

Investigating Knowledge Management Systems Development in Practice: A Case Study of a Small Marketing Consultancy

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Abstract: The field of Knowledge Management Systems Development (KMSD) is growing rapidly as a field of practice and research. Yet, approaches to KMSD in organizations remain ad hoc or proprietary, while a lack of research into KMSD in practice still persists. The involvement of IT in KMS remains a false assumption, as does the requirements of management. As a result, organizations lack insight into how to effectively develop their KMS in a way that meets the needs of the organisation. This paper addresses this gap in practice and research by reporting the main elements of a case study for developing an actual KMS in a small, but dynamic marketing consultancy. The paper focuses on the principles of the practice that emerged from an Action Research inquiry, and provides informal commentary and rationale on the themes of concepts uncovered. A KMSD method emerged from practice using iterative and intertwined cycles for problem-solving and for research. The case study presented is about the problem-solving that addressed the actual challenges of the organization, for which a KMS was the primary solution. The paper describes the main elements of a continuous, iterative, five-phase KMSD method. The first phase is concerned with making sense of the organisation and its actual business challenges and determining whether KM is an answer to these; the second is about envisioning a new business situation, while the third and fourth are about designing a KMS and exploring the use of IT for it; the fifth phase is about monitoring and evaluating the effectiveness of the continuously changing KMS. The paper offers guidance to the practice of KMSD, especially regarding what concepts need to be provided for in a KMS. It also shows how the usefulness of IT to support a KMS can be nullified by the need of knowledge workers to own what they might share.

Keywords: knowledge management, knowledge management systems, knowledge management systems development, method, small and medium enterprise, SME, action research

1. Introduction

Organizations are yet to find a coherent practice for developing their Knowledge Management Systems (KMS), especially when IT is needed to support the KMS. Lengthy debates in recent international conferences¹ and academic journals² have not resulted in the KM community converging on a coherent framework for Knowledge Management Systems Development (KMSD). Nevertheless, it is clear that the practice of KMSD is growing rapidly and that this growth is equally well represented in academic research. This paper is concerned with practice that emerged in a research inquiry into how organizations can effectively develop their KMS; the research is detailed elsewhere (Moteleb & Woodman, 2009) but elements are summarised in this paper as needed.

1.1 Project Context

While a great deal has been written about many concepts of KMS, this has primarily addressed the issues of definition, theory and models. Little of this research has addressed practical issues in KMSD. The research reported in (Moteleb & Woodman, 2009) seeks to fill this gap in KMSD research and practice through an Action Research (AR) (McKay & Marshall, 2001) carried in a small marketing consultancy in the UK through which systematically derived useful emergent concepts towards a coherent approach for KMSD using techniques of Grounded Theory research (GT).

Knowledge Management (KM) researchers and practitioners offer a variety of models to overcome such challenges. Yet there is a lack of research into how organisations can develop their KMS. KM

¹ E.g. European Conference for Knowledge Management (ECKM), International Conference on Intellectual Capital and Knowledge Management (ICICKM)

² E.g. Journal of Knowledge Management, International Journal of Knowledge Management and Electronic Journal of Knowledge Management

models claim to offer various opportunities for organizations to overcome challenges through improving collaboration, maximising use of resources, etc. As a result many organizations initiated projects to adopt relevant KM concepts and develop their KMS. The primary aim of these projects is to improve creation, dissemination and utilisation of knowledge among various stakeholders (Moteleb *et al.*, 2005). However, KM models fail to explain how organisations can develop KMS in practice (Moteleb & Woodman, 2007). Organisations therefore require a systematic method to guide the development of their KMS. Such a method should include concepts, procedures and techniques that cater for the unique context of KM in organizations.

The AR project was carried out in a marketing consultancy – referred to hereafter as *the company*; the approach taken to address a set of *the company's* business problems of the time. *The company* provided a wide range of marketing and multimedia services to private- and public-sector organizations. *The company* dealt with all aspects of modern marketing, from the development of marketing strategy to the conception and delivery in areas such as design branding, corporate identity, and advertising; it specialised in integrated marketing solutions using state-of-the-art technology including corporate portals, content management systems, intranets, e-commerce, multimedia, digital communications and network infrastructures.

The company had been facing difficulties in creating and maintaining growth and competitive advantage, as business had been growing. Research-consultants were engaged as part of a team for two projects to investigate *the company's* business problems, design an organizational system as a solution and explore and identify IT solutions to support this system. A 'system' was taken to be organisational and not necessarily IT-based. The projects spanned two years with a six-month gap between them. Between the two projects the whole design and development teams of *the company* changed. Initial conversations in AR Cycle 1 showed that problems were related to: (a) project performance, (b) client satisfaction and (c) innovation. KM was not an *a priori* part of the first project's brief, but became part of solution thinking. The second project aimed at designing and developing a KMS prototype supported by IT, to improve project performance, client satisfaction and innovation. In Cycle 2, two problems areas were added: (d) collaboration and (e) time-to-competency. Both projects were conducted in collaboration with Middlesex University e-Centre and funded by the London Development Agency.

