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Knowledge management approach – food safety program

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Contents

	Pa	je
1	Introduction	.3
2	TBKM approach for the panel	.3
2.1 2.2 2.3	The Task of the Panel Functional Elements of the TbKM System Structural Elements of the TbKM System	.3 .4 .5
3	Applying the TBKM approach: a learning community model	.5
3.1 3.2 3.3	A Learning Community Ontology: structuring the repository Information Wards: establishing authority and maintaining autonomy 7 3.4 Adopting a proactive approach	.5 .7 .8
4	Conclusion and recommendations	.8
5	References	.9
6	Appendix A	10

1 Introduction

This document is a final report presenting our understanding of how the concept of a Learning Community, based on a knowledge management approach, can support the work of the Scientific Risk Management panel (the Panel) to achieve its aims.

This paper is based on our understanding the Panel's operations with an emphasis on:

- 1. What are the major tasks that the Panel is conducting,
- 2. Who is performing the tasks
- 3. How are the tasks conducted

As a result of this analysis we identify the role knowledge management can play in assisting the Panel's operation and explore how the Learning Community concept can assist the Panel's operations.

2 TBKM approach for the panel

The TbKM is a framework that explicitly supports the "thinking" and "doing" aspects of a work task. The TbKM approach addresses the practicalities of work, as performed by individuals and groups, focussing on the cognitive, conceptual and social aspects of the work task. In practice these aspects of work are translated into particular actions, namely decision making, sense making, learning and remembering that we term collectively "thinking". In addition, the TbKM approach provides the means by which these actions are supported and integrated with the practical and tangible activity, the "doing", that together represents the performance of a task (Burstein and Linger, 2003). This combination of work practices we define as knowledge work (livari and Linger, 1999; Linger et al 2000). TbKM addresses the management of knowledge work, unlike most mainstream approaches to KM that are concerned with the management of knowledge.

2.1 The Task of the Panel

From our participation in two meetings of the Panel, and background material, we understand the work of the Panel as providing the industry with information to develop evidence-based practice. From this perspective the Panel is concerned with assembling and assimilating the existing information on specific issues relevant to the industry, reviewing and making sense of this information, assessing its value as evidence, identifying where knowledge gaps exist, and commissioning research to generate the necessary evidence to inform practice. This activity is clearly articulated in the Objectives of the Panel as set out in its Terms of Reference.

In order for the industry to be proactive in relation to food safety, the Panel is concerned with identifying those issues that warrant its attention. While the priority areas have been identified in by Food Safety Program Plan 2006-2009, the Panel also needs to maintain a watching brief on national and international development to anticipate what issues are likely to impact on the industry and develop practices to address that risk. While evidence-based practice is directed to specific risk, a proactive stance implies that the Panel will also consider the relation and interaction between issues that in itself can be a potential risk for the industry.

As a new initiative under the by Food Safety Program Plan 2006-2009, the operations of the Panel are as yet undefined. Thus a further (and we believe, on-going) task of the Panel is to

develop protocols and methods for its investigations and communications strategy. The work practices of the Panel should be reflective so that its protocols and methods remain relevant to its work and are flexible so they can be applied to diverse situations and issues.

Collectively these activities represent the internal work of the Panel that is centred on the assembling, reviewing and generating the necessary information for the development of evidence-based practice,

Panel also has an external function. In its ability to assemble and assess evidence, the Panel represents an authoritative group that is a source of new knowledge for developing evidence based practice. We would argue that there is a need for the Panel to interact in some formal way with bodies concerned with the developing industry policies, regulations and standards.

This extends the Panel's activities beyond its interaction with the developers of the process risk model. These activities suggest that the Panel requires both an internal work agenda and an external communications functions. This external function represents the third dimension of knowledge management; "communicating". It represents the ability to share knowledge with a broader community and to ensure internal work remains relevant.

Design and development of communication methods and protocols is a "thinking" component of knowledge work of the Panel, which is not currently supported and could be easily overlooked. However, from the knowledge management point of view it is such generic practices that could have long term value for the Panel and the whole industry concern. This analysis shows that the Panel is clearly engaged in knowledge work that can be supported by task-based knowledge management. The following section presents the functional and structural elements of knowledge management that are integral to support knowledge work and are relevant to the activities of the Panel.

