the grounds that it raises the question of how the justifiers themselves can be justified (Brown 1994) and so too does not advance our understanding. Bonaventura's approach also leaves us with a number of abstract notions, such as imperatives, and patterns, organizational networks, rules and cognitive scripts (to name but a few!). While these might direct empirical attention, he does not clarify how they relate to each other, or to the overall concept of knowledge.

The situation as regards a definition of knowledge in the field of knowledge management is thus clearly very unsatisfactory. Perhaps this is inevitable. It has after all been argued that 'knowledge' is a 'loose name', one of those '"vague words" one is at times compelled to use' because it has been used to refer to a great many often different things (Dewey & Bentley 1949:48, 78, 92). The lists of 'kinds' or 'forms' of knowledge - know-how, know-what, know-why, and so on - appearing in knowledge management literature bear witness to this confusion (see e.g. Whitehill 1997; Quinn et.al. 1996; Bonaventura 1997; Blackler 1993, 1995). I do not propose to resolve a problem that has occupied many great minds over the centuries, but simply to make some observations and suggestions that might facilitate clarity in thinking about what 'managing knowledge' might consist of in the context of work organizations. I shall also follow Dewey and Bentley (1949) in using 'knowledge' in a loose way throughout much of this discussion.

3. PERSPECTIVES ON KNOWLEDGE

Knowledge management shares with education and artificial intelligence the need for a practical working definition or conceptualization of 'knowledge'. Case (1996) and others (von Krogh and Roos 1996a,b; von Krogh et.al. 1996; Venzin et.al. 1998) have described several perspectives on knowledge on which this account is based. Although there are terminological differences, Case's (1996) framework of three traditions: the empiricist, the rationalist, and the cultural or socio-historic, will be used to provide an outline. Situated cognition (Clancey 1997a) is here included in the latter category as it seems to be highly

compatible. The relationship of autopoietic (von Krogh et.al. 1996; Sierhuis and Clancey 1997) and connectionist perspectives (Venzin et.al. 1998) to these three traditions will also be indicated since these have been invoked in the context of knowledge management.

3.1 The empiricist tradition

This has its origins in British empirical philosophy (Case 1996: 75). Aadne et. al. (1996) and von Krogh et.al. (1996b) refer to it as the representationist or cognitive science approach. The fundamental assumption is that there is an external world which we perceive through stimuli affecting our senses. Our minds detect patterns in those stimuli, which are subsequently stored in memory as knowledge. Treating individuals as metaphors for organizations, this approach is applied to organizations which are thus said to process and transform information obtained from outside, derive knowledge as a result of processing, and store it in organization-wide knowledge structures (Aadne et. al. 1996: 24-6; see also von Krogh et.al. 1996, 162-3).

Knowledge is conceptualized as real entities in the form of mental representations in peoples heads (Lave 1993:12) of other real entities located in the pre-given external world. It is regarded as universal and objective, governed by the external world; resulting from information processing; and enabling problem solving (Aadne et.al. 1996:11-12; von Krogh et.al. 1996: 162-3). The view of knowledge as rooted in processes and places (real or metaphorical) external to the person who knows is a central distinguishing feature of this perspective (Case 1996: 75-7, 79, 82). Knowledge can be defined as 'a repertoire of patterns that we have learned to detect and operations that we can execute on these patterns' (Case: 1996: 82). This perspective dominates the field of knowledge management (von Krogh and Roos 1996).

3.2 The rationalist tradition

While the empiricist perspective assumes, by a large, a passive role for individuals and organizations as receivers of externally generated stimuli, the rationalist approach (Case 1996: 77-9) allocates a central role to individuals in the construction of knowledge. From this perspective, the senses provide data to the mind, that in turn imposes order on what is perceived. Thus in place of mind as pattern detector we have mind as pattern creator. Langer (1969: 7-10) described this approach as the 'autogenetic thesis that *man* [sic] *develops to be what he makes himself by his own actions*' (1969: 7 italics in original). He suggested that it is based on a Kantian view of autogenesis which assumes an organism to be self-organizing, with the power to generate or construct its own growth. Knowledge is thus seen as originating primarily in the person's actions in and on the world, and therefore as located in individual cognitive processes (Case 1996: 82). A definition of knowledge consistent with this perspective is that it is 'something that is constructed by the mind, and evaluated according to rational criteria ...' (Case 1996: 83).

