

**Knowledge Dis-Integration:  
A neglected process in the Organizational Knowledge Debate?**

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## **Knowledge *Dis*-Integration:**

### **A neglected process in the Organizational Knowledge Debate?**

#### **Abstract**

This paper introduces a fresh perspective to the current Knowledge Management debate by exploring Knowledge Integration and Dis-integration practices. These issues are relatively under-researched in studies of organisational knowledge even though issues of integration seem to underpin most of the knowledge processes currently discussed in the literature. Drawing on empirical findings from a large organisation in the Construction sector the discussion presents the strategic and operational perspectives of two formal knowledge interventions introduced by the organisation to support the delivery of integrated solutions – by connecting products and services. The analysis of the findings reveals some of the conditions which have limited the potential for knowledge integration and reveals that dis-integration is a useful process for understanding the tensions inherent in efforts to connect knowledge. The discussion reviews three tensions in knowledge integration which provide new insights about the political nature of knowing and the ambidexterity in the balance needed between formal and informal knowledge management interventions as well as, homogeneity and heterogeneity. The paper concludes by highlighting additional research questions that can usefully guide future research and outlines some issues for reflection that both academics and business practitioners involved in knowledge management need to consider if the value of knowledge for action is to be achieved through efforts to understand the complexity of knowledge as a phenomenon.

**Key words:** Knowledge, integration, dis-integration, tensions, ambivalence

## Introduction

The role of organizational knowledge as a key strategic resource within modern organizations and the consequent interest in knowledge strategies and processes put together under the label of Knowledge Management (KM) have outlived projections of a management fashion. The KM debate has been populated by a rich tapestry of perspectives and has produced multiple interpretations and an in-depth understanding of the ambiguous concept of knowledge and the processes aiming at its development and economic appropriation within organizational contexts.

Highlighting the fundamental distinction between strategies of codification and personalization (Hansen et al., 1999), organizational knowledge is perceived as either a 'stock' to be transferred through the use of advanced Information and Communication Technologies (ICTs) or as a 'flow' to be harnessed in communities and networked forms of organizations (cf. McKinlay, 2004). ICTs are presented as the suitable mechanisms for the capture and transfer of knowledge (e.g. Soete, 2001), while personalization strategies propose the nurturing and facilitation of knowledge sharing in Communities of Practice (CoPs) through social interaction (e.g. Brown and Duguid, 2001; Alvesson and Kärreman, 2001).

The KM debate has evolved significantly over the last ten year. The interest once dominated by the IT-oriented community has shifted towards perspectives that emphasize social interaction and a more relational approach to the understanding of the phenomenon of knowledge (Empson, 2001; Swan and Scarbrough, 2001). Equally, empirical work indicates a dual emphasis and investment by organisations in both the development of ICT based and community and project-based KM initiatives (e.g. Kellogg et al., 2006; King, 2002). For example, King's (2002) research in the KM programme in the World Bank identified investment in 100 or more CoPs for the development of knowledge sharing processes and in ICTs aiming to alleviate temporal constraints traditionally obstructing the process of information transfer.

A variety of knowledge processes accounting for different types of knowledge are seen as necessary for the economic appropriation of knowledge. Underlying such accounts however, is the assumption that different domains and bodies of knowledge will be integrated across different levels (individual, group, organizational) once knowledge is made accessible through mechanisms (technical and social) that underpin the way in which it is disseminated and shared. In this case, the KM debate has been instrumental in providing insights into the barriers and constraints of knowledge transfer and sharing processes that are seen as fundamental to (and, occasionally synonymous with) the process of *knowledge integration*.

Knowledge integration (KI) has received some treatment in the current KM debate (see Grant, 1996; Kogut & Zander, 1992). However, where reference is made to KI the tendency is to focus on the integration mechanisms (Kenney and Gudergan., 2006), the modes/methods of integration (see Hislop, 2003) and the social forces enabling KI (e.g. social capital, social context see Lang, 2004). 'Knowledge being integrated' or 'knowledge integration' is the terminology frequently used in interpretations of the purpose of KM initiatives, yet what KI actually entails and how it is practically achieved has not hitherto received any substantial analysis. Consequently, although KI underpins many KM processes it has received limited analysis as a potentially unique and separate KM process in its own right.

The purpose of this paper is to contribute to our understanding of KI by further unpacking what is KI and what conditions may support or hinder the integration of knowledge especially in relation to KM interventions. We define KI as the process by which disperse knowledge within a social context located in individual actors, in social relations, in actions and artefacts and other repository mechanisms, is connected. We consider that the main purpose of KI is to support practical judgment especially when addressing competing priorities, tensions and other forms of ‘crisis’.

Our analysis is informed by empirical findings from a case study of a large organisation (ConstructCo) in the construction industry. We focus specifically on the organisational knowledge implications of the recent shift in emphasis on Government-led Private Finance Initiatives (PFIs) and Public Private Partnerships (PPPs). These recent changes have expanded the range of knowledge traditionally required and in the presence of long standing project tenures and client pressures for additional service offerings, knowledge is recognised by organisations in the sector as a key priority for delivering ‘integrated solutions’. The latter also reflects a wider trend referred to as the ‘new service model’ where the focus is on the integration of products and services which is seen as a strategic priority particularly among modern manufacturing organisations (see Brady et al., 2005; Hobday et al., 2005). Here, the potential for knowledge intensive work is significant and so is the management of knowledge. It is assumed that progressively work involves both knowledge around the product and the service with a distinct focus on external and internal customer satisfaction. In the construction sector this means that organisational knowledge needs to be managed from one project team to the next in a sequence so that contractual agreements can be maintained through life. KM between projects at any one point in time significantly enhances the possibility of better product-service delivery.

We organise the ideas in four main sections. We review the extant literature on KI to unveil some of the current conceptualisations of both integration as a process and KI as a KM practice. We explore knowledge integration further in the third section by presenting empirical findings from our case study having outlined our methodological approach first in section two. Our findings provide new insights into KI especially as they expose the tensions inherent in KI. We reveal how the organisation’s intentions in investing in KM initiatives which are expected to support KI are met by users who expose some of the inherent problematic of integrating knowledge. Our analysis and discussion in section four repositions KI in relation to the dis-integration evident in our findings. We promote a complex view of KI as a process that acknowledges diversity as a key aspect of the integration process. We conclude the paper by outlining the main implications for future research in Organisational Knowledge distilling key considerations for advancing scholarship in relation to KM issues that can have a positive impact on practice.

### **Organisational Knowledge and Knowledge Management Processes: A Review and Critique**

The Organisational Knowledge debate has so far drawn attention to three main characteristics of knowledge in social arrangements. Firstly, it has highlighted the situated nature of knowledge and its relationship to actions and interactions between actors (Brown & Duguid, 2001). Secondly, it has emphasised the relational nature of

knowledge in the way it connects people, structures and mediating artefacts (Gherardi & Nicolini, 2000). Thirdly, it has acknowledged that there are multiple sources and types of knowledge which reflect in turn different modes of knowing (Blackler, 1995). In short, the Organisational Knowledge debate has enriched our understanding of the tacit, temporal, distributed, situated and embodied nature of knowledge (Tsoukas, 1996).

We now acknowledge that if knowledge is to be effectively nurtured and employed to serve different ends then a variety of knowledge processes may be at play. For example, where the intension is to support the development of knowledge, reference has been made to knowledge creation processes (Nonaka & Takeuchi, 1995). Attempts to capture dispersed knowledge have accounted for knowledge processes such as knowledge codification (Soete, 2001). Conversely, if the intension is to transfer knowledge the mechanisms (technical and social) that underpin the way in which knowledge is disseminated and shared (Newell et al., 2002) has been the focus of attention.

