

The Concept of Knowledge in KM: a Relational Model

Colin Reilly

University of Melbourne, Parkville, Australia

ctreilly@pgrad.dis.unimelb.edu.au

Abstract: This paper reports progress in research into the applicability of the knowledge management (KM) paradigm to third sector organizations. Case studies and an action research project are described. Although KM techniques are in use, resource priorities, program funding, and dispersed authority inhibit KM in these organizations. There is little intentional consideration of the relationships between the values held by these organizations and the data gathered from experience. A relational knowledge domain model is proposed that shows how knowledge is derived from observing real or imagined universes, is stored in knowledge artifacts, and is operated on by natural and designed processes to realise future states of the universe being observed. This model is intended to promote a more holistic approach to knowledge and its management in values driven organizations but can be applied in any organization or community of practice.

Keywords: knowledge, organizational knowledge, knowledge management frameworks, nonprofit organizations, third sector organizations, case study, action research

1. Introduction

This paper reports on a research project investigating the suitability of the knowledge management (KM) paradigm for shaping information systems strategy in third sector organizations. These nonprofit, values driven organizations constitute some 10% of economic activity in monetary terms, but little is known about their management and whether strategies adopted in the commercial and governmental sectors are valid for use in the third sector.

Case studies and action research within one group of organizations has found that the KM concept is not overtly in use, but many KM issues are in fact being addressed. The chief barrier to KM adoption is resource constraints, but there is also a failure to understand the relationship between the values that drive the organizations and the data and information they accumulate in their operational activities. A relational knowledge domain model is outlined to illuminate these relationships. Adoption of this model could assist these organizations to recognize their KM activities and embed them within their operational processes and activities.

An overview is given of knowledge concepts and knowledge in an organizational context. The third sector is introduced and the case studies and action research being undertaken are described. A summary of findings from these studies demonstrates that KM is being undertaken in these organizations. The proposed knowledge domain model is explained.

2. Knowledge in KM

In Barbara Blackman's (2008) phrase, 'Everything in nature and in the universe is an infinity of uniquenesses' – knowledge is a means of taking stock and making sense of this infinity. Information systems and databases generally store data that describe facts about instances of this 'infinity of uniquenesses' in an objective, structured way without comment (Firestone and McElroy 2003; Mekhilef et al 2003). This low level information does not necessarily constitute knowledge and a failure to recognise this will undermine any attempt to introduce the concept of KM in an organization (Fahey and Prusak 1998). However, Moteleb and Woodman (2007) suggest that the distinction often drawn between data, information, and knowledge is distracting and irrelevant because 'They are labels for essentially the same thing'.

Leading KM frameworks rated by Lehane et al. (2004) adopt differing approaches to the question of identifying knowledge. Lee and Kim (2001) adopt a knowledge-based view of the organization and tabulate knowledge creation, integration, combination, absorption, leveraging, and linking capabilities as sources of competitive advantage. Organizations may already have knowledge typologies to classify and structure their knowledge content. Building on the concept of knowledge as a sustainable, strategic resource, Achterbergh and Vriens (2002) propose two background functions for knowledge: assessing (perceiving, interpreting and evaluating) signals and determining appropriate responses by articulating possible courses of action, exercising judgment to select from them, and implementing them. For organizations, the important question becomes 'About what domains does knowledge need to be produced and processed [for the organization] to remain viable?' Holsapple and Joshi (2002) discuss knowledge manipulation activities and propose a generic

framework for them which they claim 'can be applied to multiple concepts of knowledge', but these knowledge concepts are not examined.

Recognising knowledge as the key to organizational success (Lehaney et al 2004) requires the organization to have a coherent view of its knowledge concepts in use in order to assess the suitability of prospective KM frameworks.

3. Knowledge concepts

Plato's definition of knowledge as 'justified true belief' has been predominant in Western philosophy (Kakabadse et al 2003), but limitations of language and the variety of discourse or practices that frame knowledge suggests universal knowledge spoken with a singular voice is unattainable (Agger 1991). Pragmatically, knowledge can be considered as understanding based on experience that can be shared or communicated (Firestone and McElroy 2003; Hirschheim 1985) and provides 'capacity for effective action' (Argyris 1993). Putting aside Kant's contention that reality is forever unknowable, knowledge can represent reality (Spender 1996).