The KMSD research was appropriate for small-to-medium-sized enterprises (SMEs) as they are often willing to adapt to meet business challenges and are consequently required to manage knowledge of their suppliers, partners, contractors etc., often dispersed in time and place – exactly the challenges that KM is used to address in a variety organizations.

1.2 Problem-solving using Action Research

This paper reports on emergent concepts, procedures and techniques for the practice of KMSD. The projects served the dual aim of helping organisations address actual challenges and opportunities, and in so doing capture emergent methods for KMSD in practice.

As far as a company participating in the AR was concerned, it had business problems it wanted solved. What transpired was two AR cycles that addressed the business problems and within which the KMS became the chosen solution strategy. The general problem-solving interest in AR is depicted in Figure 1. After initial problem identification and 'fact-finding', the problem-solving activity is planned and actions are carried out. Monitoring and evaluation either leads to exit (completion) or an amended action plan and a further cycle. A corresponding cycle to meet the research interest in problem-solving can be found in Moteleb & Woodman, 2007.



Figure 1: The Problem Solving Interest in Action Research Cycles

1.3 A Five-phase KMSD Approach

The KMSD consists of five overlapping phases of transformation; phases are not sequential steps but sets of exploration and change activities that overlap and interact. Figure 2 depicts these five phases. In the first phase, conversations are used to make sense of the organisation's current challenges and opportunities and, crucially, to decide whether KM has potential solutions. The second involves collective team envisioning of improved situations that address the challenges and opportunities. The outcome is a continuously emerging vision of the aspired-to situation. Phase III produces a KMS design for the improved situation in terms of the knowledge agents, knowledge flow and knowledge interfaces in a way that can accommodate the different and changing knowledge perspectives. Phase IV involves the team considering potential technologies to support the KMS in a way that caters for complexity and change. The final phase is concerned with maintaining the health of the KMS, allowing it to evolve with the organisation; it repeats activities in earlier phases but may result in the process starting again – almost always needed when the earlier articulation of the business and its problems no longer makes sense.

The paper is organised according to the five-phase KMSD method; detail of the research data and its analysis is not provided. Rather, we concentrate on commentary and explanation of matters of practical interest. Due to space limitations we focus on the principles of Phases, I, II and III. The detailed techniques for applying those principles (interviews, workshops, etc.) are dependent on the business problems being addressed and the nature of the organisation.

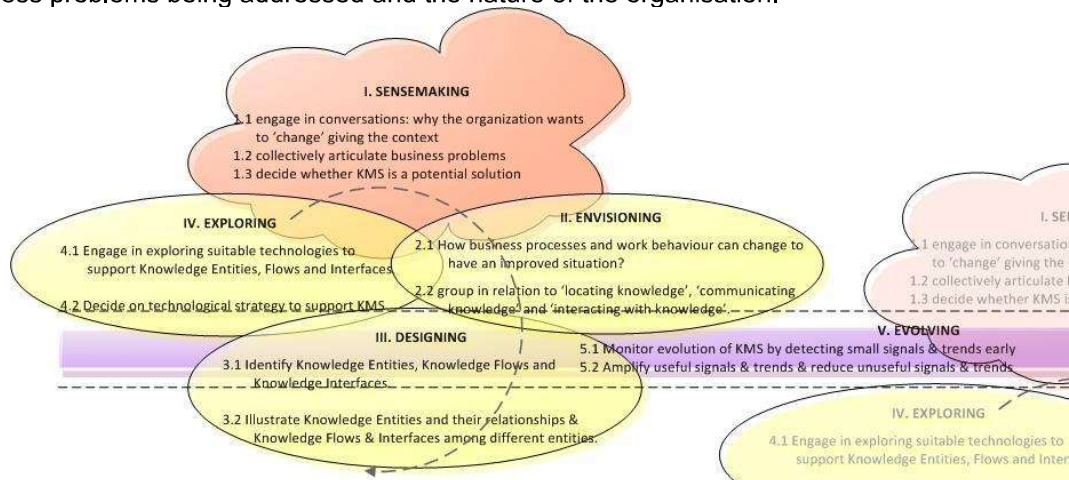


Figure 2: Five phases of KMSD for Organizations

2. Phase i: making sense of the current business

The first phase in KMSD evolved throughout AR cycles from initially being described as 'fact-finding' to 'diagnosing current problematic situations'; eventually both of those terms were seen as part of sensemaking in which the complexity of the business becomes better understood.