The emphasis on distinct knowledge processes resonates with the importance of knowledge as a corporate asset to be harnessed for superior organizational performance, which some scholars do contest (see Alvesson and Karreman, 2001). In essence, different knowledge processes reflect the multiple ways in which knowledge tends to be employed. We also observe that many of the existing KM processes assume, at least implicitly, that if knowledge is better connected and integrated this integration can deliver better organisational performance (Awazu, 2004). In other words, the assumption is that knowledge integration is central to efforts to ‘manage’ knowledge (Kenney & Gudergan, 2006). Integration is expected to strengthen the alignment of strategic and operational priorities, provide consistency and coherence and bridge the gap between rhetoric and reality in the way organisational vision and corresponding actions are pursued.

### **Knowledge Integration**

Integration as a process has received a limited analysis in management and organisation studies. Lawrence and Lorsch’s (1969) seminal work remains one of the main contributions in our understanding of integration. Their main thesis is that in complex organizations, a degree of differentiation characterising distinct parts of an organization is as necessary as a degree of integration of distinct parts for overall organizational performance. They view the organization as a system that comprises of multiple, distinct subsystems, where each subsystem develops unique, sectional orientations and task-centred behaviours in response to the unique business requirements it attends to, but also where organizational performance is equally dependent upon the synthesis of distinct parts. In an investigation of six organizations with integrative devices, such as integrating teams and departments, Lawrence and Lorsch concluded that the differentiation and integration of subsystems may be desirable in the presence of increased levels of environmental uncertainty and internal complexity, but are also antagonistic states that if not handled with care may bring organizations to a performance slump. The work of these authors highlights the importance of reconciling discrete organizational units and taking necessary steps against ‘rigid compartmentalism’ (Fenton and Pettigrew, 2000: 24).

Concepts like co-ordination (Malone & Crowston, 1994; Crowston, 1997) and collaboration (Powell et al. 1996; Huxham & Vangen, 2005) allude to integration as a powerful means of connecting distinct organizational groups and overall performances that are greater than the sum of individual parts. Along these lines more recently, complexity science and studies of Complex Adaptive Systems have been propounding a view of integration emphasising heterogeneity and interdependence in the emerging nature of order and disorder (Stacey, 1996; Anderson, 1999; Axelrod & Cohen, 1999). Applications of the principles of Complexity science in relation to social complexity and organisational learning (see Antonacopoulou & Chiva, 2007; Antonacopoulou, 2006a) have shed new light on the dynamic nature of learning and knowing in organisations drawing attention to inter-connectivity as key to understanding the fluid, emergent and self-organizing nature of learning and knowing in organisations.

Another perspective for exploring integration lies in the new service model which is also the focus of the case study that this paper reports on. The new service model focuses on the integration of products and services (Brady et al., 2005; Hobday et al., 2005). Here, the concept of integration as Hobday (2000) points out focuses on the combination of the technological, knowledge and production systems that deliver products with those that deliver services. That is, it is assumed that progressively work will involve both knowledge around the product and the service with a distinct focus on external and internal customer satisfaction. In other words, different bodies of knowledge from discrete parts of the organization that have traditionally been defined by long-standing and unique statuses, structures, time and goal orientations, need to be integrated. Therefore, strategic and operational bodies of knowledge that stem from different parts of modern manufacturing organizations and reflect different understandings of product-service delivery, need to be integrated despite the highly problematical nature of such endeavour (Antonacopoulou and Konstantinou, forthcoming).

Within the limited accounts that seem to more directly deal with notions of knowledge integration differences of emphasis can be traced not so much in the strict definitions provided by authors but more in the way that they hold the idea of KI. Building on the work of Paul Carlile (2002, 2004) around issues of integration, Kellogg et al. (2006) conducted research in a complex organization where different parts of the organization had to cooperate but held highly heterogeneous bodies of knowledge. The authors identify:

the ongoing enactment of a trading zone where community members make information *visible* rather than *transferring* it from one community to another, where they *represent* their work legibly through a repertoire of project genres rather than *translating* different meanings to reconcile interpretative differences, and where they *assemble* work products through a process of juxtaposition, adaptation, and dynamic alignment, rather than engaging in joint *transformation*. (p. 42; emphasis added).

The dichotomies between making knowledge visible and transferring it, among representation and translation, and between assembly and transformation capture important differences of emphasis that may help delineate the concept of KI. Even though Kellogg et al., argue for one state over another in the presence of conditions of increased internal complexity and ambiguity, their work suggests that, on one hand,

the integration of knowledge may allude to notions of ‘knowledge fusion’, where discrete and heterogeneous bodies of knowledge are transferred, translated and transformed. Similarly, Hislop (2003) talks about the ‘blending’ of bodies of knowledge hinting at processes where bodies of knowledge are amalgamated and signs of distinctiveness are (painfully!) emulsified. On the other hand, it may imply notions of ‘knowledge aggregation’, where discrete and heterogeneous bodies of knowledge are displayed, represented and assembled. The authors highlight both the exploratory and limited generalization of a single case study, thus indicating the embryonic nature of the above ideas and, by implication, their interpretation here.

Another study that provides developing yet very interesting ideas around the notion of KI is the work of Okhuysen and Eisenhardt (2002). Here, it is argued that the process of KI is: a) not synonymous with the process of knowledge sharing, and b) that small, formal interventions can assist the process of KI. Emphasizing the distinction between sharing and integrating, Okhuysen and Eisenhardt (2002: 383) conclude that: ‘it is useful to distinguish between two other knowledge processes: knowledge sharing (i.e. individuals identify and communicate their uniquely held information) and knowledge integration (i.e. several individuals combine their information to create new knowledge)’. They point to notions extending beyond the transfer of knowledge and advocate the transformation of individual/personal knowledge to organizational/collective knowledge. Perhaps more importantly, however, their work also indicates that simple formal interventions may facilitate processes of KI that need not be ad hoc and thus open up the KI debate to include management intervention. This point resonates with other contributions to our understanding of KI by drawing attention to integration mechanisms (e.g. Kenney and Gudergan, 2006), and social forces enabling knowledge integration (e.g. Lang, 2004).

Although the insights from existing research into KI are useful they do not fully explain how organisations align strategic and operational priorities in KM initiatives that seek to deliver KI. Moreover, we know little about how the right balance is struck between ICT and socially driven KM initiatives (e.g. CoPs) in relation to KI. In other words, although there is some agreement that interventions are important we don’t know enough about the right balance that needs to be maintained between formal and informal interventions. Equally, unclear is whether there is alignment in the expectations and needs of the organisation as opposed to those of individuals in relation to KM initiatives. We cannot assume that just because the organisation propounds the importance of KI through KM that individual knowledge users would be inclined to follow suit. We know already from previous research exposing these tensions in relation to Organisational Learning initiatives (see Antonacopoulou, 1999; 2001; 2006b) that the political nature of learning and knowing often exposes these tensions as polarised positions and an obstacle to the frequently assumed homogeneous development agenda between the individual and the organisation. This means that if we are to understand integration more generally and KI more specifically, we need to explore further these tensions and understand the conditions that may affect different degrees or levels of connectivity.

In short, integration as a process fundamentally entails knowledge and learning at its core if we take the existing perspectives into account. In the KM debate however, the process of integrating knowledge appears to be relatively under explored. It is this gap that the research reported in this paper has sought to address. In the section that follows

we outline the methodological approach adopted in pursuing our study of knowledge integration in relation to product-service integration in a major construction company.

## **Research Objectives and Methodology**

### **Background**

The case study presented in this paper is part of the wider EPSRC/ESRC funded Knowledge and Information Management (KIM) project which involves research conducted with companies in the aerospace, defence and construction sectors. The purpose of the project is to explore KM challenges in the context of the shift in these industries from providing products, to supporting clients throughout the service life which links product with service, and the implications this concept of Integrated Solutions has on Organisational Knowledge. This paper focuses on the findings from one of the case studies, ConstructCo, a major construction company that has been investing significantly in KM primarily through two formal interventions: a shared electronic platform (thereafter e-KM) and role-based Communities of Practice (thereafter RCoPs). These KM initiatives focus on linking individual knowledge through socialisation and the use of ICTs.

ConstructCo is one of the world's leading construction companies, with divisions in the Americas, Europe and Asia Pacific, with approximately 10,000 employees. The UK division, which is the focus of the case study, has a workforce of over 2,000, with an annual turnover of £1.3 billion. ConstructCo operates in a number of markets, including Retail, Commercial, Industrial, Residential, Education and Healthcare sectors, and is also involved in the PFI and PPP markets.

