Integrating Doing and Thinking in a Work Context

An Australian Knowledge Management Perspective

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Abstract. This paper aims to provide evidence for the proposition that the Australian Standard creation process parallels a direction of KM research pursued by Information Systems (IS) academics in Australia. Two theoretical frameworks, one task—based and one activity—based, are used in this paper to amplify the innovative insights of the Australian Standard, providing a more substantial theoretical base that is grounded in the practice of integrating production (doing) with the conceptual and cognitive work (thinking) that underpins that production within a specific work context. We demonstrate that the Australian Knowledge Management (KM) Standard, developed by a committee of KM professionals and academics with the input from of a wider community of knowledge professionals working in diverce Australian organisations, has resulted in a representation of KM that is organically aligned with these

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two theoretical frameworks.

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1 Introduction

The study of knowledge and knowing has been at the core of the philosophical enterprise across most cultures. However, the current corporate interest in knowledge is based on a realisation that emerging economic theories, coupled with social and industrial restructuring, demand a more rigorous approach to the exploitation of knowledge as an organisational resource (Drucker 1998). In Australia, this interest has been taken to a new level with the publication of an official Australian Standard (AS5037-2005) for Knowledge Management (KM), notably the first of its kind in the world.

This Standard was developed through a consultative process over a four year period from 2001-2005 by a multidisciplinary committee of industry representatives, KM practitioners and academic researchers and is written primarily to guide and inform business and government organisations. This paper aims to provide evidence for the proposition that the Australian Standard creation process parallels a direction of KM research pursued by Information Systems (IS) academics in Australia. This research produced a body of knowledge that is grounded in the complex realities of organisational work practices. The main philosophy of these KM theories postulates that doing and thinking are integrated in the phenomenon of knowledge work (Linger and Burstein 2001). We suggest that this approach to KM may strike a common chord with IS researchers in Scandinavia.

The Australian KM Standard is not a traditional prescriptive standard (see Bowker & Star 1996), but rather a dynamic set of guidelines that describes the current understanding of the KM field designed to inform organisations and guide practice. Over the four year period of its development the approach to KM in the Standard evolved from one based on a consensus of best organisational practice to one that was more organic and integrated, based on the amorphous notion of a knowledge eco-system. The resulting content of the Standard was deliberately not based on any coherent theoretical framework. However, since it is practice focused by intention, it does resonate with task-based and activity-based approaches proposed by a cohort of Australian IS researchers working in the KM field, represented by the authors of this paper.

We begin the paper with an analysis of the Australian KM Standard, and its evolution, before applying the lens of our research paradigm which empha-

sises a middle-out approach to KM, focussed on work practice. This research has identified a significant deficiency in the way KM is understood in organisations, where the focus is either on individual knowledge or on formal processes at the organisational level. Neither of these traditional foci recognises that most knowledge is created through work in groups and networks that are not explicitly recognised in the formal organisational structures and processes.

A case study of the Australian Defence Organisation (ADO) is used to illustrate the analytical power of the practice-focused KM approaches for understanding processes of learning in such complex organisational environment.

2 The Australian KM Standard

In order to place this paper firmly in the Australian context this section presents a precis of the Australian KM Standard. The Standard is distinctive in that it takes KM into the realms of complexity and emergence and away from the world of hierarchies and bureaucracies. As such, it is a document that encapsulates much of the pioneering spirit of KM research "down under".

2.1 The Background Driving the Standard

Many Standard bodies throughout the world were alerted to the importance of the growing field of KM at the turn of the millennium. The explicit acknowledgement of the value of knowledge as an organisational resource in the early 1990s lead initially to a focus on codifying knowledge as information and on the technology to store and disseminate this information. This promoted a view of KM as an organisational initiative that was strongly process oriented and, most importantly, as a process that could be managed, controlled and measured. This commodity view of knowledge can be readily incorporated into economic theories and is consistent with a top down organisational perspective.

On the other hand, the current interest in KM was also instigated by the popularisation of tacit knowledge, especially the interpretation of Polayni's (1966) concept by Nonaka and Takeuchi (1995) in their book The Knowledge Creating Organisation. This approach focused on the individual and knowledge that cannot be articulated and represented symbolically. Tacit knowledge is private but it is also social and manifested in the relationships within social networks. This is a more complex view of knowledge as it involves many concepts that allow the individual to interpret their world and act in that world.

This approach focuses on knowledge sharing and learning as the means to construct and re-construct individual knowledge. It also implies that context, complexity and dynamics are integral to knowing and understanding how knowledge is used.

KM initiatives in an organisational context are reflected in people's activities. Explicit organisational knowledge is expressed in the definition of work processes while individual tacit knowledge is expressed in terms of competencies, skills, expertise and the social construction of this capability. The actual work practices used in production reflect both explicit and tacit knowledge. Underlying both approaches to KM is the dialectic system of production and management, underpinned by ICT, to match a rapidly changing environment. This systemic approach has been the driver for many IS researchers to see KM as a field relevant to their interests.

The two approaches to KM described above address work activities in an organisational context but do not have the analytical precision to understand the complexity of how work is actually done, what is being done, who does what and how learning occurs in those activities. Our KM research focuses primarily on work practices in a social context, and represents a "middle out" approach to KM. From this perspective, the main aim and value of organisational KM lies in understanding of work practices in a "bottom-up" motion, complemented by strategic adjustment of organisational and group processes, suitably supported by ICT, in a top-down motion. Moreover it offers a synthesis between the vertical organisational hierarchy (in terms of corporate, group and individual levels) and the horizontal social network engaged in a specific enterprise or practice. As a result, it provides a context for individual action and makes sense of that practice in terms of organisational goals.

The Australian KM Standard has resulted in a representation of KM that is organically aligned with this view.

2.2 The Evolution of the Australian KM Standard

In recent times the scope, pace and success rate of the standardisation processes has changed drastically, providing both uncertainty and new opportunities. Standards can be prescriptive to be enforced by laws or regulations. Others, such as the KM Standard, are descriptive best practice guidelines or simply a timely informed description of the current landscape in an emerging area. Standards Australia has developed a practice of identifying emerging issues, within the growing complexity and sophistication of modern business, where managers needs guidance in how best to proceed in a changing environment. While this has opened the door for different standardisation concepts

and processes, as well as different forms and styles of Standards, some criticism and controversy has been levelled at projects to create Standards in areas such as risk, governance (Vincenti 2003) and particularly KM (Australian KM Committee 2004; Hasan and Lee 2004).