Observations from reality can be labelled, measured and codified systematically. A classification scheme or taxonomy can group and categorise such explicit knowledge consistently and meaningfully (Mekhilef et al 2003). Quantification and analysis of these observations and measurements can be generalized to undergird theory, but the more complex the system being observed the blunter these tools of analysis become (Holland 1995) as more variables come into play.

Knowledge may be recorded in an artifact such as a book or information system, but must be assimilated and interpreted by a person to become known (Boulding 1956); it cannot by itself enable knowing (Cook and Brown 1999). The individual possessing knowledge personalizes it in a subjective manner and such knowledge therefore 'may or may not be unique, useful, accurate, or structurable' (Alavi and Leidner 2001).

Recordable knowledge is referred to as explicit, can be transferred systematically, is seen to be objective (Nonaka and Takeuchi 1995; Polanyi 1966) and can subsist, awaiting discovery, without being known. But the greater part of knowledge is tacit, embedded in the minds and bodies of human individuals, perhaps semi-consciously (e.g. the knowledge of how to walk) and often not easily transferred to others (e.g. the knowledge of how to play the violin). Once embedded, however, tacit knowledge may appear to be effortless. (Grayson and O'Dell 1998; Leonard-Barton and Sensiper 1998; Polanyi 1966) Tacit knowledge can be labelled as skills or capabilities and is generally considered to be personal (Nonaka 1998). However, machines and systems may also be considered to possess tacit knowledge (e.g. the musical instruments from one instrument maker that have a persistently distinctive tone or feel compared to those from another firm (Cook and Brown 1999) or the undocumented feature in an information system that imposes an unformulated business rule on its users).

Sensemaking within organizations occurs at an individual level and collectively through social interaction with others by sharing ideas to explore and resolve problems, utilizing organizational structures, processes, rules, and roles within the overarching culture of the organization (Cecez-Kecmanovic 2004; Weick 1990). Such collective understandings evolve historically, tested and evaluated in changing contexts, to become organizational knowledge sustaining success (Firestone and McElroy 2003; Handzic and Hasan 2003; Tsoukas and Vladimirou 2001). Particularly within an organizational context, the vehicle, form or genre selected for the recording and transmission of knowledge will itself convey information about how the knowledge is to be interpreted or used (a formal directive will be treated differently to a discussion paper; in one organization a budget may set general directions, in another it may impose strict limits) (Cook and Brown 1999).

While the KM literature pays much attention to characteristics of the knowledge being managed – e.g. explicit vs tacit (Polanyi 1966) and the dimensional model proposed by Meyer and Sugiyama (2007) – the word is often used as though it is a tangible, measurable commodity and, in an organizational context, as though there is one, agreed piece of knowledge to fit a collection of data or a set of information. If we accept that the scientific method can at best produce explanatory theories but cannot attest to their truth (although it can sometimes justify the claim that a theory is false), it follows that the knowledge being managed is tentative (Popper 1979). Furthermore, it is possible for alternative perceptions of what is true knowledge to co-exist within an organization because knowledge, as distinct from data or information, is what is known by an individual person and different persons will interpret or know the same thing in different ways.

4. KM in third sector organizations

The third (or nonprofit) sector completes a view of society that also includes the public (or governmental) and for profit (or commercial) sectors. Investigation of the third sector relates primarily to its functions and governance. Information systems researchers have largely neglected this sector, being preoccupied with large firms and public sector organisations and technology use at the individual level. In turn, the third sector has been a tentative and late adopter of information systems and advanced management techniques, in part because of a lack of resources or knowledge of appropriate models and technologies.

Another contributing factor to the low adoption of information systems in many third sector organisations is the absence of large scale transaction processing that was the chief precursor of information systems development and adoption in large commercial and government organisations.