ConstructCo's investment in KM initiatives reflects not only a strategic priority of the organisation, but also a response to wider trends in the construction industry at large. The industry is beginning to experience change as companies respond to issues such as client dissatisfaction and low profits through using KM as a business strategy (see Carrillo et al., 2000). The construction industry therefore, provides an interesting context in which to explore KM. The project-based, geographically dispersed nature of work provides challenges to firms, as they need to access the tacit knowledge that is used and developed onsite, and the need for KM is increasingly recognised and engaged in by UK construction companies (Carrillo et al., 2004; Graham and Thomas, 2005).

The UK Government has also recognised the challenges and potential in the construction sector if companies invest in innovative activity and the development of skills (DTI, 2002). The UK Government's initiatives (PFIs and PPPs) have radically transformed the demand for knowledge. These types of projects to be pursued under these initiatives create the need for effective KM between sectors and across the life of the project, particularly where the potential to innovate is an expected outcome. There are inherent barriers to achieving integration across the construction process, due to the fragmentation of the industry, the structural flexibility in the sector and the project-based nature of work (Dainty, 2007). With many companies still typically in the early stages of developing appropriate learning mechanisms to support integrated solutions (see Brady et al., 2005), it is important to examine the extent to which KI – arguably an essential aspect of Integrated Solutions – is evident as a strategy that companies are implementing to support changes in the nature of the construction industry.



## **Research Methodology**

Considering the gaps identified in the literature in relation to KI as well as, the significance of understanding KI in relation to the new service model that is a strong influencing factor in the Construction sector, the research was designed to address the following question:

*To what extent do companies who actively invest in Knowledge Management interventions demonstrate evidence of Knowledge Integration?*

This research question reflects that the main focus of the exploratory study we pursued was to understand if KI is happening as a result of a company's investment in KM initiatives. We were also keen to understand that if KI was integral to the KM initiatives intended to support the delivery of integrated solutions in products and services that we capture how this integration was happening and what may be the forces that affect KI.

We collected data within ConstructCo by adopting a grounded theory (Strauss and Corbin, 1998) approach using qualitative interviews as the main method of data collection. The interviews were supported by background questionnaires, which were sent to interviewees prior to the interview. These questionnaires provided additional information on the participants, their career development and current role in the company and some of the industry trends that they noted as significant. Another supplementary data collection method was observation (non participant). We were given access to attend the meetings of two RCoPs. These events provided insights into the organisation, content and role of RCoPs as a KM intervention and enabled us to interpret more accurately some of the issues interviewees raised during the interviews about the value attached to RCoPs as a method of KI. Finally, archival materials were collected throughout the research to obtain a better understanding of the company, the strategic priorities it currently pursues, the various strategy documents in relation the KM initiatives, the documents that were key mediating objects in each KM initiative (e.g. RCoP agenda, minutes, lessons learned documents or the IT platform printouts of knowledge exchanges between participants e.g. questions posed and answers obtained).

We designed the research to unfold in two phases. Phase 1 focused on the strategic level and sought to understand the organisations' assumptions and intensions in investing in a range of KM interventions in relation to the Product-Service agenda. Phase 2 focused on the operational level and in particular sought to unpack the perspective of the users of KM initiatives to better understand from their point of view if these initiatives were useful in enabling them deliver the integrated solutions that clients were increasingly calling for.

In total we conducted 20 interviews across the two phases and were able to secure a sufficiently diverse sample by engaging a variety of perspectives from a broad spread of ages, seniority levels, years of service in the organisation, roles and responsibilities, across different regional offices and both genders. The interviews were semi-structured and were conducted in a conversational style following the themes/questions from a predefined interview schedule. Among the themes we engaged interviewees in conversation included their personal and organisational history, strategic priorities, understanding of Integrated Solutions, company

capabilities and impetus for innovation and the KM initiatives currently in place. All interviews lasted approximately an hour, were tape recorded and subsequently transcribed verbatim. The interviews were analysed using NVivo and a coding strategy was devised sensitising us especially to tensions such as that between the organisation's rhetoric in relation to the KM initiatives and the reality as experienced by the individual users.

In the sections which follow, we distil key findings in relation to the two KM initiatives within ConstructCo and focus on the strategic and operational perspectives as reflected in the espoused assumptions made by the organisation compared to the operational perspective which reflected the way users of these KM initiatives employed them.

## **Findings and Analysis**

### **Overview of ConstructCo' Investment in Knowledge Management**

For construction companies the development of an effective KM strategy is challenging but also particularly pertinent because of the geographically dispersed project-based work. In line with this understanding of the potential benefits of the effective organisation of knowledge and expertise, ConstructCo has in recent years invested in its personnel and infrastructure to support the flow of knowledge within the organisation. The focus of ConstructCo' KM strategy is on tacit knowledge and experience, with the key objective of achieving integration of individual knowledge throughout the organisation, creating effective links between the people with expertise and their colleagues that need or would benefit from this knowledge:

*'My main thing with knowledge in this company isn't so much the documents, it's mostly who knows what and putting them in touch with each other' (KM Manager).*

To do this, in addition to providing access to documents and templates, health and safety information and the intranet throughout the company, ConstructCo has implemented two main initiatives to manage knowledge: One of the initiatives is an ICT-based platform for exchanging knowledge – e-KM – intended to link knowledge seekers with knowers. The second initiative is a series of role-orientated communities of practice – RCoP – intended to support the sharing of knowledge among people with similar roles, thus identify good practice and avoid repeating the same mistakes.

Both KM interventions have been instigated with the intention of linking the workforce who are scattered across the various global divisions, and to support learning and innovation across projects (particularly in the UK), creating physical and virtual connections between employees, utilising individual knowledge and personal networks for the potential contribution they can make to the development of the company. These initiatives combine to recognise the importance of the individual and the experience each employee will possess, in conjunction with virtual, IT-led support, emphasising the need to capture tacit and explicit knowledge to inform the construction process across projects. The interaction and congruence between these interventions is a pertinent issue in understanding the appropriate way to manage knowledge in a construction company, and the significance of KI to delivering Integrated Solutions.

To understand the effectiveness of the KM strategy in ConstructCo, and the extent to which organisational knowledge is integrated, the subsequent sections present the findings in relation to each of these KM interventions from a strategic and operational perspective.

## **e-KM**

### Strategic Perspective

For a firm such as ConstructCo, there is a continuous challenge of supporting learning and the development of knowledge across the organisation. The cycle of knowledge from individual to organisational level is a complex process, bounded by routines that emerge in the course of work (see Orlikowski, 2002; Tsoukas and Vladiimirou, 2001). The response by ConstructCo to attempt to capture the value of personal knowledge was to introduce a formal intervention (Okhuysen and Eisenhardt, 2002), in the form of an IT-based communication system which we will refer to here as e-KM, launched in the company in 2000. e-KM acts as a means of accessing the diffused knowledge that is held by individuals, and also provides seekers of knowledge with the ability to utilise colleagues' contacts. It is a way of reacting to the demand for knowledge by encouraging and giving employees the means to tap into their colleagues' experience, keeping knowledge up-to-date and encouraging intra-organisational communication. Technology is deployed to complement the tacit knowledge of employees, avoiding the need to refer to a database of individual capabilities and experience, also making the progression of organisational knowledge a community endeavour that people choose to engage with for the development of the company.