During our work with *the company*, the phase started in AR Cycle 1 as a linear and structured activity of 'fact-finding'. The term is used in AR and seemed appropriate until the absence of 'facts' became apparent. In negotiating the first project, the research-consultants used semi-structured interviews with management to have a better understanding of current business problems. These interviews showed that *the company* has been facing difficulties in *project performance* especially with increasingly outsourcing projects' tasks to external contractors and partner organizations. They had been facing particular challenges in *customer satisfaction* as workload is constantly increasing. They have been also missing opportunities for *innovation*, in spite of broad and deep expertise and skills of internal staff and external workers.

Project performance was affected by increasing outsourcing, especially of core competencies, within a centralised organization structure. *The company* had two design and development units: one for print and the other for IT (usually web-based) services. Although their activities represented core competencies of *the company*, some IT and graphic design tasks were often outsourced to be able to provide full services to their clients. Only six staff (including the owner-manager) were permanent in these two units during AR Cycle 1. Most non-core functions were also outsourced. The few non-core functions were kept in-house, such as marketing and sales, which were assumed mainly by the owner-manager. Given the centralised organization structure, outsourcing became a problem because of difficulties in communication among internal and external projects team members. This was identified as the main cause of poor project performance.

The company also faced challenges meeting clients' expectations, for example in completing projects to requirements and on time, especially as their client-base had been expanding. This had reduced the occurrences of repeat business and lessened their ability to take on more projects. Hence profits were declining.

Client satisfaction also suffered from the centralised communication as staff missed out on critical information for completing projects to clients' requirements. Although imperative to understanding and articulating clients' requirements, understanding clients remained embedded in meetings between owner-manager and clients, and was not adequately communicated to relevant staff. This (among other things) has led to projects not meeting clients' needs, and consequently to client dissatisfaction. With increasing number of projects and client base, the situation has been deteriorating as this has triggered several client requests for changes, which were prolonging projects' time and cost, and in turn causing further client dissatisfaction.

In addition, despite a wide range and depth of expertise and skills among staff and external contractors and partner organizations, *the company* was missing opportunities for innovation. A centralised organization structure and centralised communication were causing a lack of understanding of available expertise and skills among project team members, thus hindering their ability to build on each other's work. Expertise generated internally (e.g. in software development techniques and technologies) often remained tacit, especially with the increasing number of staff and range of expertise; *the company* was missing opportunities to explore new knowledge and share it among staff. Knowledge embedded in business processes (e.g. lessons learned in project management and development) usually remained hidden in internal system processes, although these were evolving with increasing number and variation of projects. Moreover, considerable part of knowledge was generated and remained external to *the company* (e.g. different development techniques and technologies are used by various contractors and partner-organizations), especially with increasing reliance on external expertise to enable offering integrated services to their clients.

'Fact-finding', therefore, with management led the team to the conclusion that the ability of *the company* to create and maintain growth and competitive advantage was directly linked to their ability to improve *project performance*, *client satisfaction* and *innovation*. Project performance was hindered by vital knowledge not being disseminated to project team members when they needed it. Client satisfaction was directly affected by lack of sharing critical knowledge about clients to understand their needs. Moreover, innovation was hindered by lack of sharing expertise and lack of capturing and utilising knowledge internally and externally and the ability to transfer this knowledge to staff, especially new recruits. Crucially, *the company* needed to capture and share knowledge among team members and use this knowledge to improve project performance, client satisfaction and innovation. It was important that there was easy remote access to knowledge of staff, especially when out of the office for days. It was also important that there was access to knowledge about clients and their

requirements. Furthermore, *the company* needed to explore and manage expertise of staff and knowledge in business processes both internally and externally.

A major reason for the sensemaking of Phase I is to determine whether there is a possibility that some form of KM could be the source of potential solutions to the business challenges and opportunities. The dominance of issues to do with knowledge, communication and innovation pointed to KM, which led to Cycle 1 of Phase II (see the next section).

The start of the second project (AR Cycle 2) was more participative in that it involved more stakeholders in sensemaking conversations. The team comprised mostly of new internal staff and external freelancers together with the research-consultant started a new AR Cycle to investigate current business problems at *the company*. Participation through informal conversations, focus groups and unstructured interviews with various stakeholders encouraged a shared sense of *the company* and better understanding of business problems. Two new problem areas emerged in this cycle: *collaboration* and *time-to-competency*.