Standards Australia's entry into the field of KM began in 2000 with a consultation process leading to the production of a KM Handbook (HB275 2001). This created such interest that a committee was formed, representing a wide range of professional organisations to develop a KM Standard. The Interim Standard (AS5037[Int]) was released in 2003 for comments and this feedback. In late 2005, a substantially revised document was launched as the Australian Standard (AS5037 2005) that reflected the professional and academic community feedback on the Interim Standard as well as the advances in KM over the ensuring two years. After a short break The committee plans to reform shortly to monitor the growth of KM and amend the Standard appropriately.

The three KM documents published by Standards Australia show an evolution of KM theory and practice. The Handbook (HB275 2001) was based on the framework developed by the committee but was grounded in practice. It encapsulated concepts and relationships for understanding, developing and implementing KM in a way that was quite new at the time. This document reflected the top-down process view of KM described above.

Building on the Handbook, the Interim Standard (AS 5037 [Int] 2003) saw KM as a diverse multidisciplinary field that was rapidly evolving with strong links to culture from both a workplace point of view and from a wider societal context. The objectives of the Interim Standard were to:

- describe the key concepts of knowledge management,
- provide a model for exploring how different aspects of knowledge management can be used to help an organisation achieve its strategy, and
- reflect emerging practices in knowledge management.

The KM model, while emphasising the dynamic, integrated and balanced nature of its components, is based on the principle that effective and relevant KM must be aligned with the overall organisational strategy. Although this is laudable and makes sense, it restricts KM to support existing thinking and not being an agent for organisational change and learning. The Interim Standard also assumed a top-down process view of KM suggesting a linear process that followed three key phases in developing and implementing KM:

- understanding the context for KM,
- conducting a knowledge gap analysis, and
- facilitating knowledge in action.

The final version of the Standard (AS5037-2005) offers a more scalable and flexible framework for planning, implementing and assessing KM strategies that respond to an organisation's state of readiness and topography. It takes the stance that KM can transform organisations and not just be aligned with current objectives and strategies. The Standard aims to assist organisations to assess whether an organisation is ready to adopt KM concepts and understand the environment best suited for enabling their KM activities followed by methodologies and advice on how to implement the Standard within the context of an organisation's internal and external environment. The current KM Standard is a substantial departure from the Handbook and Interim Standard as it offers a synthesis between the vertical organisational hierarchy and the horizontal social network of knowledge work.

2.3 An Overview of the Australian KM Standard

As noted in the press release for the launch of the Standard

> the new standard provides an easy-to-read, non-prescriptive guide, which helps individuals and organisations improve their understanding of knowledge management. It offers a flexible framework for designing, planning, implementing and assessing policies and initiatives to improve knowledge management in an organisation. It also includes practical notes from knowledge management implementations and a section which covers six emerging areas: complexity, innovation, the creative economy, sustainability, working in a global culture and technology (Standards Australia 2005).

The Standard does not promote a prescriptive, universal, linear KM process but rather a cyclic set of three phases:

- Mapping: an audit of the current organisational KM state in the local context and culture and identifying suitable KM goals.
- Building: experiences and linkages: this is the vital phase of prototyping, trialling projects, building trust, generating champions.
- Operationalising: initiatives and capabilities: including determination of effectiveness, measurements and performance evaluations.

The Standard represents the elements, enablers and other KM factors as a knowledge eco-system. This concept is strongly influenced by notions from Complexity Theory (Snowden 2002) where cause and effect cannot be predicted in advance and attractors and boundaries replace rules and control. It recognises that every KM initiative is different and unpredictable, because of the unique context of each organisation. It recognises that any KM process is

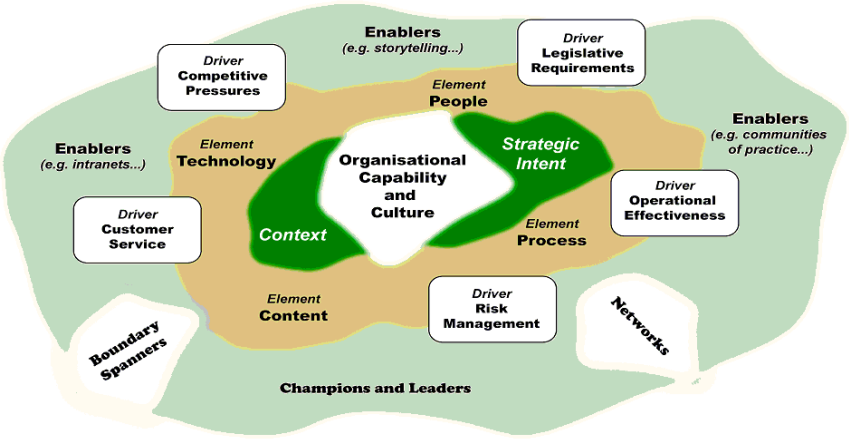

Figure 1. A visualisation of the Knowledge Eco-System from the Australian KM Standard

organic and emergent rather than mechanistic and controlled. The knowledge eco-system expresses the pragmatic and practical interpretation of these concepts and is reflected in the *Building* phase of the KM process. The Standard also suggests possible enabling processes and technologies to support KM initiatives but warns that what works in one organisation at one time might not be appropriate at others. To reinforce the emergent nature of KM, the Standard includes sections on how to evaluate the effectiveness of KM initiatives and programs as well as sections that identify current trends that may determine the future directions of KM.

2.4 A Theoretical Interpretation of the Significance of the Knowledge Eco-System

KM in organizations, whether the focus is on explicit or tacit knowledge, has little concern for theory. Likewise, the Australian KM Standard committee was tasked to focus on producing a document to benefit the practice of KM in organisations and so had no mandate to address issues of KM theory. However, the status of the Standard in representing current KM thinking to the real world behoves KM researchers to analyse and align theory and practice. The Australian context gives us an opportunity to do this and we do so now.