The problems typically faced by organisations in managing knowledge often revolve around how information is kept relevant and up-to-date as it develops through practice, how it can be easily accessed by users, and how to encourage participation in knowledge sharing activities consistent with the approach used by other organisations reported in earlier studies (see for example Brown and Duguid, 1991; McNamara et al., 2004; Orr, 1998). With tacit knowledge recognised as a key value to the organisation in developing capabilities and a competitive position relative to its sector, the issue of how to create access to this personal knowledge without physical socialisation is a challenge that lies at the centre of e-KM. ConstructCo have approached the dilemma of integrating the knowledge of the mobile and changeable workforce by encouraging employees to invest in the e-KM system as a mutually beneficial initiative. This is not a substitute for face-to-face contact, but a way to facilitate access to individual knowledge:

*'I think it's [e-KM] the only way we're going to ever get around this – like, people don't know everything, so they do need help with things. So, if you don't know who knows what, how else are you going to find out? So, I think you need a system like e-KM to put you in touch with people. I also think that because there's lots of new people joining the company, then they need something to kind of, again, tap into the network without having to spend a year meeting people, and they need an instant way of tapping into that knowledge network. So, that, to me, is e-KM' (KM Manager).*

e-KM acts as a boundary spanning device, not only creating links between projects but also enabling cross-disciplinary cooperation, and the potential to develop relationships intra-organisationally. Unlike the example of Kellogg et al. (2006)

where boundary spanning conducted virtually involves display, representation and assembly of knowledge across the trading zone of the intranet, with e-KM the nature of enquiries link individuals through the experience they have and eliminates the focus on explicitly technical language. The e-KM team will carry out part of the translation process (Carlile, 2004), by using the appropriate language to phrase the question so that it is clear. Consequently, the enquiry can cross disciplines to draw on the knowledge that other works sphere have. e-KM performs the role of a trading zone for the ConstructCo workforce, although it responds to specific knowledge needs and is not a compulsory part of the work process. It is, however, a virtual space where individuals can both ask for help and offer their knowledge.

The structure of e-KM is also, through its global reach, a way to partially overcome the situated, stickiness of knowledge, by attempting to circumvent the factors that can impact on transfer such as the ability to identify appropriate knowledge sources and the nature of communication (Szulanski, 1996), and the context of the knowledge (Engestrom, 1999). Individuals are presented with the opportunity to communicate in this virtual space (Nonaka and Konno, 1998), as through e-KM individuals are being asked to acknowledge their role as part of the collective ConstructCo knowledge community:

*‘Through e-KM I do, I sort of think it’s the role of everyone in the company to support others...The main strength is that it reaches the total company, and you can actually search through the brainpower of the company as a whole, globally. It can pull in quite unexpected ideas from different parts of the world, and I think that’s very good. Another strength is that it helps build communication between people, and people will share knowledge, and it sets up a communication between people in different parts of the business’* (Innovation and Performance Director).

The concept of e-KM as a KM initiative is positioned with the intimation that it will challenge the traditional knowledge boundaries in the firm, through changing the way that networks are made. By bringing the dispersed workforce together through the questions and answers that the e-KM system handles it provides the basis for creating new connections between people. Once a knower responds to a question, they can continue the exchange with the seeker in the most appropriate form, such as using telephone conversations, email or site visits.

e-KM seeks to draw on individual knowledge, linking that with technology to build on the evolving experience that people have, while also having access to previous responses. By linking the people that need knowledge with the individuals that possess it, the tacit-to-tacit exchange that typically occurs through socialisation (Nonaka and Takeuchi, 1995), is assisted through ICT, and there should be greater access to tacit knowledge which is of value to the development of company practice (Pathirage et al., 2007). The nature of the system means that the company can avoid one of the three ‘core integration challenges’ that Carlile and Rebentisch (2003) allude to in relation to the knowledge gap created between storage and retrieval. By having a just-in-time approach to knowledge this avoids unnecessary delay in the utilisation of knowledge. By linking individuals, it also creates the potential for the further development of knowledge as a spin-off from the formal process.

The strategic intent and understanding of e-KM would seem to suggest that through employee engagement with the initiative, the knowledge support infrastructure is in place to link individual knowledge on a company-wide basis, which is also expected to result in company-wide KI. The initiative relies on active participation, because the central focus is to bring knowledge seekers and knowers together. All employees are connected to the system through email, but it does not include all members of the company in the subsequent part of the knowledge flow. Without the commitment of the workforce and their willingness to invest in the initiative, e-KM cannot operate effectively or claim to integrate knowledge throughout the organisation.

### Operational Perspective

e-KM represents an effort to encourage a knowledge sharing culture and make this an explicit characteristic of the behaviour of ConstructCo employees and integrate knowledge through making it part of organisational routine (Grant, 1996). This is consistent with the perspective of the organisation which dominates the strategic perspective discussed in the previous section. The expectation is that employees will engage with e-KM, so that through their participation knowledge will flow effortlessly around the organisation. The underlying assumption is that KI will automatically occur through ICT due to the easier access to individuals' knowledge that is created.

The dominant assumption is also reinforced operationally by interviewees who acknowledge the valuable role that the e-KM can play in integrating individual knowledge:

*'This e-KM system is a fantastic learning device really. And the fact it's sent to everybody when you get responses, even if you haven't sent the question out, you will get to read it, so you all, sort of, can, you know, start reading about what other peoples' questions are. So, no, it's a good method and works very well'* (Design Manager).

Perceptions of e-KM and how it should work reflect on the one hand, a degree of consistency between the strategic and operational view. In other words, the organisation's intentions seem to be compatible with the way employees across the business perceive the purpose of the KM intervention. On closer examination, however, we note some inconsistencies in the way e-KM is employed in practice. There are three main recurring themes that emerged from the interview analysis that provide an understanding of how e-KM works in practice, and these will be discussed to unpack further the emerging gap between strategic intent, and operational reality.

### *Inappropriate Answers*

The progression between each stage of the construction process, the time constraints involved, and the role of intra-firm collaboration (Dubois and Gadde, 2002), mean that when a problem is encountered or information is required, the organisational knowledge flow must be effective and efficient. e-KM is presented as a system that can post enquiries within approximately two days, or can respond quicker if the question is urgent. The success of e-KM is dependent on the participation of the workforce, not only in relation to individuals being willing to ask for help from colleagues, but crucially that people are prepared to volunteer what they know and

offer their experience to contribute to the knowledge of other members of the workforce, all for the benefit of the company.

For people to invest in the e-KM system, it is important that responses are relevant and of value, beyond other knowledge sources that employees could access. By supporting a way for individuals to participate in a tacit-to-tacit knowledge exchange beyond their immediate community, the potential to learn across disciplinary boundaries, to find an appropriate answer is expected to contribute towards increasing the depth of organisational knowledge and combine knowledge (see Fong, 2003). However, the integrity of the system is hindered by peculiar replies that are not seen to be helpful and do not contribute to a solution. Here, a seeker demonstrates how the system is limited by who participates and the extent of their knowledge:

*'I mean your questions, again, are so bespoke that you don't always get a reply or a useful reply. I had a reply once that – I had to get on this project and there was, like, a big desk for mixing music and controls and we had to move it around the building to do different things, and I wanted to know how we could move this easily and if there any, sort of, trestle or platform you could move it around on. And I got one back saying, "I've spoken to my son, and he says you shouldn't move them around and they should be fixed", which wasn't a very good answer really' (Design Manager).*

The system can only perform to integrate knowledge through participation, and is also only as strong as the experience that people possess. If the knowledge that the seeker requires is not available, then this creates the potential to respond by creating knowledge. However, the system does not support this activity, because interaction is limited.

The e-KM initiative was introduced with the intention to 'build communication between people' and identify who knows what within the company. The initial anonymity of enquiries, however, created a situation where individuals can be directed to themselves for an answer:

*'Some people have a tendency to respond to questions with, there's a guy who works here who will know the answer, so the few occasions I'll ask questions, I'll actually get a lot of different people, who I've worked with on other projects, who will respond by saying, "AS will know the answer", which is slightly weird. But, fair enough, they're being helpful, and I might know the answer' (Envelope Project Manager).*

This suggests that there is a gap in knowing the skills and experience that colleagues possess, and that it is difficult to identify potential knowledge sources. e-KM demonstrates a deficiency in its ability to integrate and make known the expertise that is held by individuals in the organisation. By relying on employees responding to questions (or by their knowledge being 'volunteered' by colleagues), there is a division evident in what people know, and the ability to access individuals' knowledge. e-KM requires support so that in addition to people passing on personal knowledge, employees communicate their awareness of colleagues' knowledge. Socialisation is an essential aspect of integrating such diverse knowledge (see Lang, 2004), and in relation to the responses that are generated, there appears to be a shortfall in the depth of knowledge people have.