Collaboration was affected due difficulties in communication among internal staff, and also with external freelancers and partner organizations. To cope with increasing number of projects and limited resources, *the company* was maintaining a flexible organization structure, in which staff were swapping from one project to another and taking-on different roles and responsibilities. This had resulted at times in difficulties of understanding each other's tasks and responsibilities, and confusion and redundancy in tasks. This led to over-dependence on the owner-manager and caused project overruns in time and budget. The outsourcing of core competencies further aggravated this situation. Collaboration among internal staff and external freelancers and partner organizations – often dispersed in time and place – was affected because of difficulties in communication among internal and external projects team members. The fluid organizational structure made it even harder for staff to know who was doing what and when.

Furthermore, relatively long time-to-competency was slowing projects, impeding performance and resulting in over-dependence on the manager-owner and creating a communication bottleneck, especially with high rate in staff turnover (e.g. the entire development team has changed twice in three years).

Both of the new business problems to emerge in Cycle 2 of Phase I are indicators that KM could help. Cycle 2 of Phase II thus had to consider how a future improved situation would address these new business problems.

3. Phase ii: envisioning future improved situations

The second phase evolved throughout AR cycles from being considered a form of systems analysis to the current notion of envisioning improved future situations. This shifted the focus from negative aspects of problems in current business processes and work behaviour to positive aspects in imagined situations with improved business processes and work behaviour.

This phase is executed through whatever means of human communication are appropriate for the organisation, e.g. informal conversations or interactive workshops, with “what would it be like if...?” questions posed to see solutions to current problems. While guiding the company members of a team a KM practitioner need to look for a number of practical ‘themes’ and their associated ‘concepts’ as described below. These themes are groupings of practical concepts that were uncovered in the research side of AR cycles while carrying out the problem solving. The explanation of how these themes and concepts, with attendant properties and dimensions is described elsewhere (Moteleb & Woodman, 2009). Hence, envisioning an improved situation in KM terms may address particular business needs, but our work shows it involves dealing with these themes, even if they are considerably mixed up in a newly envisioned future scenario:

- locating knowledge,
- communicating knowledge **and**
- interacting with knowledge.

The theme locating knowledge refers to the ability of the organization and its stakeholders to find essential knowledge. It was uncovered from four concepts. The concept «who knows what» came

from conversations with internal staff, as they emphasised, for example, the need to know what information others hold that might be valuable for the job. The concept «who is doing what» emerged from the redundancy in activities. The third concept «who has which expertise» emerged from the staff's need to understand the capabilities of other team members. The final concept «what is required» was uncovered as staff needed to understand accurately clients' requirements to be able to assess amount and level of work required.

Each concept has 'properties' and 'dimensions' that practitioners eventually need to refine. These are the component parts of the concepts and some sort of value that distinguishes one instance of a concept from another. Concepts related to locating knowledge share the following properties:

knowledge connection – indicators to knowledge and expertise with others, with a dimension of degree of similarity, needed so that projects can avoid reinventing the wheel.

knowledge visibility – accessibility of knowledge to others, with the dimension degree of accessibility that defines, for instance, the extent to which knowledge is available to different team members. The emergence of property of *knowledge visibility* and its dimension degree of accessibility pointed to a clear difference between working management and the relevant knowledge workers. Whereas work with staff revealed that knowledge about projects should be accessible to all team members, conversations with the owner-manager revealed that other knowledge, such as knowledge about clients, might need to be kept exclusive.

The theme communicating knowledge encapsulates three concepts. The first, «what knowledge is communicated», was uncovered from conversations with staff as they stressed, for example, a lack in passing important knowledge for a project job among staff. The concept «who/to whom knowledge is communicated» was brought up mainly in relation to client satisfaction: as staff highlighted the importance of communication with clients in understanding their requirements. However, this concept refers also to supplier and partner organizations; staff thought of organizations as an entity like an individual. The concept «why knowledge is communicated» emerged in relation to improving project performance and innovation through better understanding of projects, jobs, expertise and documents. Staff emphasised that they often missed out on the bigger picture and how it related to their roles. They also highlighted the importance of enhancing their expertise, and keeping up-to-date with advances in IT. Documents are also essential for accurate communication of knowledge.

The properties common to the concepts of communicating knowledge are:

- *knowledge connectivity* – the ability to link knowledge of individuals, organizations or artefacts together, with the dimension degree of separation, which determines how close is the knowledge from the seeker. More than one degree of separation makes it harder to get relevant knowledge (e.g. as in centralised communication).
- *knowledge value* – the usefulness of knowledge, with a dimension of timeliness that affects workflow, and which captures the relevance, quality and timing of knowledge; although staff might prefer to have knowledge communicated to them in early stages, they acknowledged that in some cases knowledge can only be communicated gradually.