The practical implementation of KM in most organisations is directed from the top and oriented toward processes that can be managed, controlled and measured in a mechanistic and bureaucratic fashion. On the other hand, the

resurgence of theoretical research in KM has followed the work of Nonaka and others, in the 1990s (e.g., Nonaka and Takeuchi 1995) focusing on the tacit knowledge of individuals (Polanyi 1962) with an emphasis on their collective contribution to organisational memory and learning (Spender 1996). The entities and context of KM from this perspective form a complex set of inter-relationships that may best be described as organic rather than a machine or bureaucracy.

The Australian KM Standard has used the concept of a knowledge eco-system to represent the core organic nature of KM and to provide a more relevant guide to KM for practitioners than the constrained, process-oriented approach currently prevalent in organisations. This is mirrored in the various theoretical foundations to the work of several Australian IS-KM researchers. These include the sense-making approach of Cecez-Kecmanovic (2004), the application of autopoeisis adopted by Kay (Kay and Cecez-Kecmanovic 2003), the study of the social nature of organisational learning in the work of Warne and colleagues (Warne et al. 2002; 2003a; 2003b) in addition to the Activity Theory and Task-based approaches of the authors. It is worthwhile noting the extent to which these authors have collaborated or at least referenced each other's work. When placed in the context of the organic nature of the way KM is approached in the Standard, this provides a part of the evidence for a distinct Australian 'flavour' of KM.

In the authors' middle-out approach to KM the focus is neither on the organisation nor the individual but rather on the activity site of collaborative knowledge work. Collaborative knowledge work involves participants working together on organisationally defined tasks that rely on formal processes, following fixed schedules and strict standards, but are also cognitively demanding, involving complex technical judgements, a high degree of professional and individual expertise and experience (Aarons et al. 2006; Davenport 2005). Iivari and Linger (1999) characterise knowledge work as a collaborative activity that:

- is based on a body of knowledge,
- entails working on representations (data) of the objects of work
- stipulates typically a deep understanding of the objects of work, and
- the outputs of which entail knowledge as their essential component.

Indeed the development of this theoretical foundation has revealed that the issue critical to organisational growth and learning is not accumulation and capture of knowledge as an asset, as is now considered by the main stream KM, but rather the phenomenon of knowledge work. The middle-out perspective opens a new discourse on knowledge work in the context of modern complex knowledge eco-systems of modern organisations. The exponential

growth in power and application of ICT has elevated work, which was once routine, to the level of knowledge work. Consequently this contributed to the growth of complexity and dynamic nature of organisational knowledge ecosystem.

The authors have previously conducted independent research within this discourse, using two separate theoretical frameworks, one task-based and one activity-based. More recent analysis (Linger et al. 2005) has provided evidence that these two approaches contain many closely aligned concepts which cover a common understanding of this critical phenomenon. The next section of the paper describes the significance of this convergence.

3 Holistic and Organic Frameworks for KM: A Work Practices Perspective

The brief overview and conceptual comparison of the activity-based and task-based frameworks are based on the results of an analysis that shows both the extent of their convergence as well as their different but complementary applications. The two applications of the frameworks are:

- analytical tools for describing knowledge work at individual, group and organisational levels, and
- as design frameworks for creating intelligent support for knowledge workers and facilitating organisational learning.

3.1 The Activity-Based Framework

In this framework, the concept of activity comes from the Cultural-Historical Activity Theory, referred to here as simply Activity Theory (see Leontiev 1981), which provides researchers with a holistic explanation for all the meaningful things people do. It provides a unit of analysis, activity, which is the dialectic relationship between the subject and object of work, where the subject is the person or people engaged in the doing and the object in the sense of 'the object of the exercise' encapsulates the purpose and motives of doing. Activities can have individual or collective subjects, i.e. people engaged in particular purposeful work, so that a different subject or a different object means a different activity. From the middle-out perspective knowledge work consists mainly of activities with collective subjects (sometimes called activity systems). The dynamic dialectic relationship between subject and object implies that the way knowledge workers perform tasks while using and creat-

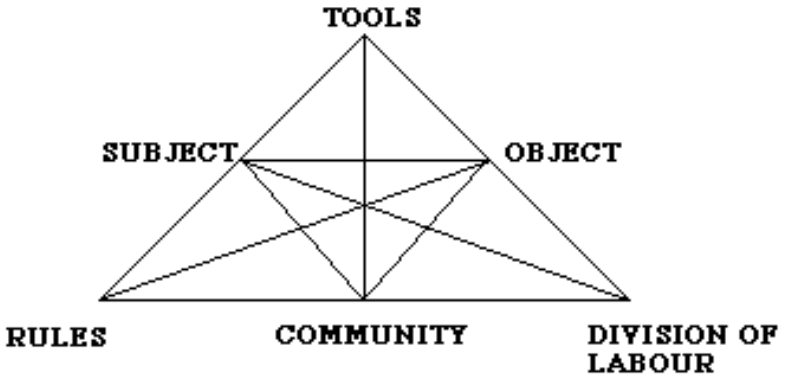

Figure 2. Engeström's (1987) structure of an activity

ing knowledge is both subjective and objective. Development of the activity occurs in both the subject and object through interaction and practice. Thus the dialectic relationship between subject and object extends to one between thinking and doing with experiential learning as an outcome.

Engeström's (1987) popular triangular representation of an activity, as shown in Figure 2, is used as the framework for any Activity Theory analysis. Knowledge grows through the 'always active subject' (i.e., people continually change/grow as they learn through the life of an activity). There is thus a synthesis of thinking, learning and doing at the core of human activity that underpins the concept of knowledge work.

An activity is a high level unit of analysis that is related to purpose and motives and is culturally and historically situated (i.e. takes place in context). Activities are performed by sets of *actions*, which relate to a specific goal or objective (NOT objects) but are not meaningful in themselves, only in their contribution to the activity. Different sets of actions can be used to conduct the same activity. Under certain circumstances actions can be automated to operations, many of which are incorporated in the design of ICT systems. Activities – actions – operations form a dynamic hierarchy (Leontiev 1981) that is one of the theoretical concepts most widely used for analysis of knowledge work.