2.2 Functional Elements of the TbKM System

Task-based KM identifies sense-making, remembering and learning as the three major functional elements that collectively allow users of a KM System to engage in reflective practice. This is shown in Appendix A. Reflective practice is a major force behind knowledge work and represents one of the important means by which the practice can be improved. Reflective practice involves continuously review of work in order to better understand what was done, and how it could be done better. Most commonly, such reflection is largely personal and implicit. However, in a knowledge management context, these practices need to be explicit and acknowledged as an integral part of the work that is being performed.

Sense making results in building a clear and shared understanding of an activity. Such understanding facilitates learning which in turn facilitates innovation. Memory is an essential element of the information infrastructure of a KM system. It supports both learning and sense making as it represents the collective experience of past tasks and includes both the record of task performance and the reasons why it was performed that way (the Why). Reflective practice relies on the ability to remember and recall past episodes of the task in order to make sense of the cumulative experience represented by memory and to learn from that experience. The internal activities of the Panel involve members coming together in order to:

- assemble evidence through literature search, commissioned research, evaluation of current regulations and practices (Remembering)
- analyse the collected information through collective knowledge sharing (Sense Making).
- developing evidence-based practices to address the risk (Learning)

These internal activities involves Panel members, invited/coopted experts, and support staff, who bring to the meeting a vast amount of personal expertise that is not documented. The role of the meeting is to allow members to share their knowledge and to collectively address the risk. Knowledge sharing generally involves discussions that are more or less unstructured and constrained only by the amount of time allocated to the discussion.

These functions highlight the dynamic and emergent nature of knowledge management that require flexible and extensible structural elements in order to accommodate changes and evolution while maintaining historical integrity.

For the purposes of setting up KM System, the functional elements identified above require complementary structural elements, which are described in the next section.

2.3 Structural Elements of the TbKM System

Reflective practice is supported by information and technology infrastructures and occurs within the context of appropriate organisational processes. Conceptually these constitute the structural elements of knowledge management and are described in Appendix A. From this perspective, organisational processes focus is on how work is organised rather than the procedural aspect of how work is performed while information resources relate the content, sources and principles of use for the information, which is required to perform the task. Technology infrastructure refers to the existing and desirable information and communication technology for supporting knowledge processes as defined by the functional elements of the KM System. This includes hardware and software architectures as well as social networks, which are involved in knowledge work.

Based on our interpretation of the task of the Panel, we consider the structural elements to be currently undefined in a systematic and explicit way. The development of the protocols and methods to be used by the Panel in its deliberation will set up the organising principles that will determine how the Panel works. This will also influence the how information is organised and made available to Panel members and hence the technology required to support the work of the Panel.

3 Applying the TBKM approach: a learning community model

Our proposal is to focus on the structural elements of knowledge management to implement the KM system. In our approach we propose a Learning Community model as the organisational design and ontology and information wards as the basis for creating an appropriate information infrastructure for supporting knowledge creation and management processes initiated as a result of the Panel task performance. The technology infrastructure and practical implementation issues will be determined and addressed in the next phase. In addition the function elements of knowledge management will be the subject on our on-going participation in the Panel and directed to the development of the evolving protocols and methods used by the Panel.

3.1 A Learning Community

The work of the Panel involves a complex network of stakeholders concerned with the meat and livestock industry. The members of the Panel have been selected or nominated on the basis of their expertise in the industry and (to a lesser extent) their representation of particular grouping that has a relevant role in the industry. The interaction between members is both structured and

unstructured involving formal discussions during Panel sessions as well as informal communications during the Panel sittings and outside those sessions. In practice, the work of the Panel is dependent on the personalities and the trust that exists between them.

These relationships are established through a range of activities each member has been involved in prior to their appointment to the Panel. It is interesting to note the importance of these relationships to each member and the additional opportunity the Panel presents to develop those relationships.