Von Krogh and his co-authors have outlined an 'anti-representationist' theory of organizational knowledge based on the theory of autopoiesis (von Krogh et.al. 1996; Venzin et.al. 1998). This theory was originally developed in neurobiology to explain the functioning of biological organisms (Capra 1996:96-8; von Krogh et.al. 1996: 160-62). At its heart is the notion of a closed, self-sustaining system of interacting components, such as a biological cell (Capra 1996: 197-8). According to von Krogh and his colleagues, autopoietic theory suggests that 'cognition is a creative act of bringing forth a world. Knowledge is a component of the autopoietic (self-productive) process ... [and] is not abstract but rather is embodied in the individual ...'. Knowledge is something known by individuals, and is thus dependent on their viewpoints - 'Managers use established knowledge to determine what they see, and they use what they already know to choose what to look for in their environments ...' (von Krogh et.al. 1996:163-4). Venzin et. al. (1998:43) suggested that from the autopoietic perspective,

knowledge can be defined as something that 'resides in the mind, body, and the social system. It is observer- and history-dependent, context-sensitive ...'. The emphasis in von Krogh et. al. (1996) is thus on the self-referentiality of systems conceptualized largely in terms of ideas and concepts. This appears to indicate that autopoietic theory relies on the key assumptions of the rationalist tradition, namely, the 'autogenesis' of the system. On the other hand Sierhuis and Clancey (1997) link autopoiesis with situated cognition in a conceptualization of knowledge that is very similar to that of the socio-historical approach, and the place of autopoietic perspectives may require further clarification.

3.3 Connectionism

Before looking at socio-historical and situated perspectives mention must be made of connectionism. Connectionism (also known as neural networks) refers to a class of computational models of cognition in which processing is carried out by large numbers of relatively simply elements. Each element receives input (excitory or inhibitory) from one or more other elements, responds to those elements, and in turn excites or inhibits the activity of yet more elements. Thus what the system 'knows' only emerges as interactions occur - connectionist computer systems do not have programs in the sense of a set of complete instructions in the manner of other computers. Knowledge is therefore present only in the patterns of activation and aggregate activities of many units in the network (Schwartz and Reisberg 1991: 440-41; Elman 1998).

Connectionism has been seen by Venzin et.al. (1998:39) to furnish an alternative 'connectionistic epistemology'. Treating a computer neural network as analogous to individuals and to organizations suggests that knowledge should be considered as present only in the patterns of activation and aggregate activities of many units in the network (brain cells, or individual members, respectively). From this viewpoint, organizational knowledge can be conceptualized as 'a state in a system of interconnected individuals', and knowledge as 'dependent on the state of the network of interconnected components.' (Venzin et.al. 1998:40,41).

Edelman (1992:226-7) has pointed out that connectionist models are very poor analogues of brain functioning, and it remains to be seen whether they are any better for organizational functioning. The epistemological implications of connectionism are also unclear. It still adheres to key assumptions of representationism, particularly in seeing the environment as the prime source of knowledge (Venzin et.al. 1998: 39). On the other hand, it undermines representationist models (Werner et.al. 1993; van Gelder 1996) and some versions appear compatible with analyses of mediated action (Wertsch 1998: 51-3), and distributed cognition (see e.g. Hutchins 1993), two concepts which have strong affinities with the radically different socio-historical perspective on knowledge.

3.4 The situated cognition and cultural or socio-historical perspectives

These two distinct streams of theorising and research are linked together here because they appear to be complementary, at least as regards 'knowledge'. Situated cognition is part of the emerging 'situative perspective' on human behaviour, learning, development, cognition, and psychology (Greeno et.al. 1998). 'Situated cognition' is something of a misnomer since from this perspective all cognition is situated. For the present, however, we have to use this term to distinguish it from mainstream cognitive science. Development of the concept owes much to Clancey's discussion of problems arising from the representationist legacy in artificial intelligence (e.g. Clancey 1995, 1997a, 1997b). His argument is a complex one, ranging as it does from artificial intelligence and cognitive science to ecological psychology, models of brain functioning, and the sociology of knowledge. He also emphasises the importance of 'activity', a key socio-historical concept, although he appears to use it in a less specific sense than the latter tradition.