The three concepts of theme interacting with knowledge are «what knowledge interactions are happening» and « what knowledge interactions are happening ». These shared one property:

- *nature of knowledge* – the sort of knowledge communicated, with two dimensions: point of interaction and various types. Point of interaction is the dimension for the means and channel of interaction (e.g. face-to-face meetings or email contact). Various types determined by the knowledge holder or requester, reflecting, for example, the type of knowledge required about projects or jobs, being different to the type of knowledge required about expertise. (This also impacts interacting with this knowledge as discussed in the next section.)

Thus, Phase II is about the practice of envisioning future improved situations where the vision is articulated in terms of business solutions but (as far as the KM practitioner is concerned) can be categorised according to the three themes, locating knowledge, communicating knowledge and interacting with knowledge. The next phase is about a designing a system to make help make the improved situation happen.

4. Phase iii: designing kms to realise improved situations

The third phase evolved throughout the AR cycles, starting out as a type of systems design before being named as above to avoid the implication that an IT system was being developed. In planning the problem-solving actions in the first AR cycle, this phase was first thought of as producing an IT-based KMS design with technical specifications. During AR cycles in *the company*, this phase emerged to become a collective design of the KM system. By a system we mean the setting needed to realise the envisioned improved situations of business processes and work behaviour.

The KM practitioner's role in this phase is to look for themes and concepts with their properties. The difference here is that design is involved, and that means choices. In Phase II the envisioned improved situations were in some sense dictated by the business challenges and opportunities.

Another difference is that associated with the design themes (i.e. design-related groupings of concepts) are design actions. Hence the theme of knowledge agents that groups several concepts has an associated design action of linking knowledge agents.

The theme of knowledge agents was uncovered in Cycle 1 and confirmed in Cycle 2 with staff in *the company*. During a workshop for designing KMS, a set of emergent concepts emerged first for knowledge-holders (i.e. individuals): «who can pass this knowledge to me» and «to whom I should pass this knowledge». The concepts came from staff, as they emphasised a need to know if certain knowledge and expertise was in-house, had a need to know who to ask in relation to certain knowledge, especially when new to the organization (and so lacking in competencies) and the need to know who might benefit from knowledge.

Linking knowledge among individuals, however, was not always feasible. High staff-turnover, outsourcing and changing roles of staff made it difficult to locate, communicate and interact with knowledge solely among individuals because of difficulties in associating particular knowledge to certain individuals and the absence of these individuals due to different reasons. High staff-turnover and outsourcing for example created gaps between current and past staff and between internal and external staff respectively. Fluid roles of staff in a flexible organization structure made it difficult to know who is doing what at a particular moment in time.

Consequently this theme uncovered a need for linking knowledge not only to individuals but also to other entities including organizations and artefacts (i.e. projects, tasks, expertise, documents). These were first termed 'knowledge entities', but as a result of later practitioner feedback that warned of a tendency to see 'entity' as a passive notion, the term is now knowledge agent.

Staff in *the company* saw a need for a special type of knowledge agent, an "oracle" that is concerned with knowledge about, for example, *all projects* ever taken place in *the company* and *all expertise* ever known in it. An oracle was imagined as representing knowledge about all other agents in a class; so a project oracle would represent knowledge about *all projects*, things like "roles in relation to others", "similar projects and best practices", "the big picture", "project documentation".

Linking knowledge agents therefore is about enabling stakeholders to locate, communicate and interact with the knowledge of individuals as well the knowledge of artefacts and organizations. Accordingly, a knowledge agent was defined as an essential constituent of the KMS that is capable of locating, communicating and interacting with knowledge. A knowledge agent could be an individual, a company, or an artefact (e.g. a document, a database), and it can be internal or external. Figure 3 illustrates the knowledge agent *Individual*, which is mapped to other knowledge agents, including other individuals.

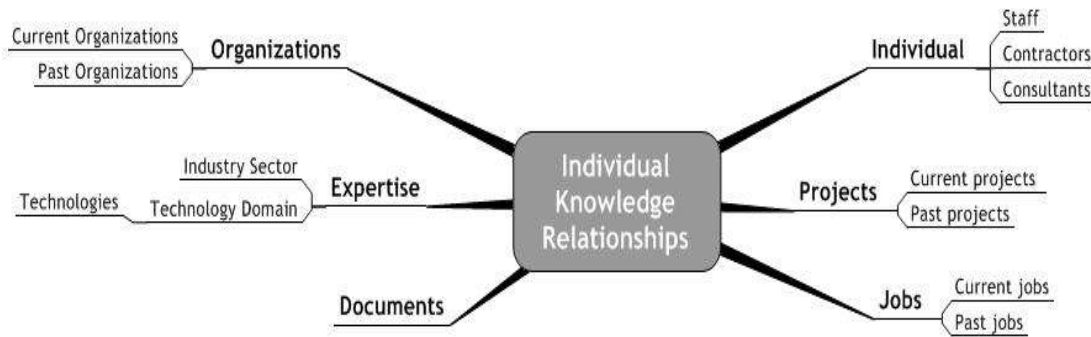


Figure 3: Individual knowledge relationships

Concepts related to the theme linking knowledge agents share the same properties as the locating knowledge theme used in Phase II: *knowledge connection* and *knowledge visibility*.