The major weakness of this approach is that the deliberations of the Panel lack an explicitly defined information structure to support those deliberations. This means that discussions rely on individual member's knowledge and experience but this contribution is not explicitly articulated nor recorded. Thus the background information a member might use to discuss the topic is not available as part of the context of the discussion and decisions based on that discussion. This highlights other deficiencies followed as a result:

- no centralized organizational memory
- no formal process for learning
- difficulty in maintaining continuity of discussion on a specific topic over different sessions
- no explicit process for documenting information gathering activities,
- there is no common "space" for sharing relevant information.

The "learning community" model, shown in Figure 1 below, is proposed as a conceptualisation of the work of the Panel. The advantage of such conceptual approach is that it allows members to construct and exploit a shared resource as a result of a collaborative enterprise. Moreover, this model is a specific interpretation of the TbKM approach to suit the needs of the Panel.



Figure 1. A learning community model

The model shows members' affiliation rather than their roles on the Panel to emphasis both the internal work and external communications role of the Panel.

The shared resource is a knowledge management system (KMS) that provides members with the support to conduct their individual roles on the Panel as well as their collaborative efforts to gain a shared understanding of the information about specific issues.

An important aspect of the model is that in any particular instance the learning community is only concerned with a specific task as discussed above. In the same time the KM system is designed for the generic task of review and evaluation of data about issues affecting the industry rather than being limited to a specific microbiological issue. This allows the Panel to get access to the information resources produced by the previous operation of the members of the panel or identified by them as necessary to support activities as described in section 2.1 of this report. Thus the KMS aims to:

- meet the needs of a network organizational structure of the community that is the Panel
- • address the diversity of needs of different roles within the community as well as the needs of individual members within that community
- facilitate assembling, reviewing and generating information to construct evidence to inform practice
- formalize the Panel's learning processes
- create an organizational resource through a structure to document shared knowledge.
- the internal work agenda and the external communications functions.

In order to perform such a role and achieve its aim the architecture of KMS needs to follow certain principles as described in the next two sections.

3.2 Ontology: structuring the repository

An ontology can provide the necessary structure to the information resources assembled to support the work of the Panel. The ontology essentially combines a taxonomy of the issues with other elements that define the interaction between the issues such as the procedures, protocols and processes that manage the issues, as well as grouping issues to establish any casual links or relationships between them. This structure represents the shared understanding of the issues considered by the Panel and is the basis for communication between members.

The importance of this structure is that it defines the boundaries of the issues considered by the Panel and limits the formal communications between members to those boundaries. But perhaps the most significant aspect of an ontology is that it provides the means to explicitly document all relevant information is the basis for an organisational memory for the Panel.

3.3 Information Wards: establishing authority and maintaining autonomy

The second framework we use for the constructing structural elements of the KMS is the information ward approach (Hart, 1996, 1998 etc) to address the issue of trust and create an authority structure over the information repository. An information ward (IW) can be considered a subset of information and processes that is perceived to be owned by person as a consequence of their organisational role in an enterprise. Within this IW there is a subset, termed the political IW (PIW) that is considered the necessary core information and process required for that person to perform their role. Any encroachment by an information system into the IW, and in particular the PIW, has the potential to generate conflict over control and ownership of the information and processes. A further source of conflict arises if the IWs of different people overlap. Failure of information systems increases in either situation but especially if both situations co-exist.

The authority structure implied by the IW allows the KM system to be accessed by relevant people outside the Panel but this access is limited by the Panel. Such limited access is appropriate for the Panel to meet its external communication function. Internal work agenda of the panel can also be supported through the IW mechanism. The IW allows each member to collect and assemble information they consider pertinent to the issues under discussion but

control when such information can be accessed by other members. It should be noted that it is individual members who make decisions about who when has access to the information they assemble. Thus each member retains autonomy while also being capable of contributing to deliberation in a constructive and structured way and actively participate in developing a shared understanding of the issues. Such shared understanding underpins the authority of the Panel in defining the evidence to inform industry practice.

3.4 Adopting a proactive approach

The combination of structural elements discussed above provide a structured and formal means to explore what is known in order to postulate new and unexpected issues and situations that could impact the industry. The ontology allows novel relationship to be formulated and to fit unusual information into an existing structure in order to assess its relevance. The IW allows members to share their information so that others can interpret this information from the perspective of their own expertise. And importantly, to collectively explore how this interpretation fits within the current world view expressed through the ontology.