The cultural or socio-historical perspective has it origins in the cultural-historical school of Russian psychology of which Vygotsky was a founding figure (Case 1996: 79-81) and is also known as activity theory (Engeström and Miettinen 1999:1). Activity theory emphasizes the importance of the historical, object-oriented and collective nature of human activity and knowledge (Engeström and Miettinen 1999: 10-12; see also Blackler 1993; Engeström et.al. 1990, 1999; Engeström 1993). It also shares many key assumptions and perspectives with pragmatic philosophy, symbolic interactionism, situated learning, situated cognition, and theories of mediated action (Engeström and Miettinen 1999; Star 1996; Lave and Wenger 1991; Clancey 1997a; Sierhuis and Clancey 1997; Wertsch 1998).

Star (1996) and Toulmin (1999) both see activity theory as providing a way to escape the dualism of viewing knowledge as determined either by an external objective world, or by the power of human rational thought because it provides a way of showing that *both* sources are inseparable. Toulmin drew out some of its implications for understanding knowledge, and suggested that the state of knowledge can be described as the established procedures of any professional discipline, '*at a given time*' (Toulmin 1999:60, emphasis in the original). On this account, 'knowledge' is provisional, and subject to verification by procedures accepted by social groups. Toulmin confined his comments to 'professional work', but there seems no reason not to extend his definition to any and all kinds of human activity. These procedures do not 'belong' to any one individual, but are always the property of groups or collectivities of people ('communities of practice' - Lave and Wenger 1991) as they are developed through interaction and dialogue between individuals, in the context of activities such as work.

This approach is also characteristic of situated cognition. Clancey defined knowledge as the 'capacity to interact, to reflect, to innovate.' (1995 :12); 'to coordinate and sequence behavior' (1997b:3); the 'capacity to engage in an activity' (1997b:19). Ryle, whose debt Clancey acknowledged (Clancey 1995:2), similarly argued that: ''Know' is a capacity verb... of that special sort that is used for signifying that the person described can bring things off, or get things right. ...' (Ryle 1949/1963: 128). Clancey places this perspective in context when he talks of 'viewing knowledge as a capacity attributed by an observer, not as a static "body"' (Clancey 1997a: 172).

This distinction is an important one. Typically in earlier philosophical discussion, in artificial intelligence, education, and generally, we employ metaphors of knowledge that suggest it is a 'thing' that people have, that can be stored, and so on. 'Capacity' could be understood still as referring to a 'thing' but whether it can be meaningfully understood *as capacity* if considered apart from 'being possessed' is questionable. Assume A is a capacity of B, if it is separated from B, then it ceases to be a capacity of B, and becomes something else. In the context of 'knowledge' and considering 'knowledge' to be indicative of some relationship between a knower and a known then this approach indicates we should consider 'knowledge' only in the context of a knower-known relationship (or transaction) (Dewey and Bentley 1949; Clancey 1997a).

Clancey suggests that a more appropriate metaphor for knowledge, as befitting a capacity, is of 'energy' (Clancey 1995:2; 1997b:6). He does not dwell on this metaphor, and its full implications have not been worked out. Maxwell, whose work on electricity paved the way for the twentieth century revolutions in physics, wrote that his work showed that "the energy of a material system is conceived as determined by the configuration and motion of that system" (Maxwell 1877, quoted in Dewey and Bentley 1949: 106). This clearly fits well with Clancey's view that knowledge is '*dynamically constructed* as we conceive of what is happening to us, speak, and move' (Clancey 1997b:7); knowing occurs in the process of acting (Sierhuis & Clancey 1997). Further, 'knowledge' 'corresponds to conceptualizing and other representing processes in the brain' (Clancey 1997b: 26). Knowledge is simultaneously 'inherently "neural" in form' (as a process in the brain), and 'inherently social in content'

because it develops with respect to activities, which are themselves socially constructed (Clancey 1997b: 3, 14, fn 5).