3.2 Task-Based Knowledge Management

The Task-based Knowledge Management (TbKM) framework explicitly defines knowledge work along the *thinking* and *doing* dimensions (Burstein and Linger, 2003; Linger et al. 2000). The TbKM approach addresses the

management of knowledge work rather than knowledge. The approach addresses the practicalities of work, as performed by individuals and groups, focussing on the cognitive, conceptual and social aspects of the work task. The practical manifestations of these aspects of work include decision making, sense making, learning and remembering that are collectively labelled *thinking*. The TbKM approach provides the means for identifying tools and methods by which these practices are supported and integrated with the material production, the *doing*, during the performance of a task (Burstein and Linger, 2003) driven by a specific objective.

Diagrammatically, the integration of doing and thinking is represented in Figure 3. The TbKM framework consists of two nested interrelated layers:

- The *Pragmatic* layer represents the actual performance of work that needs to be done in order to produce the organisationally defined outputs;
- the *Conceptual* layer represents the actor's understanding of the body of knowledge required to perform the work defined by the task. This understanding is expressed as models of the structure of their knowledge and their knowledge of the process required to perform the task.

As a practice oriented approach, both layers of the framework represent those aspects of the actor's knowledge that can be articulated and documented. This is not limited to explicit knowledge but is oriented towards articulating implicit knowledge that captures what is actually done rather than what is meant to be done or what is said that is done.

The *Structure* model is, in our experience, generally expressed as some form of a conceptual graph representing the ontology of the problem domain (Linger et al. 1998). The *Process* model is more complex and closely linked to the organisational context of work. Various theoretical formalisms can be exploited to represent an actor's understanding of their work performance. The generic *Process* model presented in Figure 3, derived from Activity Theory, include the definition of tools available to perform the work task, the method to be employed and objectives of the task as understood by the actor. There are interdependencies between these three elements and, together with the *Structure* model, they influence how an instance of a work task will be performed.

Taking the eco-system approach, the TbKM framework components are defined and often dynamically re-defined to ensure strategic and operational alignment of the individual objectives with the current organisational imperatives. This definition is congruent with the elements of the KM eco-system and includes people, process, technology and content related to the task. In the

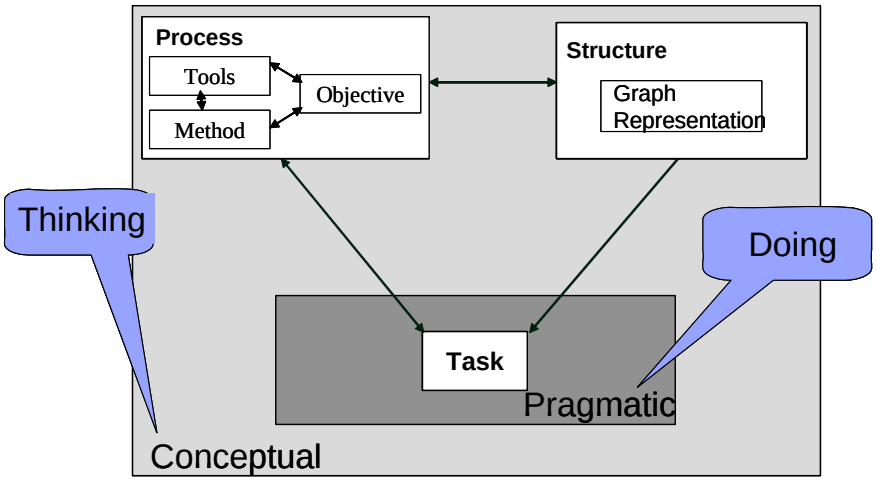

Figure 3. The TbKM framework (adapted from Linger and Burstein 2001)

same manner, the tools and methods are defined and re-defined depending on the opportunities and constraints imposed by specific organisational design, technical infrastructure and information needs at the point in time when the task is performed.

The issue for KM practice, from the TbKM perspective, is how all components within and between layers interact during the task performance. As a first approximation, performance of a task is an instantiation of all elements with the actors applying their experience and implicit knowledge to integrate the components each time the task is being performed. Thus, we assume that even routine tasks require the actor to exercise judgment and involves application of knowledge acquired from the past experience of performing the same or similar tasks. Thus, TbKM is directed to supporting both:

- task performance with clearly defined organisational outputs at the pragmatic level; and
- generation and collection of experiential knowledge associated with task performance including explicitly documenting single and double loop learning (Argyris and Schön 1978).

As all work is by definition a socially situated activity, it implicitly assumes that all actors, in the community responsible for, and associated with the task, interact and communicate. Therefore the TbKM framework is extended to incorporate a Communicating dimension. Thus a comprehensive definition of KM requires a combination of the three dimensions of Thinking, Doing and Communicating (Burstein and Linger 2005). The ICT as another

component of the TbKM framework aims at supporting all three dimensions of the work performance.

A fundamental assumption of the TbKM approach is that knowledge production is an integral element of task outcomes. This knowledge is articulated in the Conceptual layer as task instances. Moreover, the collective instances of task performance provide actors with explicit material to review practice thus allowing them to perform as reflective practitioners (Schön 1991). The implementation of the TbKM framework leads to the creation of a knowledge work support system. Such a system methodically preserve knowledge of each instance of the task performance in a dynamic memory system (Burstein and Linger 2002) and provides the means to utilisation this memory with intelligent decision support functionality such as reasoning, memory aids, explanation facilities and learning capability. Applied in a comprehensive way, TbKM organically links individual task performance with group reflection on the useful outcomes from these individual activities taken in the context of organisational KM strategy. Such reflection produces documented evidence for consensual group experiences, which can lead to revision of group practices and double loop learning. As a result, TbKM facilitates and provides a mechanism for systematic organisational learning.

3.3 The Alignment of the TbKM and Activity Theory Frameworks

A comparison of the two frameworks shows similarities between the position and relationships of task on the one hand and activity on the other:

- Significant common concepts include: work, learning, organisation and performance as well as obviously knowledge and management.
- Mapped concepts based on the expertise and interpretation of the authors are task/activity, actors/people, memory/cultural-historical, support/tools, approach/research.
- Outliers on the TbKM side—data, models, decisions
- Outliers for Activity Theory—object (related in Activity Theory to motive and purpose), community.