The learning community and its infrastructure, expressed in the KM system, provide the means by which the Panel can collectively address its terms of reference while maintaining each member's autonomy within that collective action.

4 Conclusion and recommendations

Based on the analysis of the activities outlined in the Food Safety Program Plan and observation of the first and second meetings of the panel, the following conclusions and recommendations are proposed.

- 1. It is clear that the work of the Panel can be classified as knowledge work and will benefit from explicit knowledge management system to be put in place to support creating, preserving and distributing knowledge it generates as a result of its activity;
- 2. The design of such KMS can be developed following the Monash Task-based Approach to KM as described in Appendix A.
- 3. The design and development of the KMS will require explicit definition of organisational principles, to support the operation of the Panel in the best way;
- The processes, methods and tools for discovering and providing information resources required by the Panel's operation need to be identified and classified as part of creation of the information infrastructure for the KMS;
- 5. An appropriate technology infrastructure needs to be identified and put in place to support continuous and consistent information flow to help the Panel in its knowledge work.

We are willing and prepared to assist the Panel in undertaking further analysis and design of the KMS architecture. Additional resources need to be considered to address technical implementation of the KMS.

5 References

- Burstein, F. & Linger, H. (2003), "Supporting post-Fordist Work Practices: A Knowledge Management Framework for Dynamic Intelligent Decision Support", Information Technology & People special issue on KM, Volume 16, Number 3, pp.289-305
- FSPP0609 Food Safety Program Plan 2006-2009, Excerpts relevant to scientific risk management panel and knowledge management.
- Iivari, J. and Linger, H. (2000) "The Characteristics of Knowledge Work: A Theoretical Perspective", Proceedings of the Americas Conference on Information Systems, AMCIS'2000, Long Beach California, USAHart, D. N. (1994) "Information Wards – A New Conceptual Tool for Modelling the Political Implications of Information Systems Development" *Technical Report CS 01/94*, Department of Computer Science, Australian Defence Force Academy.
- Hart, D. N. (1997) "Modeling the Political Aspects of Information Systems using 'Information Wards'" *Failure and Lessons Learned in Information Technology Management*, 1(1), pages 49-56.
- Hart, D. N. (1998) "Info*Warder: Group Support Software for Tackling the Ownership and Political Aspects of Information Systems Project Proposals" *Proceedings of the Hawaii International Conference on Systems Sciences (HICSS31)*
- Linger, H., Burstein, F., Kelly, J., Ryan, C. & Gigliotti, P. (2000), "Creating a Learning Community Through Knowledge Management: The Mandala Project", accepted for IFIP WP8.3 Conference on DSS and Knowledge Management, Stockholm.

6 Appendix A

Monash Approach to Knowledge Management

The approach to this proposal is based on the theoretical constructs of Task-based Knowledge Management (TbKM) developed by the Knowledge Management Research Program at Monash University. The relevant elements of TbKM for this proposal are task definition and knowledge management structure and functions. These elements are interpreted and adopted to the task specified in this proposal.

Task Focus

The task-based approach to knowledge management adopts a "bottom-up" perspective, focussing on the activity or enterprise that needs to be supported. Identifying the activity defines the work that must be performed in order to achieve the stated organisational objectives and outcomes. These are the pragmatics of the KMS. In addition, task-based knowledge management also dictates that the enterprise is considered in more abstract terms.

This conceptual level of the KMS defines the means to organise activities and to develop appropriate documentation of the stakeholder understanding of the enterprise. This conceptual level allows stakeholders to articulate some (but not all) of the tacit knowledge that underlies their ability to perform their work.

Identifying and conceptualising the enterprise is a critical first step in requirements definition and provides the means to limit the scope of the KMS. At the same time, conceptualising the enterprise defines a stable definition of issues management that supports organisational learning and provides a context within which to implement changes to issues management.

Structural Elements

We have conceptualised the structure of knowledge management as the intersection of organisational processes and information and technology infrastructures as shown in Figure 3 below. We treat organisational processes as a structural element as the focus is on how work is organised rather than the procedural aspect of how work is performed.