The theory of situated cognition provides some conceptual tools that clarify this approach. We need therefore to look little more closely at this concept, to understand in what senses cognition is 'situated'. First, however, we need to consider two key concepts: situation, and activity.

Clancey defined situations as '*conceptual constructs*, not places or problem descriptions' (Clancey 1997b: 3 italics in original). He argued that 'we segment the world perceptually, within the rubrics of our activities. In our interpretive process of qualifying and weighing experiences, ... our process of seeing and naming has created a world ... our interpretations claim which facts are meaningful to the problem at hand...' (Clancey 1997b: 21-2). This social constructivist approach is contrasted with the representationist one which treats structures as inherent in the situation waiting to be discovered.

Activity has a dual nature. On one hand it is a 'means of coordinating action, a manner of being engaged with other people and things in the environment ... a *choreography*.' (Clancey 1997b: 16). Here the emphasis is on relationships between different levels of what people do, which also involves consideration of wider social relationships. A building contractor, for example, is simultaneously engaged in filing plans, filling out forms, being a member of a profession, living in a particular place, and having certain aspirations - all of which impinge in various ways on filing plans, and so on (Clancey 1997b:14-19). At the same time activities are '*conceptualizations* for choreographing how and where tasks are carried out' (Clancey 1997b:3). Conceptualizations are cognitive processes in the brain (Clancey 1997b: 26). Situated cognition embodies the assumption that the social 'choreography' has to be conceptualized at the individual level both for individuals to act appropriately and for such networks of roles to be maintained.

Given these preliminaries, cognition can be understood as 'situated' in three senses: functional or social, structural or interactive, and behavioural or psychological (Clancey 1997a: 25; Clancey et.al. 1998: 6). He derived these categories from a framework used to describe complex systems (Clancey 1997a: 23). Changing the order here to functional, behavioural, and structural highlights the implicit temporal dimension of each category in a way that clarifies their interrelationships.

The functional perspective emphasises the social grounding to how people interpret what they are doing, their intentional stance, and how that can be understood to arise and be shaped. An individual's 'knowledge is *functionally situated* as that of a person who participates in our society in a certain way'; 'knowledge of activities ... is with respect to social relationships and purposes' (Clancey 1997a:24, 27). The building contractor's work provides one such example. Kuhn's (1970: 187-9) account of how novice scientists acquire the appropriate paradigms provides another. Kuhn argued that it is only by doing exercises that a student discovers how to see their problems as like those already encountered, and subsequently to view 'the situations that confront him as a scientist in the same gestalt as other members of his specialists' group. ... they are no longer the same situations he had encountered when his training began. He has meanwhile assimilated a time-tested and group-licensed way of seeing.' (Kuhn 1970: 189). Studies of negotiated order (e.g. Strauss et. al. 1963) and recent ethnographies of work (e.g. Orr 1990, 1996) also illustrate how the process of collective formation of working procedures is developed and sustained. From this perspective, situated cognition is a theory of conceptual content: 'knowledge is inherently social in content' (Clancey 1997b: 14, fn 5).

The second sense in which cognition is situated is a behavioural (Clancey 1997a:25), or psychological one (Clancey et. al. 1998:6). Cognition is behaviourally situated in that in performing, 'perception, movement, and conceptualization are changing with respect to each

other moment-by-moment'. (Clancey 1997b: 12). It is 'grounded' in everyday activity, 'an interactive spatial-temporal setting' (Clancey 1997a: 23), a notion that emphasises 'the local feedback and time-sensitive nature of action in place' (Clancey 1997a:25) and behaviour as being 'improvised by resequencing and recomposing previous behaviors' (Clancey et. al. 1998: 6). The detail of behaviour is shaped by continuous reflection on and feedback from what has just been done. In this way, cognition is a process of continual readjustment of the next step in the light of what has just been accomplished: 'action changes the person and the environment' (Clancey et.al. 1998:6).

Clancey is somewhat ambiguous about this aspect since elsewhere he merges it with the social or functional perspective (Clancey 1997a: 27), but it does appear as distinct, and important, not least as from a temporal perspective it lies 'between' the social and the structural forms of knowledge. Time in the functional sense of situated is implicitly 'long' relative to behavioural situatedness since behavioural processes always occur within social-functional contexts.