### *Saturation and Time*

The way that individuals respond to a request for knowledge demonstrates the barriers that an ICT approach has created in the knowledge flow. The impersonal nature of the system removes the seeker from the question, and the potential knower from the context of the request for knowledge. Arguably, the relationship between seeker and knower is different when contact is face-to-face and the context of the question is known, compared to an anonymous email:

*'I don't think everyone reads the emails when they come through with the questions with people, you know, seeking help. Some people are probably too busy to respond to it, even if they do know the answer. It's human nature, isn't it, time constraints and the rest of it. But, you know, it's a great tool'* (Construction Director)

Engagement with the system takes place in relation to other responsibilities, and email requests for knowledge are not approached with the urgency or necessity that they are sent with. Virtual networks can effectively support the knowledge flow, although they are characterised by weaker connections between members (Ormrod et al., 2007; Tagliaventi and Mattarelli, 2006), but e-KM does not appear to have created the shared space (Nonaka and Konno, 1998) to support consistent use and commitment from employees.

In fact, it could be argued that the e-KM system is placing greater expectations on individuals to be responsible for managing personal knowledge, not only in relation to know-how for example, but also documents that they have used in the course of their work:

*'I think time constraints restrict people from thinking about something. I think someone might have done something in the past, but they'd have to start delving through emails and they'd have to go through boxes in their garage to dig out files from the back of their car, and I think people just can't be bothered really. If somebody did have the time to go to that container and dig out the files and scan them in and send them to somebody, then perhaps it would save a lot of time and money for somebody else, but I think people, you've got to look after yourself sometimes. I think it's time, everyone's so busy'* (Design Manager).

The investment that employees are being asked to make in organisational knowledge clashes with other work commitments and personal time. As a result, integration of individual knowledge is limited and intermittent, depending on individual circumstances and the extent to which people can engage with the process.

The connections that individuals have developed during their careers, both internal and external to the company, are part of the knowledge that people refer to on a 'just-in-time' basis. The relevance of e-KM from a KI point of view is that it was introduced as a way to bring the workforce and their knowledge together, but in practice knowledge seekers are more likely to use informal networks:

*'...you really should talk to the people around you before you go onto e-KM really, because you're wasting peoples' time, and it's more important for you to talk to somebody than it is to email somebody. So, yeah, we always try and*

*promote people to get up from their desk and walk down the office and talk to somebody you might think might know the answer' (Design Manager).*

The role of informal connections to support KI is discussed in other research as well, (see Awazu, 2004) where boundary spanners and gatekeepers collect and possess knowledge. e-KM is intended to perform the role of linking seekers and knowers, integrating the diverse knowledge within the organisation, but this remains predominantly a social process that operates outside the KM strategy implemented by ConstructCo.

### *Seekers' Questions*

In addition to the way that employees respond to e-KM in relation to the extent to which they answer questions and the type of reply given, a further dimension of the initiative that recurred in the interviews was the nature of questions that tended to be posed:

*'I always kind of feel – I suppose, that's the nature of the thing, the questions are very – tend to be very specialist, so if you're, sort of, excluded from it, and there needs to be another level for the more routine type questions. I perhaps tend to feel awkward, I suppose, you know, why are you asking this, because you should know about this, you know? I don't think somebody would ask about a wind turbine, well, nobody's actually – very few people have done one, so, yeah, fair enough, but perhaps at a lower level' (Commercial Manager).*

While there is an expectation in the KM literature that the implementation of initiatives subsequently creates integration (such as Grant, 1996), limited attention has been given to the circumstances of integration. e-KM's function is to link knowledge, but this assumes a level of interaction and commitment to the system that is not completely present. More specifically, although employees are given examples of the type of questions to ask, they tend not to all possess comparable knowledge. The system does not compensate for incongruence in understanding and knowledge required by users, which is (unintentionally) excluding people from participation.

Not surprisingly therefore, we note that the actual utilisation of e-KM is decreasing:

*'When it started I was very impressed with it, and the questions were varied and a mixture of incredibly complicated with, sort of, some more day-to-day issues. They have become less frequent, definitely. I don't know why, but they're definitely less frequent. One lot of three questions every week and a half, and one lot of four questions, where it used to be about ten at a time every week, and the questions were more accessible. I mean at the moment they're just so, so, so specific and detailed. Which, I guess, if you get one person in the world that can answer it, it's done it's job, but you can almost get deflated reading every question and just feeling I'm offering nothing to this. And I think it stops you asking the simpler questions, and you feel it's become a forum for only very, very technical issues' (Project Commercial Manager).*

Instead of e-KM working towards narrowing the gaps in knowledge that exist in ConstructCo by integrating individual knowledge through information technology, it is isolating the workforce and making people more uncomfortable about exchanging



knowledge in this way. Lang (2004) refers to social capital and the embeddedness of ties in KI. Relating this concept to engagement with e-KM, individuals are taking their prompt of how to use the system from other users, and this is undermining the purpose of the system because despite anonymity they do not trust the system and risk exposing their lack of knowledge and are unsure what is appropriate. Without the socialisation to support these exchanges, interaction with colleagues is potentially limited in depth. When individuals have a question, they are more likely to utilise personal networks than rely on organisational knowledge:

*'For specific field stuff that I do, I've got a reasonably good knowledge base, and I've got a lot of friends who are Consultants. So, I would ask, if I have a question that I don't know, I would generally ask a Consultant or a Specialist Engineer before I would ask another person in the company'* (Envelope Project Manager).

Users have become passive participants to e-KM, as the level of engagement cannot support the effective flow of knowledge throughout the organisation. This is similar to Bell and Zaheer (2007), who argue that friendship is more effective than organisational ties to knowledge transmission, even across geographically dispersed locations. This emphasises the difficulty of using virtual means to connect individual knowledge, particularly when the users of e-KM do not represent a coherent electronic community (see Lesser and Storck, 2001), but is an attempt to bring the entire ConstructCo community together without a clear focus of identity or practice.

## **Role based Communities of Practice**

### Strategic Perspective

At the time of the research, ConstructCo had twenty-one RCoPs which were gradually created in response to a perceived requirement for a forum where people performing specific roles can meet and exchange ideas and experiences on a regular basis. The significance of socialisation to knowledge development has been the focus of substantial debate and research in the literature on Organisational Knowledge (see for example Nonaka and Takeuchi, 1995; Wenger, 1998). Through practice and participation, knowledge is shared and developed (Brown and Duguid, 1991), and ConstructCo acknowledge this issue, and also aim to generate further interaction through formalising RCoPs:

*'Mostly you learn from doing it and, yeah, there's a few ways. One, you learn from doing it and finding your own way and working it out. You also learn from other people on your project, and then you learn also, from the wider groups that you belong, so the Communities of Practice are a way that people have kind of to learn from each other'* (KM Manager).

Through participation, storytelling and shadowing (Orr, 1998; Swap et al., 2001), involvement in a community creates an environment within which common understanding enables knowledge to be shared. These – arguably artificial – communities are orientated towards specific work practices, which unite colleagues in a community defined by identity, although not routine, physical participation in a community on a daily basis. The RCoPs were developed to provide the opportunity for knowledge to flow, in a defined time and space. Subsequently, through the individual the knowledge is diffused to other projects through 'infected' members (Levitt and March, 1988):

*'I think they're a very important forum for people to meet and find out what other people are doing in the business and share knowledge. It's a good network, because of the way the Communities meetings are set up, people will then generally take them to projects, so people see what's happening on other projects. Whereas, projects can be quite insular and the teams may not visit each other. So, that's a very good strength'* (Innovation and Performance Director).