Hansmann (1980:898) viewed 'the non-profit organization as a reasonable response to a relatively well-defined set of social needs that can be described in economic terms'. Third sector employment is variously estimated to be from 9 to 15% of the workforce in developed economies (Benz 2005). It follows that consideration should be given to the suitability of mainstream technologies and management paradigms for such a significant part of society, if only to encourage worker mobility between sectors. Benz cautions that for-profit sector management policies may not always be 'best practice' in the third sector – evidence is needed to warrant their introduction.

The relatively new field of knowledge management presents a different, more encompassing approach to information systems as it attempts to enable organisations to both produce knowledge from their information resources and link that knowledge to the knowledge held by their staff and embedded in their processes and records so as to improve organisational performance and effectiveness. This research seeks to investigate the applicability of knowledge management concepts to the third sector.

Two complementary research approaches have been taken within the one umbrella third sector faith community in one first world country so as to minimize cultural differences.

5. Research studies

A small number of case study organizations have been investigated by the author. ChildCare is an organization accommodating and fostering children in need in a medium sized metropolitan city. WelfareOne is a statewide organization delivering a variety of welfare services in widely dispersed locations, many as an agent for government bodies. WelfareTwo is similar to WelfareOne but is about twice the size and operates in a different state. Both WelfareOne and WelfareTwo are among the largest social welfare agencies operating in their respective states. Interviews have been conducted with CEOs, board members, and operational managers in these organizations.

The researcher is also a participant in a knowledge-related project being implemented by FaithFed. FaithFed is a metropolitan-based church with many local operating outlets or parishes grouped in regions. The project is seeking to collect demographic data and urban planning information in order to develop strategies for future growth and alignment of its property resources with operational requirements. FaithFed has a complex structure, with remunerated leadership supported by decentralized local voluntary management groups. While the organizational structure appears to be hierarchical, there is in fact an emphasis on consensual decision making, although the roles and responsibilities of participants are fluid and subject to often conflicting interpretation.

6. Findings

'Knowledge' is not a prime focus of the movers and shakers in the welfare organizations under investigation. Managing relations with stakeholders, delivering services, and recruiting and developing staff within tight resource constraints are the key issues. Also of importance is influencing policy and seeking to change society, but these take second place to meeting the needs of clients and staff. While none of the interviewees claimed to be focused on 'knowledge management' (a new concept to most), all spoke in terms of strategy, personnel, information systems, infrastructure and research. Several themes emerged that relate to the concept of knowledge management. Information to come from professional and operational staff may give further insights.

6.1 Governance and strategy

All agencies investigated believed they have adequate systems for recording and reporting on the delivery of services. This is the main focus of their information systems, which are often mandated by the government body funding the service. The systems are reporting and compliance focused, used principally for operational purposes. Little use is made of the data for trend analysis or research purposes, and in some cases ownership of the data may be with the sponsoring funder, not with the agency delivering the service. Funders are provided with 'the data they ask for', which may not be the data they need. The CEO of WelfareTwo commented that there is 'much more knowledge that we collect than we use, [there is a] lack of time to interpret it; a strong tradition within the community sector that emphasizes service delivery, rather than research and evaluation and review [and] probably a lack of skill on the part of some staff'.

The chair of WelfareTwo noted that although many aspects of their services were highly regulated, the agency was not subject to the same level of corporate regulation as taxpaying entities. This may be a factor in the difficulty in discovering knowledge about the third sector generally, e.g. for benchmarking purposes.

The agencies attempt to influence public policy and have funded research to help argue the case on behalf of their clients. They also do this through their membership of peak advocacy organizations. Some knowledge is gained through pooling information with other agencies, 'although there are some agencies that won't share at all'.

6.2 Stakeholder relationships

The main focus is on clients (customers). While the agencies have good knowledge of their individual clients in relation to particular services, they lack the ability to understand natural collections of clients such as families as well as they might. Because different services are funded from different programs there is little infrastructure to enable a holistic approach to client needs.

The agencies have differing levels of knowledge about their donor and volunteer stakeholders. They generally hold the view that the relationship with the parent church is patchy, with a lack of appreciation and knowledge on both sides.