The second design theme is knowledge flow. During a workshop for designing KMS, a set of emergent concepts emerged for representing knowledge flow among knowledge agents. The concept «what knowledge is needed to flow» came from staff, who emphasised a need to know what is or can be communicated among individuals, organizations and artefacts. Similarly the concept «where and when knowledge is needed to flow » was uncovered as staff emphasised the need for relevant knowledge to flow to relevant individuals, organizations or artefacts at a suitable time and place.

These concepts first emerged in a role-playing team workshop (i.e. internal staff and research-consultants); each participant represented one knowledge agent. Then conversations were initiated to address two main issues: (a) what knowledge each agent needed from each other and (b) what knowledge can each agent give to another, based on their understanding of their functions. This uncovered the importance for what staff called “knowledge to flow” between relevant knowledge agents when and how they needed it. The knowledge agents interacting with oracles thus became crucial in determining knowledge flow in a KMS.

A knowledge flow matrix was devised to map knowledge flow arising from workshop activities. Figure 4 shows examples of knowledge flow among knowledge agents for *the company's* emerging KMS. (Many more versions were produced.)

	Individual	organization	Project	Expertise
Individual	Who knows what that could help me or my job?	What are the problems / objectives? Where do you want to be? What is the context?	What is required? What is my role in relation to others? Are there similar projects?	Are there any applications that can be re-used? What is the best way to go about it?
organization	Do individuals have full grasp & understanding of problem? What ideas do they have?	What value can the organization bring? What resources/ skills does the organization have?	What experience in similar projects? How does project relate to objectives?	What expertise is available to achieve objectives/ deliverables?
Project	What is the project plan? Who are the members? What are their roles and skills?	What is the project brief? Who represents the client? What are the resources?	How was project management done before & in which context?	What are best practices for achieving project?
Expertise	What knowledge can benefit others?	What is required? Why? In which context?	What are the lessons learned?	What is other similar expertise?

Figure 4: Knowledge flow matrix at *The company* – Cycle 1

Concepts related to the theme knowledge flow share the same properties as the theme communicating knowledge: *knowledge connectivity* and *knowledge value*.

The third design theme knowledge interfaces encapsulates the concepts for representing knowledge flow among knowledge agents: «what knowledge interface is needed» and «why a knowledge interface is needed». The concept «what knowledge interface is needed» was due to staff as emphasising a need for an interface in working with clients, for example. Similarly the concept «why a knowledge interface is needed» was uncovered as staff highlighted that when starting a new project, it is useful for some interactions (activities) to happen with individuals and organizations as well as artefacts. Staff stressed that current interactions were undefined and in many did not exist because interaction with knowledge agents was mainly through the owner-manager. It was envisioned that in a KMS knowledge interactions should happen between any knowledge agent and another. This was further reinforced by a wider group of workers (including internal staff and external freelancers) who emphasised, for example, the need for interacting with individuals working on the same project to coordinate milestones and terms of work. They also emphasised the need for interaction with the client to meet their expectations.

Concepts related to the theme representing knowledge interactions share the same property as the theme interacting with knowledge: *nature of knowledge*.

Figure 5 depicts part of the KMS designed according to the Phase III design themes and concepts.