The RCoPs meetings perform a similar role to e-KM, acting as a bridge between individuals and different projects. The communities complement the primarily virtual communication of e-KM by supporting the exchange of tacit knowledge through physical interaction specific to particular functions and roles:

*It's a method for people to broaden their expertise...if someone doesn't know much about building services they can join the Building Services Community of Practice and go along as learner through that process. It won't make them a Building Services Engineer, but they'll understand a bit better how to interface with that side of the business. So, that is a good function of it, and I think that's one of the real positive sides of it. It gives people the ability to make that part of their continued professional development as well. So, I think that's useful to people'* (Innovation and Performance Director).

Although predominantly role-specific, these forums offer the opportunity for greater integration within ConstructCo across disciplines, through the attendance of meetings. Through having the opportunity to meet and discuss work, present experiences of innovative ideas and best practice, and being able to visit colleagues' project sites, the context of the knowledge is retained to a greater extent and is diffused to different projects through the movement of the individuals that attend, and the knowledge that they embody (Collins, 1993). Therefore, part of the communities' function is to integrate organisational knowledge. With the success of the RCoPs dependent on the individuals that participate, it is important to understand the perspective of the people that engage in these KM interventions.

#### Operational perspective

The RCoPs provide the opportunity for people across the company based in the UK to meet their peers on a regular basis. The interviewees spoke positively about these meetings:

*'I'm very interested in new things that are happening and innovations that are happening within the design. I mean that's where you're really going to come across them...you can ask questions and you can really start to explore different things that are happening outside of your own normal work environment, like this project, for example'* (Construction Manager).

*'So, it's always good to get together, have the gossip, do a little bit of technical stuff, technical discussion, and maybe have a pint afterwards, you know, and it's that sort of environment...you need, in a big company like this, you need the continuity and you need the comradeship'* (Construction Director).

*'We're very much isolated project by project, so, it's good to actually share in some of their experiences, even just to catch up on what they're [peers] actually*

*up to. It is a good forum to spell out new issues, new procedures, guidance'*  
(Project Manager).

The benefit of the communities is that they give all employees (primarily) occupying similar roles in the company, the opportunity to get together and share experiences and new practices, rather than relying on individuals to perform this function across the company (see Bresnan et al., 2003). The interviewees were positive about the communities in relation to the way they were able to meet with peers, and the social as well as the professional aspect of meeting. In addition, a number of issues that challenged the communities were evident, and these characteristics are essential to interpreting the ability of the intervention to integrate organisational knowledge.

#### *Location*

The communities provide the opportunity for employees to meet in a common space and to discuss a common agenda, supporting the diffusion of knowledge from one area to another. Through the role-specific meetings, individuals' knowledge has the potential to cross over the boundaries of a variety of projects. However, it is the literal geography of the communities that can prevent participation and limit the knowledge flow:

*'They're worthwhile and I did actually learn and benefit from them. They've generally been in London, which isn't a convenient location, with sort of working here (in Liverpool), so it's kind of dissuaded me or mitigated against me going to them, and so, I tend not to go'* (Mechanical and Electrical Service Manager).

*'Most of the Community of Practice seems to be based for ConstructCo down South. I think it's – there's Catherine runs it out of London, so a lot of the events are in London, and I don't think Peter would appreciate me jumping on a plane and disappearing for a day, and he probably wouldn't want to pay for me to jump on a plane, and so I obviously don't go. I think they are trying to introduce a Northern, sort of, slant on that, but it is very difficult to attend these things'* (Design Manager).

Employees have been given the infrastructure to support the transfer of knowledge, but the means to engage with the communities does not seem to work as effectively. The communities recognise the value of tacit knowledge, and the importance of participation in transferring knowledge and the opportunity it brings to create knowledge (Wenger, 1998). The geographical dispersal of projects causes difficulties in participating in meetings, and therefore limits membership to those near to core locations. Non-attendance does not purposefully exclude individuals from the communities, and it can be argued that some degree of tacit knowledge exchange can occur at a distance (see for example Bathelt et al., 2004), but KI clearly does not result from such inconsistent participation.

#### *Content*

One of the main values of the communities of practice for participants is that they provide a support structure for members, uniting them in a common practice and supporting situated learning (Lesser and Storck, 2001; Lave and Wenger, 2001). We found support for this in our data. Communities are perceived to be a space for

learning, but there is a concern amongst some users about the outcome of community meetings:

*'The negative side is, I wonder how often any specific actions come out of meetings that get finalised? There may be a lot of action but I suspect most of them die, and those actions get dealt with elsewhere in the business... Well, they've got to come away with some agreed improvement actions of some description. And they would be different for all sorts of different things. But it's no use just going there, having a cake and a cup of tea, and going back to your job and say, "That was a nice afternoon". Something's got to come from it'* (Construction Manager).

A necessary caveat to make in interpreting the ConstructCo RCoPs is, that membership is automatically derived from the role an individual occupies in the organisation. Hildreth and Kimble (2000) differentiate between a team and a CoP, as a member of a community derives legitimacy by earning their status. The output or effectiveness of the ConstructCo communities is less immediately evident because membership is automatic and does not focus on participation in a shared endeavour. In this respect the communities have more in common with networks of practice (Ormrod et al., 2007), and this has implications for the extent to which the communities are supporting KI.

In relation to the diffusion of innovation across the company, the communities are important, but also consequently exclude those not attending:

*'The only way it [innovation] gets done is through the communities of practice. Well, from the services we do them monthly, and then we get to on other jobs and see what they're doing, but you only find that out by – if you don't go on the community of practice then you don't see it and you don't get it. So, you need to put yourself out and go on to them and do them'* (Mechanical and Electrical Services Manager).

*'We have our communities and practice, which I am not sure how valuable they are. They're a convenient place for people to get together and have an enjoyable two hours, but do they really share any knowledge? I'm not so sure they do... It's a forum where they can take their gripes, they can take their experiences, share it, and they probably go away thinking, "I've shared 20 problems; at least I got a solution to one". And they go back to their job and live happily for another day. But I'm not sure how successful they are'* (Construction Manager).

In relation to their research on project organisations, Ruuska and Vartiainen (2005) discuss the role of personal and learning benefits of being in a community, and the data from ConstructCo also indicates that the social aspect of participating is a valuable aspect of membership. However, as an initiative that is expected to integrate organisational knowledge through the routine of attending (Grant, 1996), the role community meetings play in the knowledge flow is unclear. CoPs are typically associated with the transfer and creation of knowledge emerging through practice (Wenger, 1998; 2000), but the role they perform in ConstructCo in integrating knowledge is not made explicit by participants.

### *Participation and Organisation*

In discussing the RCoPs established by ConstructCo, it is important to consider the way that participation occurs. As mentioned above membership is automatic, defined according to role. Traditional understanding of communities is that members belong to the social learning system through engagement, imagination or alignment (Wenger, 2000). Communities appear to be characterised through informality based on various levels of participation, and through this learning occurs. In ConstructCo, the communities were created to support learning and innovation, but commitment and affiliation to the groups is not consistent, which challenged the extent to which knowledge Integration occurred:

*'There is no agenda of the next meeting, and it's very ad hoc. I tried a number of years ago to run it on a regimented, you know, every last Thursday of the month, and then we had one meeting where we talked about the agenda for the year, and I tried to set them all in advance. And you would invite a supplier or somebody to come and talk to you about something, and he would be presenting to a room full of two people, and you would be one of them. And it was just embarrassing'* (Project Manager).

*'The ones I've been to have been somewhat poorly organised, in the past. The agenda, the meeting, procedures, the arrangements, are all very much last minute, and it doesn't encourage attendance when you have that scenario'* (Project Manager).

The communities are also supported by an email system similar to e-KM that links members, and can contribute to crossing disciplinary boundaries and increasing participation. The central premise of RCoPs is engagement with peers in work practice, and ConstructCo established the infrastructure for these meetings to encourage and support the knowledge flow within functional areas and also between divisions. In practice, the nature of participation is organised on a formal basis, and perceived as being unsuccessful in bringing members of ConstructCo together to combine individual knowledge.