There is a reluctance to rely too heavily on technology for communications and knowledge sharing – in the words of the CEO of WelfareTwo 'Because, what that does is actually disassociate you with the faces, with the people you are trying to engage. In this work, principally, you want to engage people in the tasks that you are trying to do.' WelfareOne's CEO said 'my role is to have a relationship with the premier, ministers, the directors-general at the top level' and this process and its outcomes could not readily be documented. When his successor is appointed, the organization would be acquiring 'either their skills and/or their network'.

6.3 Personnel

WelfareTwo is 'passionately committed to the professional development of its staff' according to its chair. Training and development programs, with regular performance reviews, is probably the principal KM activity of all the agencies. There is an expectation that knowledge gained in professional development will flow to peers and colleagues. WelfareOne uses the performance appraisal process to encourage staff to document their knowledge for wider use and has adopted a matrix management system to diminish silos within the organization. On the issue of succession planning and the retention of knowledge, WelfareTwo's CEO commented 'that there should be some things, some approaches, some ways of thinking that when I go, ought to go'. His agency is also attempting to transfer experience by introducing a mentoring system. The agencies are particularly vulnerable to the loss of knowledge when staff leave: 'You can't replace the knowledge and experience that someone has, who has been there for years and years. No matter what they put down on paper, you can't replace that, because it's intuitive, most of the time.' WelfareOne is undertaking a skills audit of staff.

The skills/capabilities component is the most relevant aspect of the model for the agencies at this time.

6.4 Processes

ChildCare is documenting its policies and procedures. A relatively small agency, it has been heavily reliant on the tacit knowledge of its staff. The other agencies have developed substantial policy and procedure resources and are looking for ways to make them more readily accessible by using intranets with search engines etc.

Every quarter clinical teams in ChildCare examine a random sample of behavioural, emotional, or injury incidents to learn from them and assess whether systemic changes could prevent their recurrence.

6.5 Infrastructure

The three agencies all now have a PC network supporting their staff, with most workers having adequate access to this infrastructure, although there are differing levels of sophistication of staff in their ability to use available technology. All the agencies are geographically dispersed and rely heavily on the computer network for communications, complemented by opportunities for staff to meet for both operational and 'community of practice' purposes. WelfareOne attempts to leverage the features of standard programs rather than implement special purpose knowledge applications (e.g. public folders and contacts in Outlook for knowledge sharing and mimicking their physical file structure in their server directory structure). A common dilemma is the contracting system for service delivery, which the agencies believe undermines their ability to fund infrastructure. Unless knowledge management initiatives are embedded within the particular service, it is unlikely that they will be resourced. In the words of WelfareOne's CEO 'you get bugger all really to deliver highly complex services, and the capacity for us to grow corporate infrastructure is really limited'.

6.6 Property strategy project

This project was presented to FaithFed's central governance body for approval and to regional bodies for information. The opportunity was taken to survey the participants on their support and attitude towards the project at this point. There were 112 attendees at five meetings and 56 responses (50%) were received.

This found a positive response to the project, albeit with some critical comments. Respondents acknowledge that FaithFed's property decision making has suffered due to lack of knowledge or inadequately known processes. The perceived greatest barriers to using knowledge efficiently are:

- Resistance to greater information-sharing
- Inadequate understanding of the information and knowledge that already exist
- Inadequate understanding of the types of information and knowledge that IT is capable of generating.

The major information needs are:

- Consolidated information and consistent indicators
- More accurate reports
- Availability of information for the broadest base of users
- Powerful tools for data analysis.

Respondents believe strongly that this project will improve the decision making capacity of FaithFed's governance bodies, and almost as strongly that it will improve their capacity to contribute to such decision making. They also believe that the project should help FaithFed leaders to develop strategies and identify underlying trends and issues at the macro level, and that it can help local leaders to understand their demographic environment and respond to it more effectively.

Major challenges facing this project include the organisational culture, lack of ownership of the problem, and maintaining a focus on the project in the face of competing operational demands.

Additional comments strongly support the project, but also warn that it will require considerable commitment and resources, with a need to reach agreement on valid indicators. Workshops have since developed some key performance indicators, principally based on available data collections, supplemented by some additional items to cover perceived gaps.