These findings are used here to justify the value in aligning the two frameworks. As depicted in Figure 4, the intersection of the two approaches can be viewed as a legitimate language for the discourse on knowledge work within the context of the knowledge eco-system. Flanking the core of the common framework is the particular strength of each approach, from which an analysis

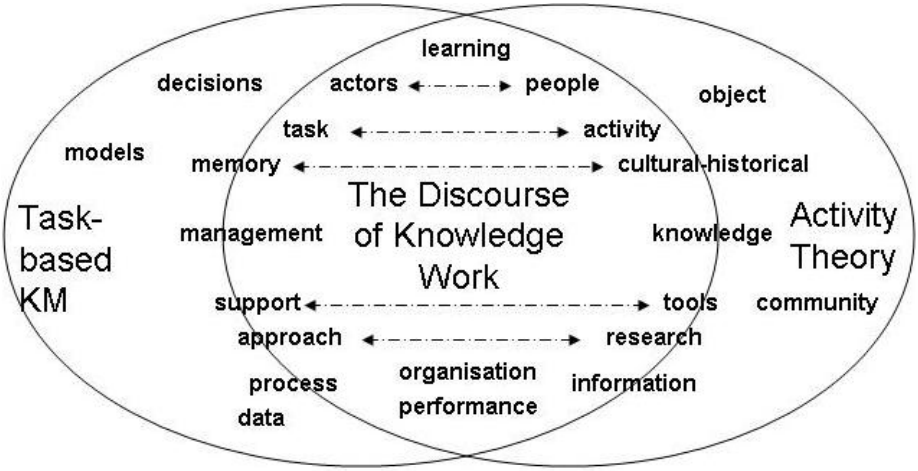

Figure 4. A mapping of concepts from TbKM and Activity Theory onto a common framework (Linger et al. 2005)

of a particular knowledge eco-system can also benefit. The greater density of concepts of TbKM provides a rich basis for the discourse of knowledge work, while Activity Theory provides a higher-level, more holistic view. TbKM and Activity Theory each have a means of visualising the relationships between the human, technical and contextual elements in work practices and learning that assist in articulating the dynamic complexities of knowledge work. Moreover these elements are well aligned with the major elements of KM identified by the Australian KM Standard. This enhances the discourse of knowledge work, making it valuable not only at an abstract, theoretical level, but also in the realm of practice where it may inform the strategic directions of future organisational forms and operations. Hence, our analysis clearly demonstrates how our approaches bring together a rich theoretical framework with a focus on knowledge work and the practical approach of the knowledge eco-system in the Australian KM Standard.

At the core of the common framework is the knowledge worker, who is, by definition, knowledgeable and astutely aware, not only of the means and purpose of their work, but also its political and social dimensions (Drucker 1959, Davenport 2005). While much of this knowledge may be tacit, it is typically shared among the work group and embedded in the knowledge eco-system. Knowledge work flourishes in a vibrant and balanced knowledge eco-system and knowledge workers play a critical role in establishing it. However, knowledge workers are often trapped in an outmoded organisational structure that inhibits the development of an effective knowledge eco-system and where

they lack the power to make worthwhile contributions to the process of organisational transformation. It is an underlying premise of the Standard that such organisational transformations can be brought about by KM. TbKM and Activity Theory provide design principles for such transformation geared towards effective integration of task performance with facilitation and support for effective knowledge cycle of creation, representation, storage, sharing, distribution for future use.

While the Standard and the two frameworks have closely aligned views on KM, they approach it at three different levels. The first level is the broad perspective of the knowledge eco-system as set out in the Standard. Next there is a deeper theoretical analysis of the activities, which uses the Activity Theoretical framework, identifying and highlighting the relationships between key elements of the knowledge eco-system. At the lowest, most granular, level is the Task-based approach to KM where the perspective shifts to one of practice. It brings the realities of social learning into the context of knowledge work and unpacks the organisational complexity of what knowledge work is and how it is performed at individual, group and organisational levels.

4 Applying the Standard with the KM Frameworks

To illustrate the knowledge eco-system and the KM frameworks in a meaningful manner requires a sufficiently large organisational context that is diverse and complex. The authors have collaborated in a number of projects that have involved the Australian Defence Organisation (ADO). The ADO is indeed a large organisation of about 95,000 members and includes the three military services, (army, navy and airforce), the government bureaucracy (the Defence Department), its logistical branch (the Defence Materials Organisation (DMO)) and its research arm (the Defence Science and Technology Organisation (DSTO)). Even at this level of aggregation it is clear that the ADO is indeed a complex structure with many, and often conflicting, cultures, divergent objectives and a somewhat confused authority structure with multiple lines of reporting.

What makes the ADO a fascinating subject of study is that the military, the Australian Defence Forces (ADF) have committed to the reigning military paradigm of Network Centric Warfare (NCW) (ADF 2003). This paradigm is based on the primacy of information and its innovative use by exploiting pervasive applications of ICT. The aim is to create a flexible and agile force in contrast to the traditional, rigid hierarchy and bureaucratic structures based on

rank, division of function and codified actions. The ADF is also addressing the human dimensions of this paradigm rather than adopting a purely technological implementation (Warne et al. 2004). Thus the subject of the study is a collection of organisations that have, individually, collectively and consciously embarked on a comprehensive process of transformation.

The two theoretical frameworks are used to amplify the innovative insights of the Australian Standard, providing a more substantial theoretical base that is grounded in the practice of integrating production (doing) with the conceptual and cognitive work that underpins that production (thinking) within a specific work context, overlaid with social component of the task performance, which requires effective communications of both production and cognitive results of work in the context of social learning.