### **Discussion**

Despite the inherent barriers to the knowledge flow in the construction sector, through e-KM and the RCoPs, ConstructCo has implemented a combination of IT and socialisation initiatives that are intended to support the flow of knowledge and limit the leakage, integrating the know-how and know-what of the company. ConstructCo demonstrates a willingness to be proactive in their approach to KM which is counter to the view that construction companies tend to react to events, rather than engage in double loop learning (see Barlow and Jashapara, 1998). The findings and analysis presented reveal multiple challenges affecting the perceived impact of these KM interventions towards integrating knowledge. Several conditions are therefore, presented in relation to each of the two 'formal' KM interventions (Okhuysen and Eisenhardt, 2002) that reflect the potential obstacles to KI.

### **Obstacles to KI**

e-KM is portrayed as a valuable tool in encouraging people to ask for help within the company and to utilise the resources available to them in the form of colleagues who

could have relevant knowledge and experience. It is also a way for ConstructCo as an organisation observes trends in requests and see what type of knowledge their employees have that is relevant to the company's operations. Returning to the KM Manager's comments, the main knowledge challenge in ConstructCo is identifying '*...mostly who knows what and putting them in touch with each other*', or the 'tacit dimension' as Polanyi (1967) puts it. e-KM was established to connect employees and their knowledge, but the observation of one user reveals one of the central flaws of the system in integrating knowledge:

*'...e-KM is people trying to – I don't think – it's trying to find a solution to a problem, rather than sharing the problems'* (Construction Director).

This initiative does not perform a KI role, but selectively diffuses knowledge between people that know, and people that have identified a specific gap in what they need to know.

The significance attached to this KM intervention is affected by the perceived relevance and reliability of the knowledge being shared by individual users. We note for example that e-KM is suffering from a growing negative reputation of dealing with highly technical issues that some users consider trivial and time consuming. Moreover, we note that often recommendations of other's expertise may not be accurate and that is also undermining the reliability of the system. Furthermore, the perceived time investment required by this formal intervention is out of balance in relation to the other priorities of users, hence unlikely to receive the time investment it deserves given it is seen as an additional task that does not yield sufficient returns from the time investment it requires. Overall, therefore, the obstacles to KI identified in relation to e-KM not only reinforce the challenges of ICT based KM initiatives, but also reveal that informal interactions between users may be equally productive means of exchanging knowledge as they respond to the need for speed, accuracy and usability. These dimensions also raise the value attached to sharing and obtaining knowledge via e-KM.

Similarly we note that RCoPs while highly valued and could be a useful way of compensating for the technical orientation of e-KM, this too suffers from several obstacles in supporting KI. Beyond observations that are consistent with other studies of CoPs (Roberts, 2006) that reflect the importance of social interaction, RCoPs in ConstructCo do not always offer a pragmatic and practical response to users' knowledge needs. They tend to be organised in locations that some find difficult to access, the activities of CoPs are predominantly evolving around meetings whose frequency also varies and whose content is not always seen to be providing sufficiently useful knowledge to inform action. CoPs meetings tend to be seen as ad-hoc and not sufficiently well organised, consequently they do not always attract high attendance by their members. The perception that these tend to be socialisation events may be contributing to their limited impact in supporting KI because even as networks they do not provide a strong sense of community to encourage members to more actively seek to connect with each others' knowledge to create new solutions to business issues. Therefore, members of RCoPs may be more inclined to engage in more informal interactions with their peers to address specific knowledge needs and to share their insights reinforcing through this way that even within specific roles there can be multiple and varied ways of knowing and doing the tasks involved.

In essence, the findings from the ConstructCo case study of KM interventions in relation to KI reveal several tensions that enable us to better appreciate why KI may be difficult to achieve. Our analysis reveals the tension between strategic intent and operational reality, the formal in relation to the informal approaches underpinning KI and the degree of homogeneity in relation to the heterogeneity of KI practices. We discuss each of these tensions in turn to unpack further the forces that constitute the dynamic and complex nature of KI.

### **Tension 1: Strategic intent and Operational reality of KI**

We note consistently from the findings that KI is a key aspect of the KM interventions that ConstructCo has introduced. We also do note however, that KI as an intended outcome is not clearly articulated. KI tends to be seen as the process of aggregation of individual knowledge for organisational ends. It is also perceived to be a process that will naturally result from the sharing of knowledge and the greater flow of knowledge. In practice however, users of these KM interventions show little evidence of integrating knowledge as there is a tendency to ‘bank’ on knowledge (to paraphrase Friere, 1972) by depositing or withdrawing knowledge through e-KM and RCoPs with the intension to accumulate a stock that can be redeployed subsequently to address specific needs in relation to work. There are limited evidence that the investment in knowledge and its dissemination is driven by a clear agenda for action that by implication will also demand that the knowledge is connected so that it can yield a greater accuracy in the practical judgements that need to inform action.

The tension between strategic and operational realities also exposes the misalignment between what the organisation expects and what individual employees perceive to be relevant and achievable. This tension reinforces longstanding debates in the gap between rhetoric and reality (see Legge, 1995). It also reveals the inherent ambivalence in efforts to integrate knowledge through greater knowledge flow which perhaps unintentionally also works in fact to dis-integrate knowledge. By dis-integrating (or deconstructing knowledge) in the questions and answers posed on e-KM and the issues raised during RCoP meetings would tend to unpack the knowledge to reveal the source of expertise and the very specific contextual conditions or circumstances during which the knowledge emerged. The extent to which it can be re-integrated and utilised by other knowledge users who are exposed to it is less clear. What is quite clear however, is that this dis-integration and re-integration relies on the users’ practical judgment (phronesis) and their practice. This means that individuals do exercise choice when and how they utilise the knowledge they are exposed to based on the perceived relevance and usefulness of that knowledge to their practice.

These observations add a new dimension to our understanding of the political nature of knowledge in organisation and especially the ways in which this political orientation to knowing may manifest itself in the misalignment between organisational and individual priorities in relation to KM. Our analysis suggests that individual knowledge users as they exercise choice can either contribute towards meeting organisational expectations and/or they may reveal additional requirements that the organisation may not have considered. The findings from our study reveal that the ConstructCo has thought a lot about investing in KM through the formal interventions it has not paid sufficient attention on how to support informal interventions that individual knowledge users seem to be relying more on.

## **Tension 2: Formal and Informal approaches to KI**

The KM strategy of ConstructCo has evidently favoured formal interventions in an attempt to support KI. However, counter to similar recommendations of previous research that formal interventions can support KI (Okhuysen and Eisenhardt, 2002), the findings of the present study suggest that this is less likely to be the case. In fact, there is more likelihood that individual users may integrate knowledge just as much through ad-hoc and informal approaches which they initiate on demand.

This observation reveals an important dynamic between formalisation and informality in procedures that are intended to support behaviours compatible with specific desirable outcomes. The paradox seems to be that the more organisations formalise certain procedures to achieve specific ends, the more likely it is that informal procedures will emerge that may deviate the focus and hence the desirable ends may not be served.

In the case of ConstructCo formalisation of KM was intended to deliver the integration of knowledge which in turn could support the delivery of product-service integration. The formalisation of the KM interventions did certainly raise awareness of the importance of knowledge flows but has done little to guide or support KI. There is limited evidence also that these KM initiatives have raised awareness of integrated solutions as a strategic priority. It is not surprising that the new service model did not feature highly in interviewees' agenda or consciousness when issues of product and service integration were discussed. The tendency was to respond to day-to-day pressures and to cope with the workload as it is. The formal KM interventions were in fact frequently interpreted as additional noise that may be a disruption and a source of added pressure given the extra demands it places on the existing workload.

Understandably perhaps, employees of ConstructCo responded to formal KM procedures by joining in only when they perceived they had something to offer or something to gain. In other words, participation and contribution to the formal KM interventions was a matter of perceived need and relevance to specific circumstances. Engagement in informal interventions initiated by the knowledge user appear to have been taking place in parallel to the formal interventions and in several instances were rated more highly in terms of their contribution to addressing the knowledge needs of the individual.