The most interesting observation of the feedback sessions is how different participants interpret the data presented according to their own mindsets of how FaithFed should operate. No clear evaluation process has been put in place and there is some concern that there may not be sufficient provision for ongoing maintenance of the information once the initiating consultants have completed their work.

7. Knowledge domain model

The knowledge domain model in Figure 1 depicts the knowledge concepts described in section 3. It was initially developed because the subjects in the study described in sections 5 and 6 appeared to have a

limited understanding of the scope of the 'knowledge' that might be included in a knowledge management system as distinct from a database or particular information system or application.

As organizations are relational by nature the proposed model is also relational, showing how knowledge derived using the scientific method can be related to more speculative forms of knowledge. The model describes what is often left unexplained as an undifferentiated 'black box' as in, for example, Duncan and Weiss' (1979) organizational knowledge base.

At the foot of the model a timeline indicates a potentially infinite number of past, present, and future states of whatever universe is being examined – this could be a real industry, organization, or country or a realm of literature or the imagination. Data can be collected, extracted, or observed from past or present states of this universe and once recorded become explicit knowledge artifacts (Kolb 1976).

The large box of knowledge artifacts represents explicit (or potentially explicit) knowledge that can be recorded in some way. The first level of generalization is descriptive – data are classified and measured. Then theories explain the data and may have predictive power. Descriptive knowledge and theories are given meaning and understood through stories of various kinds and these enable the knower to imagine and plan for a changed future state. Constraints may limit the use of knowledge and they themselves also constitute knowledge.

All these explicit knowledge artifacts may be interpreted through the prism of a genre. Genre can refer to the literary form that provides us with a frame of reference for interpreting the artifact (a novel is read differently to a textbook) and also to the physical characteristics of the artifact (the position of a newspaper story implies different levels of importance). In an organizational context, the genre used may have implications for how an item of communication is interpreted or acted upon (for example, e-mails compared to formal memos). (Cook and Brown 1999)

There is also knowledge of processes that operate within the observed world – natural processes can be described and utilized, but designed processes (technology) can build on these to create new knowledge. Knowledge about processes is used to develop machines and systems that are capable of producing outcomes from inputs, some of which may also constitute knowledge. All this knowledge may be recorded in some form of knowledge artifact (a document, a machine, a DVD, an information system), which in turn can be possessed by persons or organizations and can be known or interpreted by persons.

The ability to carry out a process is a skill or capability (tacit knowledge) developed through experience by persons who may exercise them in the interests of organizations (firms, associations, public bodies ...) or communities (families, neighbourhoods, communities of practice, nations ...).

Communities/organizations, persons, and skills/capabilities held by persons (as distinct from capabilities embedded within machines and systems) are shown outside the explicit knowledge box, although knowledge about them might be observed, collected, and extracted as explicit knowledge artifacts.

Although the presentation of the model suggests a hierarchy of knowledge (from data to ontologies to theories to stories), it should be read rather as descriptive of the kinds of knowledge possessed by an organization or individual that encompass both the social side of knowledge construction as well as that derived scientifically (McAdam and McCreedy 1999). The model is generic, and could be used by any organization. However, recognition of the 'story' dimension of knowledge that gives historical, political, sociological, etc. context makes it particularly suited for use by third sector organizations, where 'goal definition and performance measurement is far more complex than in profit oriented firms' (Helmig et al 2004:103). Nevertheless, all organisations need to take account of their context and the constraints that apply to them (if only to identify strategies to change or overcome such constraints), so this model may have universal utility.