4.1 Background to the Case

The case study is a four-year research program to investigate social learning within the ADF (Warne et al. 2003a). These settings included the operations of two services, at strategic and tactical levels and across both peacetime operations and during war games (Warne et al. 2001). Social learning, in this context, refers to learning done in or by a group, an organisation, or any cultural cluster and includes:

- the procedures by which knowledge and practice are transmitted across work structures (such as posting cycles), across different work situations and across time
- the procedures that facilitate generative learning that enhances the enterprise's ability to adjust to dynamic and unexpected situations and to react creatively to them

The study used an ethnographic approach of observations and interviews to investigate the factors in organisations that enhance and enable the assimilation, generation, sharing and building of knowledge that transforms an organisation into a learning organisation.

4.2 Findings of the Case

The research findings highlight the importance of organisational and/or cultural values for effective social learning and KM practices. In some cases, it was the absence of such values that made their importance clearer. The results (Warne et al. 2003a) showed that effective social learning was facilitated by the presence of a set of overarching values:

- *Empowerment*—autonomy to make them accountable and increase their sense of ownership of their role in the organisation
- *Cultural cohesiveness*—common identity, shared goals and a shared understanding
- *Trust*—entails mutual respect
- *Forgiveness* - forgiving mistakes and creating knowledge from lessons learnt
- *Commitment*—loyalty to the organisation reciprocated by loyalty from the organisation
- *Openness of decision making*—transparent processes and information availability to employees at all levels of the organisation
- *Sharing of information*—information as an organisational asset not a source of an individual's power base

Apart from the overriding set of values, the research team identified additional sets of factors that supported and enabled effective social learning. These factors fall into two categories. The first, designated as *Learning Capability Development*, refers to *characteristics in the environment* and provides a context in which the second category operates. This second category is referred to as *Enablers* and represents *processes and strategies* that, if present and effectively applied in an enterprise, can facilitate social learning. However, the same processes and strategies that enable social learning were found to also act as *Inhibitors* or *Challengers* of social learning when they were not thoughtfully applied or applied in an inappropriate context. Examples of the negative aspect of such processes might include an organisation characterised by destructive work practices, a highly politicised environment, organisational change (and the resultant change fatigue), and changing organisational cultural values.

Overall, the learning capability was found to be dependent on the priorities and objectives of the organisation itself and the relative dominance, or perceived importance, of *Values* in different research settings. However, the research also showed that the contribution of *Values* and *Enablers* to social learning is dependent on receptive and supportive organisational structures and processes. Thus learning capability is nurtured by, and itself nurtures, organisational values that foster effective social learning.

The study confirmed the basic premise that people are the essential core of any organisation's capability. However this potential is dependent on effective human resource management and workforce planning, to best optimise employees' competencies and capability. Similarly, effective social learning is also dependent on satisfactory work force policies, supporting capabilities,

and developing employee competencies within a supportive KM environment. This was broken down as follows:

- *Work Force Policies* is divided into two social learning constructs: *Organisational Culture*, and *Job Satisfaction and Morale*.
- *Capability* is a single, but pivotal, social learning construct: *Information and Knowledge Support*. Organisational initiatives pertaining to this construct facilitate the acquisition, construction, generation, transfer, and sharing of knowledge.
- *Competencies* is divided into two social learning constructs: *Team Building*, and *Professional Development*. Both constructs are considered fundamental to preparing fertile ground for dynamic social learning, knowledge transfer and knowledge sharing.

The complexity and effects of the *Enablers* led to the development of a number of descriptive architectures that were believed to be generally applicable to most organisations. These architectures are presented below to portray the case study in terms of the KM Standard knowledge eco-system.

4.3 Interpreting the Study as a Knowledge Eco-System

The results of the study are guiding the ADF in their adoption of network-centric concepts, which is a step towards the notion of an interconnected, complex and continually changing knowledge eco-system.

The initial social learning architecture was a high level abstraction. The similarity of the conceptual architecture to the knowledge eco-system provides the starting point for the interpretation of the ADF study from the perspective of the KM frameworks presented in this paper. The obvious mapping of items is the culture and context of the organisation that is at the core of each representation. These are described as overriding principles and values that lead to the Learning Organisation construct. This could be interpreted as the strategic intent as articulated in the core of the knowledge eco-system as shown in Figure 1. In both approaches to KM, the central issues concern the long-held and difficult to change attitudes, customs and beliefs deeply embedded in organisational memory.

Enablers are central components in both the conceptual architecture and the knowledge eco-system, while the drivers in the knowledge eco-system are analogous to the challengers and inhibitors in the conceptual architecture. As described in the Standard, the specific mix of enablers and drivers that impinge on KM programs in any particular organisation can vary but they are

not independent either of each other or of the central issues of culture and value systems of the organisation.

The conceptual architecture of social learning echoes the Standard in the complex and contextual nature of knowledge work and learning in organisations. However the lower levels of interpretation provided through Activity Theory and TbKM enable a greater understanding of what knowledge work and learning would mean to an organisation. These interpretations are supported by the structural and definitional architectures that emerged from the case study.

4.4 The Activity Theory Interpretation

One of the outcomes of the ADF case study was the definitional architecture based on three interacting layers; Culture, Capability and Pragmatics. The Culture layer represents the organisational values that were the most enduring and pervasive aspect of the research findings. Values are a dominant and dynamic factor in supporting social learning tools. The Culture layer provides the context for social learning and an important determinant in the organisational outcomes achieved through learning. Capability is expressed in terms of space, time, information and tools while Pragmatics include skill sets, processes, governance and the prescribed activity system.

Activities are accomplished by means of actions directed towards specific goals and operations appropriate to the conditions with which the subjects (people) of the activities are faced and only make sense in the context of an activity. The goals of specific actions will be determined by the Motivators, Enablers, Challengers and Inhibitors while the conditions for operations will depend on the organisational Culture, Capability and Pragmatics. The hierarchy of Culture, Capability and Pragmatics is comparable to the three-level Activity Theory Hierarchy where motives of an activity would line up with the organisational values, the capabilities with actions and the pragmatics with operations. This makes eminent sense from the Activity Theory perspective where the subject object dialectic defines the activity, or put more simply, who is doing what for what purpose. Without an acknowledgement of the values that give purpose to what is done, the activities towards organisational learning make no sense and will probably not be successful.