Figure 3. A structural perspective of knowledge management

These three elements provide the organising principles for knowledge management requirements analysis. While each element is important in itself, it is the interaction of these elements that is equally significant. The approach we adopt in TbKM is to support knowledge work that is based on appropriate information relating to both the pragmatics of the activity and the documentation of stakeholder conceptualisation of the enterprise. In this context, knowledge work refers to both the performance of activities as well as the knowledge processes that underpin those activities. Importantly, support for knowledge work must include technology that allows stakeholders to perform the work and engage in knowledge processes.

Functional Elements

Concurrent with the structure of knowledge management, we have conceptualised the function of knowledge management as the intersection of remembering, sense making and learning. These functions are used to organise and focus our analysis of the KMS requirements.



Figure 4. A functional perspective of knowledge management

Remembering is concerned with how memory is used and evolves. Memory on the other hand has a role in the information infrastructure as a repository. Sense making is largely concerned with constructing a collective and individual understanding of reality. Learning utilises both remembering and sense making in order to exploit experience to inform future action. These functions relate to the knowledge processes that together with work performance constitute knowledge work. Significantly, these functions highlight the dynamic and emergent nature of knowledge management. This also suggests that the structural elements need to be designed to be flexible and extensible in order to accommodate changes and evolution while maintaining historical integrity.

7 APPENDIX B

Glossary of Information Systems-related terms

Community

A number of stakeholder groups who work on similar processes, similar disciplines or have interrelated interests. For this study, they constitute a food industry, industry sector or an aspect of that sector with particular responsibility or focus - such as food safety.

Learningcommunity

Sometimes called Communities of Practice (CoP). Networks of people who work on similar processes or in similar disciplines, and who come together to develop and share their knowledge in that field for the benefit of themselves, their organisation(s) and their industries. They may be created formally or informally, and they can interact online or in person.

Information Ward

An information ward (IW) can be considered a subset of information and processes that is perceived by an individual to be owned by them as a consequence of their role in the learning community. Within this IW there is a subset, termed the Political IW (PIW) that is considered the necessary core information and processes over which the individual claims "ownership" and considers essential in order to perform their role. Any encroachment by an information system into the IW, and in particular the PIW, has the potential to generate conflict over control and ownership of the information and processes. A further source of conflict arises if the IWs of different individuals overlap.

Knowledge

Explicit knowledge

Objective knowledge that has already been recorded and written down. Food Safety – Interpreting Traditional Practice

Implicit knowledge

Personal knowledge that might be able to be recorded but has not yet been written down.

Tacit knowledge

Highly personalised knowledge that is hard to formalise and communicate. Tacit knowledge consists of know-how, mental models, beliefs and perspectives largely based on experience and includes skills, experiences, insight, intuition and judgement. It is the knowledge that people have in their heads that is difficult to articulate or write down so it is usually shared between people through discussion, stories and personal interactions.

Knowledge management

There is a wide variety of definitions of knowledge management. The following is the Monash SIMS KM Research Program definition: "Knowledge Management is a broad concept that addresses the full range of processes by which an organisation deploys knowledge. These involve the acquisition, retention, storage, distribution and use of knowledge in an organisation."

Ontology

The representation of knowledge in a specific domain as a set of objects (concepts) and relationships between these objects including rules and procedures for their interaction. It is often connected to taxonomy (the list of terms one needs to define when talking about subject of work).

Organisational learning

The ability of an organisation to gain knowledge from experience through experimentation, observation, analysis and a willingness to examine both successes and failures, and to then use that knowledge to do things differently. While organisational learning cannot happen without individual learning, individual learning does not necessarily produce organisational learning. Organisational learning occurs when an organisation becomes collectively more knowledgeable and skilful in pursuing a set of goals.

Organisational memory

The knowledge and understanding embedded in an organisation's people, processes and products or services, along with its traditions and values. Organisational memory can either assist or inhibit the organisation's progress

Stakeholder

An organisational entity that has a vested interest in an industry, industry sector or industry focus – e.g. food safety

Stakeholder group

A collection of organisational entities

Taxonomy

A high level representation constructed to enable the user to get an understanding of, and to navigate round, the concepts that the industry system is using to describe the knowledge in the domain. It consists of a defined word list, which can be used to classify or categorise information or knowledge resources.