A balance needs to be struck between formal and informal procedures in relation to KM interventions. This balance is not a matter of quantifying a proportion of formalisation in relation to an appropriate proportion of informality. Instead, such a balance is more likely to be reached if greater onus lies with individual users to determine how best to address their knowledge needs. This point assumes that individual knowledge users when exercising choice do so with the necessary responsibility and accountability to the personal priorities and those of the organisation at the same time. Learning to adopt this practical judgment to balance personal and collective agendas would be the acid test of KI as it would also expose the ways in which unity and diversity can co-exist.



### **Tension 3. Homogeneity and Heterogeneity in KI practices**

Unquestionably KM interventions be they formal or informal will support different levels and modes of integration. We cannot assume that integration is a uniform process. If we take fully on board also Laurence and Lorsch's (1967) assertion we cannot consider integration viable without also differentiation. In KM terms this would mean, that many of the KM initiatives that seek to support KI need to broaden the spectrum of their agenda so that they are not limited in promoting only uniform understanding. KM interventions cannot be developed on the principle that there ought to be a homogeneous knowledge agenda within the organisation. The diversity of practices that are central to the organisation's functioning is sustainable through a diversity of knowledge and modes of knowing. This means that there is also a rich variety of combining and connecting knowledge which repositions KI as a process of celebrating the differentiation of modes of knowing and modes of connecting. In practical terms this would mean that whilst a common understanding in relation to certain bodies of knowledge may be desirable acknowledging and celebrating the diversity and heterogeneity of actions and activities that bring this knowledge to life may be an integral aspect of KM interventions.

In essence the tensions discussed in relation to KI and KM interventions reveal a need to understand dis-integration as a foundation for integration. This means that to support the integration knowledge in organisations we also need to understand the multiplicity of approaches that reflect the current dis-integration of knowledge. Dis-integration itself is not to be understood as the opposite of integration, nor is integration to be presented as the ideal. Instead, KI understood as a process that entails and embraces differentiation reflects that dis-integration is a means towards accomplishing different levels and modes of connectivity. The inherent diversity that this view propounds also would entail the necessary flexibility to account for individual circumstances. This adaptability of KI to local conditions (individual circumstances) can form a useful foundation for combining both formal and informal KM interventions. In doing so, it could be argued that potentially a foundation toward greater ambidexterity (Tushman and O'Reilly, 1996) can be accomplished that can also more effectively accommodate the tensions between operational and strategic realities, short and long-term priorities. Such ambidexterity could potentially also provide both a foundation for unity in common approaches that may be formalised and institutionalised along side approaches that are heterogeneous due to the informal and emergent character of the ongoing negotiation of knowledge and action.

In short, our analysis of KI and the findings presented reflect that understanding integration demands an engagement with the dynamics of a complex process. Such dynamics and complexity reveal that greater attention is given to the co-existence and inter-dependence of seemingly oppositional dimensions (e.g. formal/informal; strategic/operational; short/long term). In other words, instead of adopting an 'either/or' logic, a logic of 'both/and' is more appropriate where possibilities are generated in the process of connecting these oppositional dimensions. Our analysis reveals this point not only through the analysis of the tensions observed in ConstructCo. These tensions however, are a foundation for extending our understanding of KI as a process that entails dis-integration at its core. This observation suggests that to understand complex phenomena like knowledge understanding how tensions are transformed into extensions is crucial (Antonacopoulou, 2008). To understand the complexity of KI as a KM process we

need to also understand the forces of knowledge dis-integration as these will provide more possibilities for explaining why KI may or may not be desirable and under what conditions it may be possible to achieve.

This analysis also invites KM scholars especially to review their approaches and analysis of KM practices in organisations and instead of dictating one-best way of supporting the development of organisational knowledge to be more sensitive to the complexities of knowledge and knowing and to account for the ambivalence of many of the KM interventions. By accounting for the tensions inherent in the intended and unintended consequences of KM interventions it is more likely that we can also come closer to the unique and inimitable nature of knowing in organisations that in turn can also provide a more realistic foundation for accounting for the practices that contribute to the distinctiveness and competitiveness of the company.

These observations also call for more research into KI as a unique KM processes. If KI provides a foundation for understanding how organisations balance tensions and create extensions in their approach to engage with the business environment they are part of, then this may also help us better understand and account for the return on the investment in KM as a form of generating new possibilities to enhance and not only maintain competitiveness. Researching KM processes like KI calls for an engagement with the practices of the organisation and the practical judgments (phronesis) of practitioners as they negotiate competing priorities in relation to their work. This focus on the micro-foundations of knowledge for action can also help us understand that amalgamating and fusing knowledge need not be process of creating a melting pot of ideas. Instead, it can be conceptualised as a creative and innovative mode of connecting distinct and unique insights that can generate unique solutions to unique problems under circumstances, even if such circumstances may often be read as industry wide trends.

In the construction sector where our case study organisation is based we accounted for a range of such trends. The extent to which ConstructCo will be in a position to maximise its impact in the market through integrated solutions, combining both products and services, will very much depend on its approach of connecting the disperse knowledge. The emergent integration of knowledge can inform and be informed by the ongoing dynamics of the dis-integration of knowledge across the multiplicity of knowledge sources it seeks to bring together.

## **Conclusion**

This paper presented a fresh perspective to our understanding of knowledge in organisations and to the importance of KM processes such as KI. The review of the current literature, coupled with the empirical findings and analysis presented reveal that at the core of the KM debate lies the need to understand the power of connectivity to attend to the complexity of knowing and action in organisations. Such connectivity calls for a shift in focus beyond simplistic accounts of knowledge as an 'object' amenable to codification and dissemination. As a complex and fragile practice, knowledge lies in the powerful connections that individuals make in action and interaction with others. These connections entail intense negotiations between competing perspectives and priorities and reveal the tensions that form a key foundation for the creation of knowledge. These tensions also reveal that the various

connections made in action entail practical judgements that are unique to the circumstances and the practitioners involved. Hence, what may account for organisational knowledge is not the aggregation of the individual knowledge. Instead, the way individual knowledge is connected creates both a set of homogeneous insights that may be shared collectively whilst also maintaining the heterogeneous insights that are maintained individually.

These points introduce an alternative perspective to the existing KM debate which on the whole has been predominantly focusing on processes that contribute to the homogenisation of organisational knowledge through interventions that enhance the transfer and sharing of knowledge. We distil these points and contribute to the KM debate by focusing on KI as a KM process. Our analysis of KI reveals the above observations and encourages both academics and business practitioners concerned with issues of knowledge in organisations to critically reflect on the assumptions that have underpinned so far our inquiry into knowledge as a phenomenon and approaches towards its integration.

Acknowledging that KI is currently under-researched our analysis of KI surfaces a number of research questions that merit examination. One key research question is the ways in which organisational knowledge emerges amidst the dis-integration of knowledge evident in the variety of practices and modes of knowing of individual actors. This raises similar issues of that of the emergence of a dominant organizational culture from subcultures and countercultures (Schein, 1999). A second research question is the relationship between knowledge and action in revealing the practical judgments that inform whether and how individual knowledge agents negotiate their identity in social interaction. In other words, how are unique individual identities connected in creating community and how does this sense of community in turn, influences subsequently their actions and knowledge. That is, how individual heterogeneity informs collective homogeneity. A third research question is the ways in which organisations strive to combine different KM processes geared towards KI and ambidexterity to respond to the combination of endogenous and exogenous forces. This implies a need to understand the power of connectivity both within the organization in terms of its KM practices as well as the connections between the organization and its environment.

These research questions would suggest that even after over ten years of research into KM and Organisational Knowledge we are still at the end of the beginning in our quest to engage with the complexity of the phenomenon. Perhaps shifting our focus to issues of ambivalence, tensions and extensions in relation to knowledge as we have illustrated in our analysis of knowledge integration and dis-integration we are more likely to directly respond to the real issues organisations have to resolve as the intended and unintended consequences of their KM interventions continue to reveal the challenges and opportunities of 'managing' knowledge.

The need to better understand how to connect knowledge through modes of knowledge integration and dis-integration may be an important next step that can bring academics and business practitioners closer together in researching the value of knowledge for action. The ideas in this paper could form useful steps in this direction.

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