The link between these two situated aspects of cognition can be illustrated by a reflective account of craft blacksmithing, framed within activity theory (Keller and Keller 1993). This account describes how one of them, an amateur blacksmith, prepares for and begins to make something 'in the spirit' of a 19th century kitchen implement. Preparation involved examining historical examples and records; reviewing other information about the tools, previous making of similar tools, and information about materials, skills, and production constraints (Keller and Keller 1993:130-35). Thus 'an umbrella plan, an internal representation of goal and procedure.' (Keller and Keller 1993: 135) could be formed which was subsequently modified in the course of the manufacturing process: 'microorganizations of task conception and material conditions, are developed in the act of production ... . It is in these specific productive steps that reorganizations of knowledge and action take place' (Keller & Keller 1993: 135). They concluded:

> One needs, therefore, to know enough directly or indirectly to conceptualize an orientation toward a goal: to provide a combinatorial arrangement of previous knowledge in the service of a new, and therefore partially unknown, production. Beyond this point ... what one needs to know to behave appropriately becomes a product of behaving. ... "All one needs to know" is only specifiable on the attainment of a goal ... . (Keller and Keller 1993: 141).

The cognitive processes involved in this activity were socially situated by the maker's concern to meet social expectations of the 1990s about the authenticity of 19th century replica tools. In order for the artefact to be 'in the spirit' of a genuine one, they used *relevant* sources of information to determine what it might look like, and so on. Further, manufacturing was behaviourally situated in that, as they put it, 'what one needs to know ... becomes a product of behaving'. Interaction with the implement-in-the-making, together with internal representing and conceptualization, shaped the next act on a 'moment-by-moment basis'.

The third, structural, dimension of situatedness concerns the 'physical structure of knowledge' (Clancey et. al. 1998:6). It is largely a hypothesis about brain functioning and the manifestation of knowledge as capacity to act at that level for which he draws on Edelman's theory of neuronal group selection (Clancey 1997a: 146-70; Edelman & Tononi 1995) and on ecological psychology (Clancey 1997a: 201-63). This review leads him to develop a model of cognition in which 'perception, conception, and action are physically coordinated' (Clancey 1997a:24). Thus, for example, we perceive a two-dimensional drawing as three-dimensional because we perceive drawings as being about things in the world we have encountered: 'human perception and meaning attribution arise together; they are coupled through experience and influence each other.' (Clancey 1997a:24). Cognition is situated, from this perspective, because conceptualizing is linked to sensori-motor coordination

(Clancey 1997a:28). This aspect of cognition is linked to the other two through the 'mechanism' of conceptualization - 'The conceptualization of a *social action* involves a kind of internal feedback that permits people to conceive *that they are conceiving ...*' (Clancey 1997a:28). This dimension is temporally 'contained' within the second while at the same time pervading and underling all cognitive activity.

If 'knowledge' is a capacity, 'embodied' in conceptualization (a neural process) and in behaviour and social actions, what are we to make of books, computer file contents and other forms of what we typically refer to when we speak of 'knowledge'? One of the strengths of situated cognition, particularly Clancey's formulation, is that it provides an answer that also facilitates conceptual development of knowledge management. Clancey argued that those artefacts such as books, maps, instructions, goal statements, beliefs and so on, that we typically refer to as 'knowledge' are really *representations* of knowledge (Clancey 1995: 2-4). Representations of knowledge, and knowledge, are distinct entities, not equivalent or interchangeable. Figuratively speaking, knowledge representations lie 'between' performances – the past performance that is reflected on, and the future performance toward which end 'knowing' is directed , (Clancey 1997b: 11-12). He indicated this relationship with the following diagram:

Figure 1 about here

In order for representations to bring into being a capacity on the part of a sentient being, to become knowledge, in the situated cognitive sense, they have to be re-conceptualized (Clancey 1995: 4). Use of representations always involves interpretation and creativity, and interpretation is always contextual (Clancey 1995: 8-10; 1997b: 13). Representations are tools for inquiry (Clancey 1997b: 11).