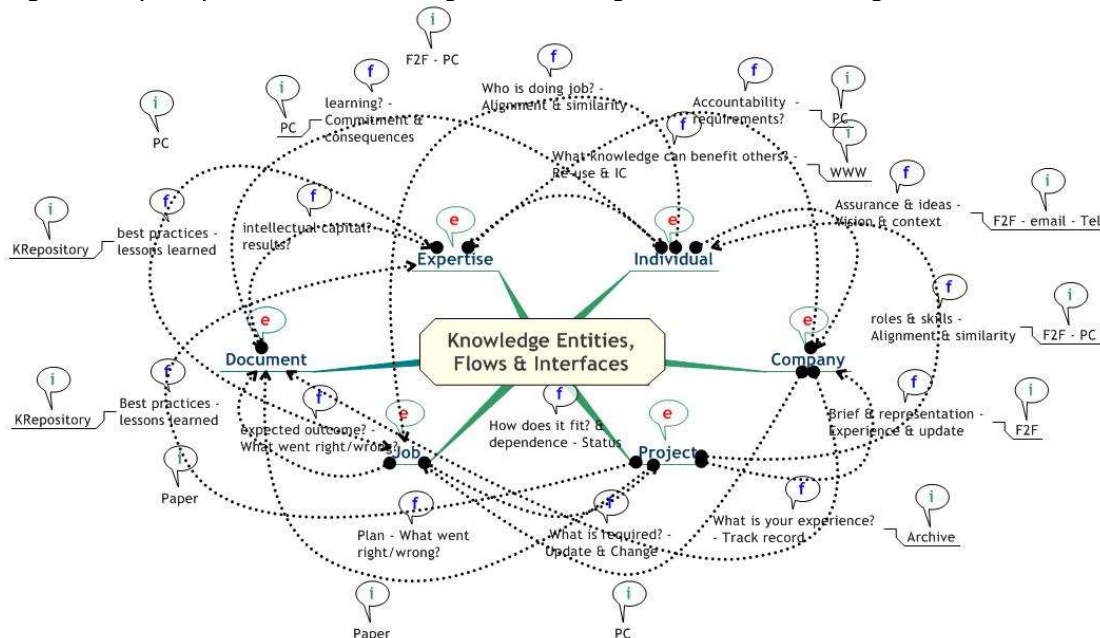


Figure 5: Knowledge Interaction Domain (key: 'e'=knowledge agent; 'f' = knowledge flow; 'i'=knowledge interface)

As indicated in the Introduction and depicted in Figure 2, the phases are not sequential steps but sets of overlapping activities that progress to some state of development. Thus, Phases II, III and IV, can intertwine in an undetermined timescale. This happened with *the company* in such a way that the cycles that included Phase IV were considerably separated in time and picked up different aspects of Phases II and III, as outlined next.

5. Phase iv: exploring technology options to support kms

The fourth phase evolved throughout AR cycles from a notion of ‘investigating KMS technology requirements’ in to ‘exploring technology options to support the KMS’. In planning the problem-solving actions in the first AR cycle, this phase was initially assumed to be about the production of a technology requirements specification. Thus, in AR Cycle 1 a ‘technology audit’ was conducted to decide on whether an off-the-shelf IT solution could assist *the company* overcoming their business problems or it was more feasible to build a bespoke solution. During Cycle 2 this phase evolved to become more participative through ‘collectively investigating IT requirements’ to support the KMS and the collaborative work uncovered the possibility that social (Web 2.0) technologies might be more suitable for the type of KMS that was emerging. However, in both cycles it was assumed that one solution (whether off-the-shelf or bespoke) is capable to address KMS needs of the organization. This

was not the case as the team discovered, as a result of these 2 cycles, that they preferred to have more flexibility in working with technology.

As shown in previous sections a KMS is designed to meet the envisioned improved situation of an organization by allowing it to locate, communicate and interact with the knowledge that is embedded in new processes and inherent in new work behaviour. This is achieved by designing a KMS that allows the organization to enumerate and represent its knowledge agents, knowledge flow and knowledge interfaces. For IT to support such as KMS means that there must be some way in the IT design to enumerate and represent the organization knowledge agents, flow and interfaces.

Space considerations restricts this section to that part of the IT exploration that took part in AR Cycle 2 as the KMS design of knowledge agents, flow and interfaces emerged. (In Cycle 1 both Microsoft's SharePoint® and 37 Signals's Basecamp™ had been explored but found to be deficient in representing some of the ideas and incompatible with daily work practice; see Moteleb & Woodman 2009).

To explore the IT options for the emergent KMS it was decided to develop a prototype software application based on Web 2.0 technologies that could more readily support ideas of knowledge agents, flow and interfaces. In Cycle 2 workshops members of *the company* explained that they needed a software application, or rather a “space” that would be more “social”, “unofficial” and “flexible” and that would become part of their daily work. Keco (for ‘knowledge ecosystem’) was developed to explore these ideas.

Keco was based on blogs to represent knowledge agents such as individual, organization, project, job, expertise and document. For example, each project knowledge agent was listed and connected to a corresponding organization knowledge agent. Each knowledge agent could publish articles and link them to other knowledge agent using simple HTML hyperlinks.

Through wikis Keco allowed for conversations, and hence communicating and interacting with knowledge, which could also represent some knowledge agents and be linked to other agents.

Clicking on any knowledge agent would link to a blog space, where articles could be added or edited. Each article could be linked to a specific knowledge agent through identifying a topic. Furthermore, RSS was used to communicate changes and updates, basically any activities, of interest to the knowledge entities whenever a new article is created or updated. See Moteleb & Woodman, 2009 for details.