From the perspective of Activity Theory, the unit of analysis is an activity. Thus a more detailed analysis of the socio-cultural study of organisational learning in the ADF using Activity Theory necessitates the identification and representation of activities that constitute learning in the ADF context. An

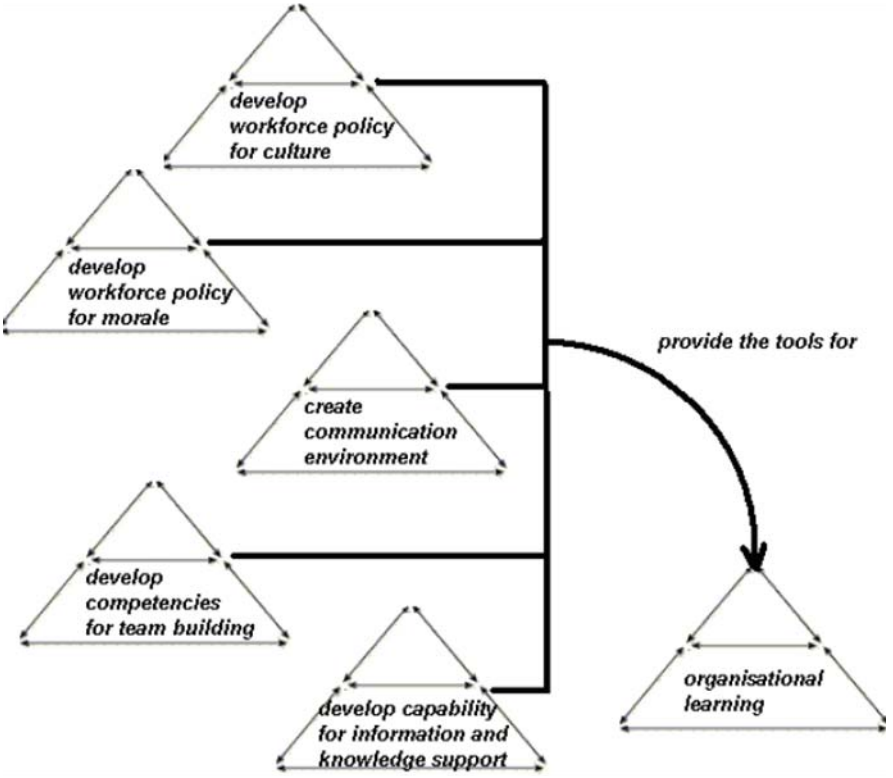

Figure 5. A decomposition of the ADF organisational learning activity system (Warne et al 2003b)

Activity System is constructed which consists of one core activity to which other supporting activities are linked. Figure 5 depicts an activity system where organisational learning is the core activity with a series of five support activities representing the social learning constructs identified in the ADF case study. From an Activity Theory perspective, this selection of support activities may not be exhaustive but appears to be the most important.

Once the activities are defined, Activity Theory identifies suitable tools and suitable community or work-unit structures that most appropriately mediate the activities. This, in the spirit of the knowledge eco-system, is not likely to be a straight forward, ordered process of overt cause and effect. The process involves setting up of attractors and boundaries, in the manner suggested by complexity theory, to allow a fertile social learning environment to emerge thereby fostering the transformation of organisational culture. The Australian

KM Standard contains descriptions of tools, such as mentoring and coaching, story-telling social-network analysis etc, that act in this way.

4.5 The Task-Based Interpretation

Complementing and fleshing out the Activity Theory interpretation of the ADF case study, the TbKM approach focuses on understanding work practices and the interaction between these practices that are conducted at different levels of aggregation as shown in Figure 6. These levels, identify the individual actor, the group or unit within which the actor works and the organisational context for the activity. These levels are sites of discourse that together provide a granular and layered understanding of how work is organised and reveals the organisation's internal functioning. At the individual level, the model represents the actors' engagement with the organisation through their participation in their units and their interpretation of the organisational values. The group level identifies the unit members and their contribution to the community, the unit's role in the organisation and how the unit interprets the formal organisational values and applies them to their activities. At the organisational level, the model identifies the organising principles under which the units and their members form a viable enterprise that performs within the bounds of both the formal, explicitly articulated values and the implicit values of the organisational culture.

The utility of this granularity can be illustrated by an example of one of the case study findings. Building a common identity through cultural cohesion was one of the tools for social learning. At the personal level, this related to how closely actors identified with their workplace and work colleagues. It was clear that there were much stronger bonds and trust in the single service environments (army, navy or airforce) than in the joint service environment (all three service and civilian within a "strategic" headquaters). At the group (unit) level, this cultural cohesion impacted on the shared understanding of the work activity and a shared vision for the organisation. At the organisational level this transformed into mission statements and stated organisational values that form part of the public image of the organisation. However, this public image also feeds into the group and individual levels influencing how they perceive their own goals and objectives. For example, some of the negative public perceptions of the ADF that were aired in the media during the study had an immediate impact on the members and units under study. Morale was directly impacted as individuals, units and the service perceived themselves to be pow-

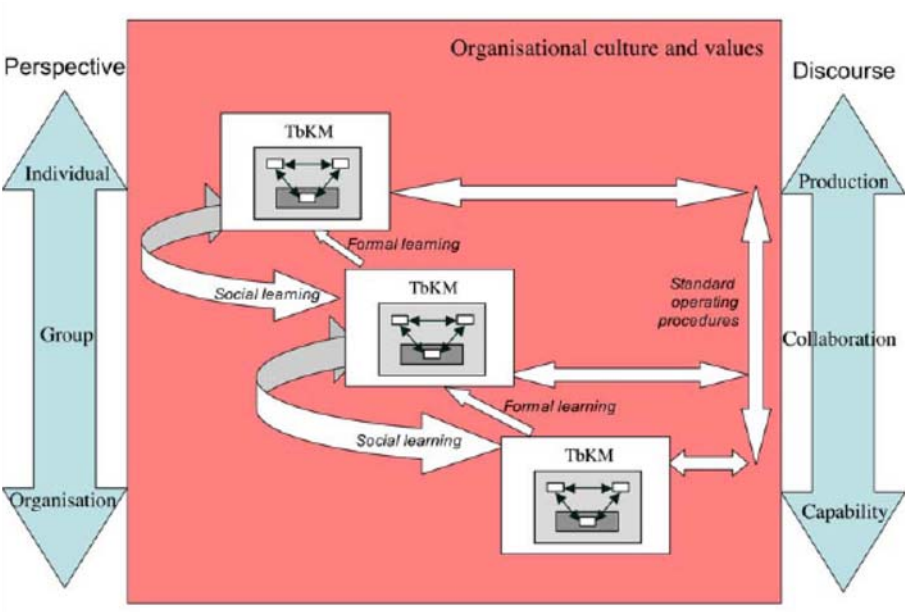

Figure 6. A knowledge management architecture for a learning organisation (adapted from Linger and Warne 2001)

erless in their ability to respond to the media reports, manipulated by the political process and under-valued by the public they serve.