He developed the concept of representations further by suggesting that there are two types, internal, and external (Clancey 1997b: 11, 14, fn. 4). External representations are those entities such as books, computer files, and so on. Internal representations are internal to an individual's brain, and take two forms – conscious representations, and unconscious representations. Conscious representations are those we use in 'imagined experiences' (Clancey 1997b: 28) when we think through something, consciously representing it to ourselves. Subconscious representing occurs during conceptualization, the neural process at the heart of knowledge (Clancey 1997b: 14, fn. 4). Clancey argues that internal representing is '*coupled* such that perception, movement, and conceptualization are changing with respect to each other moment-by-moment' (Clancey 1997b: 12).

4. 'KNOWLEDGE' AND KNOWLEDGE MANAGEMENT: IMPLICATIONS

The empiricist and rationalist perspectives on knowledge differ as regards the origins and mode of justification of knowledge. One emphasizes external, objective reality as the source; the other, perception and the human mind. That 'knowledge' can usefully be set down in words and other similar forms, appears not to be an issue between these schools of thought. If knowledge is seen as objective or at least externalizable from people then two important consequences follow for the effective management of knowledge. First, knowledge required by an organization has to be identified, obtained, stored, and made available to whichever members of the organization require it. Second, knowledge obtained and possessed by people through doing their work (i.e. tacit knowledge) has to be externalized, and rendered into a form suitable for communicating to others. It has therefore to be separated from the individuals, and made a possession of the organization, if it is to become knowledge for the organization (Myers 1996).

As Aadne et. al. (1996) noted, most knowledge management writers subscribe implicitly to the empiricist or representationist conceptualization of knowledge. For them it is assumed

that knowledge representations *are* knowledge. Once we make the distinction, however, it is evident that the typical emphasis on information and communications technology (software for sharing knowledge, such as Lotus Notes; data warehousing; intranets; data mining; and netcasting), and on modelling, mapping auditing and codifying organizational knowledge (Tissen et.al. 1998; Covin and Stivers 1997, Snowden 1997, Van der Spek and Spijkervet 1997, Davenport et.al. 1998; Myers 1996; Broadbent 1997) means that knowledge management practices focus almost exclusively on knowledge *representations*. To date we do not know what advantage might accrue to firms from such an emphasis, although some reports of benefits have been made (Davenport et.al. 1998; Broadbent 1997). Furthermore, if knowledge management practice does concentrate entirely on knowledge representations it is difficult to see how it might be distinguished from information management (Burke & Horton 1988; Orna 1990), and it may well suffer the same fate as its predecessor.

Leaving that issue aside, it is evident that people, and therefore 'people management' processes in the broadest sense, are critical to both the knowledge management processes. People have to be motivated to use the information and communications technology 'solutions' being deployed in the name of knowledge management, and have to find those resources useful. Second, the explication and recording of tacit knowledge (a critical task, according to Myers (1996)) can only proceed with the cooperation of those people involved. (Incidentally, it is interesting to note that just as AI researchers have recognized the limits of knowledge engineering for programming objects that have to behave such as robots (Clancey 1997a), knowledge engineers are offering their techniques to knowledge managers (see e.g. Mackintosh et.al. 1999)). Third, even if all this knowledge extraction, storage and so on proceeds without a hitch, people are motivated to use the systems, and find what is there interesting, knowledge management is surely only a means to the end of enhancing organizational capacity in order to perform better. The methods designed to obtain cooperation of people with the knowledge management tools and processes, and those designed to obtain performance, cannot be in conflict if the total system of human and behavioural management is to function effectively.

Recent reviews (Davenport et.al. 1998; Brown and Duguid 1998; Scarborough et.al. 1999) have highlighted the importance of many people management factors including organizational culture and infrastructure, motivational tools, and top management support. Culture is regarded as the key factor since it determines the effects of technology, management techniques, and because behaviours such as willingness to share, trust, cooperative relationships, and the absence of a 'not-my-job' mentality seem particularly important to the success of knowledge management (Kim and Mauborgne 1997, von Krogh 1998).