Although Keco provided technical support for the envisioned KMS of *the company* it did not work for a variety of reasons. The one reason that is related to KMS design is that for the mobile workforce of *the company*, Keco was no more than another IT application that tried to control them (the human knowledge agents) and their knowledge. The practice of envisaging improved future knowledge work behaviour, and designing an appropriate KMS had concentrated on enabling functions and not constraining them. Conversations with knowledge workers in both organizations regarding the use of Keco revealed that it was essential for them to keep “ownership” of their knowledge. They welcomed sharing their knowledge with other individuals and the company, but they wanted to know that they could access this knowledge and any interactions with others’ knowledge even if they were no longer part of the company. In other words, they perceived this knowledge as their own personal intellectual capital.

This post-employment behaviour had not emerged in the action research study and so the knowledge workers considering Keco saw it as being inflexible and supporting the hierarchy of the organization – a hierarchy of no relevance to them once they would have moved on.

6. Phase v: tracking and managing change

The fifth phase evolved throughout AR cycles with *the company*. Its rationale arises from the need to partially ‘fix’ the sense made of an organisation and its challenges and opportunities in Phase I in order to initiate Phase II and the need to review the appropriateness of a KMS and any IT supporting it. The sense of organisation can never be ‘fixed’ at a point, particularly if the interventions inherent in AR are ongoing (in the later phases). The fifth phase, therefore, is concerned with the organisation tracking and managing change. Small changes, however those are defined, are usually

accommodated within the constantly changing KMS. However, even small changes in the environment outside an organisation that cannot be changed, may be early warning of major change that would make the business challenges and opportunities that the current KMS addresses irrelevant and require the five phases to be started again, including especially new sensemaking.

For example, *the company* needed to review their structure as a result of the work that had gone into the emergent KMS. The flexible approach they had adopted and high rate of staff turnover had been impeding their ability to locate, communicate and interact with knowledge. Although the approach offered some agility allowing them better to respond to change quickly, the more flexibility they enjoyed, the more difficult it was to locate, communicate or interact with knowledge. The emergent KMS offered a starting point towards establishing a learning and knowledge management setting but the change was expected to be significant and the effect on staff change was unpredictable. Phase V was about maintaining the KMS and exploring new IT options, as none had been found suitable, and about watching for early signals pointing to significant change.

Collaboration with *the company* ceased as Phase V was entered, so further evidence cannot be offered regarding how Phase V was executed.

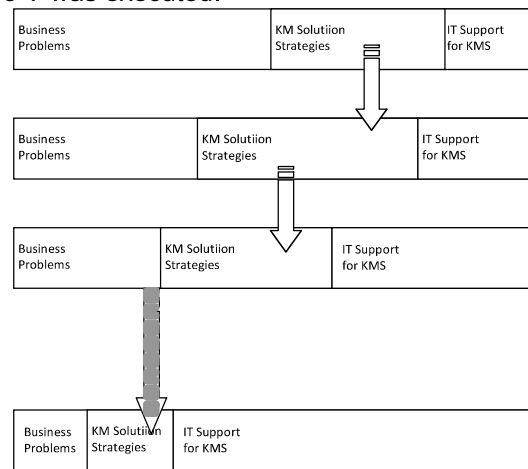


Figure 6: Separating and Delaying Discussion of KM or IT

7. Summary and Conclusion

We have described the practice in a particular company of a systematic KMSD method that emerged from work with that company and others. Detail of the research that led to the method is not provided but some comments and rationale are.

The KMSD method consists of five phases, that emerged in practice for developing KMS as sets of practices and processes that make up business setting to improve situations in an organization. The new business processes and new work behaviours must inherently allow the location of, communication of and interaction with knowledge. The KMS may be supported or enabled by IT. The KMS design is based on the themes of knowledge agents, knowledge flow and knowledge interfaces.

A practical conclusion of the KMSD method described is to separate and delay the discussion of both KM as a set of approaches to solving business challenges and opportunities and IT ideas that might support or be at the core of a KMS. Introducing either too early causes premature closure on either business solutions or IT solutions. Figure 6 depicts how the balance within 'conversations' might proceed over time: a lot of time is spent on business problems at the start of a project, and little on KM, and less on IT. Towards the end of the project, the balance is reversed (always assuming IT is required at all).

One particular problem the company discussed was the central role played by the owner-manager, a role that was somewhat justified with the high staff turnover. This was not apparent at first, and a similar centralisation (possible involving many people) can be discerned in many organisations. The key to addressing problems associated with over-centralisation, and the key to many other problems was full participation and ownership of the emergent KMS by staff (see Moteleb & Woodman, 2009 for

details). However, the knowledge ownership and mobility needs of individual staff members planning to leave the company remained obscure, even with high participation.

The omission in the KMSD method that caused the last point to be missed requires further work. A participatory approach can only work if the participants are honest and open about their needs. Clearly workers who intend to move on sooner rather than later may not want to share their plans. Conversation and interaction techniques from big organisations such as anonymous surveys could encompass private attitudes and management-unapproved behaviours.

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