From the TbKM perspective, each level has it own activity system that collectively facilitate the ability of the organisation to achieve its goals. The actor focuses on production, the group addresses the co-ordination, cooperation and collaboration required to perform complex activities, as well as dealing with the inherent competition within the group performing the activity. The organisation is concerned with ensuring that actors and groups have the capability to perform their functions. This conceptualisation maps well onto the broad division of labour that underlies the functional organisation of the ADF. Moreover, it also expresses, albeit in a very different manner, the elements of Culture, Capability and Pragmatics layers of the definitional architecture of social learning discussed above.

Figure 6 shows that the organisation maintains its viability through two essentially antithetical processes informed by the over-arching organisational culture and values. The left loop represents the social learning and cultural processes and strategies that are an essential element of knowledge work. The model shows the left loop as predominantly a bi-directional process flowing

between the individual, the community and the organisation. The study demonstrates that social learning, encapsulated in the left loop, is essential for individuals and communities to effectively interpret and adapt the formal, authorised definition of their tasks, expressed in the standard operating procedures (the right loop) in order to meet the imperatives of the current situation. The right loop is the formal managerial command structure that defines the tasks and establishes governance and the authorised procedures through which tasks are performed. Figure 6 represents an ideal approach where all levels interact and contribute to the formal definition of the task and work practices. Additionally, to support standard operating procedures, the organisation provides formal training, shown in Figure 6 as the central, effectively top down, formal learning processes.

However, an important finding from the ADF case study was that there is little if any input from individual actors into the definition of the task and work practices although groups (units) might have a formal role. This is consistent with a hierarchical, bureaucratic organisation such as traditional military organisations but is inconsistent with a network centric, adaptive learning organisation.

Activities at each level involve material production of organisationally defined outputs as well as knowledge construction and reconstruction that is consistent with the task as defined for that level. In this sense the work at each level constitutes knowledge work and the work practices include the social and cultural processes of social learning through which knowledge is shared. Such work is represented through the TbKM framework as shown in Figure 6. The tools for the conceptual, social and cognitive aspects of knowledge work are encapsulated in the social learning loop. On the other hand, the formalised organisational systems and tools that support for material production in knowledge work, constitute the formal procedure represented by the right loop of the model and the formal learning processes. Some of the pragmatic elements of social learning are included in these organisational systems. However the case study highlighted the inadequacy of many of these systems (eg record keeping) and how social processes were employed to overcome the limitations inherent in these systems. This emphasises the dialectic between the social and formal processes as well as the situational nature of knowledge work.

Figure 6 is a conceptualisation of the ADF case study and represents a dynamic and complex system that evolves and adapts over time. It shows that while the organisation still has hierarchical features its loci is in fact the social or cultural grouping around which work is organised. The interaction between individuals and their group is a strong bond that underpins the ability of the organisation to meet its goals. On the other hand the link between the group

and the organisation is qualitatively different but nevertheless is essential for the organisation's viability as is the relationship between units. Thus the elements of a learning organisation include social learning and formal process and, essentially, the dynamic and tension at their intersection.

5 Concluding Remarks

This paper began with the identification of the complexities of the field of KM and the continuing fascination of organisations with issues of corporate knowledge. A description the Australian KM Standard was used to illustrate the need for KM to take an approach based on the concept of a knowledge eco-system rather than just another set of techniques to be imposed by management on individual workers.

The theoretical frameworks are used in this paper to amplify the innovative insights of the Australian Standard, providing a more substantial theoretical base that is grounded in the practice of integrating production (doing) with the conceptual and cognitive work that underpins that production (thinking) within a specific work context.

The two KM frameworks are closely aligned and follow the philosophical and practical approach taken in the KM Standard. Our research addresses adopts a middle-out approach to KM where the focus is neither on individual knowledge nor on formal processes at the organisational level but on work groups and networks that are not visible in the formal organisational structures and processes.

The paper has developed the argument that the fundamental concepts on which the Standard is based is closely aligned with a body of KM research by IS academics in Australia. The two frameworks have been analysed in light of the Standard. This analysis revealed a three level approach with the Standard's knowledge eco-system at the broad top level, the strong theoretical basis of an Activity Theory framework underpinning that, with the Task-based framework addressing the underlying detail. It is hoped that the central position of Activity Theory in this approach will make it meaningful and applicable in the Scandinavian context.

Research of on-going interest to the authors has been the study of social learning in the ADF. Some findings of this research have been discussed in Section 4 of the paper. To illustrate the middle out, three-level approach, the ADF case study is re-interpreted in terms of the knowledge eco-system, the Activity Theory approach to KM together with the TbKM framework. This analysis illustrates a new understanding of KM which emerges when insights

from the three approaches are brought to bear. Firstly there is a broad but holistic view of the knowledge eco-system followed by the deeper theoretical perspective from Activity Theoretical that identifies dialectic and mediating relationships between key elements of the knowledge eco-system. A more applicable understanding then comes from the TbKM framework that addresses the pivot role of the workgroup in KM and in particular social learning in organisations.

The Australian KM Standard provides for holistic and dynamic analysis from the middle-out, revealing the true nature and importance of group-based knowledge work. It is in this 'messy' middle ground of the organisation that knowledge work is situated and where the practice of production (doing) is integrated with the conceptual and the cognitive work that underpins that production (thinking) and supported by social processes of communication aiming at organisational transformation, based on organisational learning and capability development, as the desired tangible outcome of KM.

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