The rationalist perspective on knowledge can also be interpreted in a way to infer that knowledge cannot be separated from people as it is only created and sustained by people in a self-sustaining (autopoietic) process. This approach shares with connectionism the view that at the level of the individual brain knowledge is a state of neural activity. Moving to the organizational level, knowledge is again a state of activity, this time residing in networks of people, which are self-referential as regards the generation and maintenance of knowledge. On this view knowledge cannot be brought 'in' from 'outside' the system or network; not can it be taken 'outside' as it only exists within the network. The idea that knowledge exists in the form of knowledge representations is not accepted in this perspective. It further implies therefore that 'knowledge' cannot be managed directly - only the conditions under which individuals, networks and groups exist and work can be managed, with good or bad effect on the knowledge processes internal to those groups. This conclusion is supported by studies such as that of the Xerox technicians (Orr 1996). This perspective again emphasises that only behaviourally informed knowledge management practices are likely to make a difference.

The situated cognition approach effects a kind of 'reconciliation' between both these sets of implications since it provides a conceptual framework in which knowledge as inherent in and inseparable from behavioural transactions, and as representations of knowledge, can be held. (This would also seem to be true of activity theory, although this remains to be worked out). In addition, it highlights the historically and socially situated nature of any knowledge management process. Knowledge is seen as situated in communities of practice, in actual ongoing behaviour, and in neural form bound to both of these. It is integral to groups and their practices or activities and is therefore effectively inseparable from activity, and thus from the work of managing those activities, and the people who carry them out. Again, therefore, the emphasis must fall on managing the conditions of knowledge production and use. Sierhuis and Clancey (1997:3) argued that 'knowledge management becomes the management of the process of legitimate peripheral participation', a concept developed by Lave and Wenger (1991) to describe an apprenticeship-like form of learning through practice akin to informal and incidental learning processes (Marsick and Watkins 1990; Garrick 1998a,b). Knowledge itself cannot be managed because it is not a manageable substance, only a capacity. These approaches also recognize the potential role of knowledge representations, and therefore suggests that efforts to manage those, such as characterize knowledge management practices, may be useful. The *use* to which such representations are put, however, is what is critical for organizations, and this depends on the human dimensions of the organization.

'Knowing in action' necessarily and irreducibly involves people at work, and the management of the 'process of legitimate peripheral participation' requires skills and knowledge derived from the human sciences, such as psychology, sociology, anthropology, and history. In organizations with a typical division of labour among management specialisms, these skills are most likely to be found in human resource development, training, occupational psychology, and human resource management or personnel specialists. They will naturally have to work with information specialists, but since human activities are central, so must the human sciences be to the management of knowledge. 'Knowledge management' can only work, not as a directive process attempting to control a substance, 'knowledge', but as a facilitative process designed to get the best out of people.

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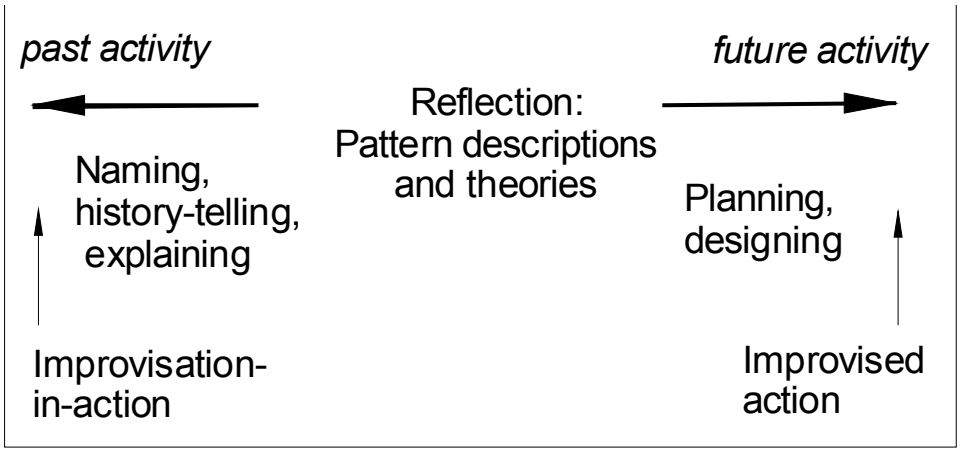

Figure 1: Descriptions lie between performances (Clancey 1997b: 12, fig. 2)