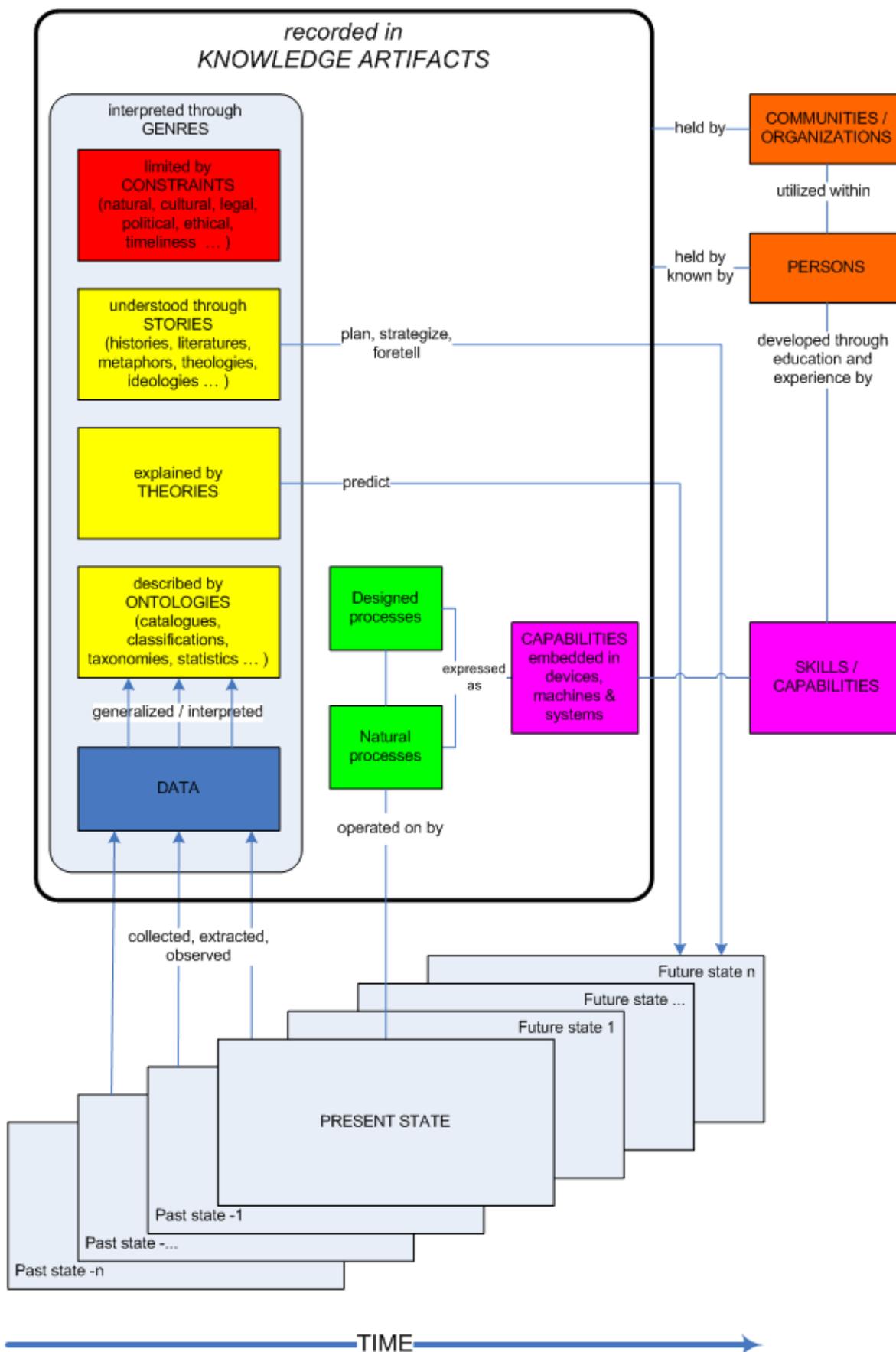


Figure 1: Knowledge domain model

This knowledge domain model does not attest to truth or validity nor does it attribute values to the various types of knowledge, but it can help an organization to embed the use of them all within its operations. A simple example would be the observation that disruptive behaviour in children is associated with poor nutrition. This could lead to the development of a theory explaining a causal relationship and proposing an appropriate diet for adolescents. The adoption of such a diet might depend on the development of stories that personify the issue to motivate carers to promote it and provide strategies for teenagers to persuade them to consume it.

7.1 Reflection

The organizations under investigation can be said to be values based. Their *raison d'être* is to fulfil a mission – to promote a faith in the case of FaithFed, to help those in need in the case of the welfare organizations – not to earn a profit for shareholders or govern in the interests of citizens. Although profit and good governance are not the prime motivations for these organizations they find it difficult to articulate other meaningful measurable outcomes to assess their performance. As a faith organization, FaithFed claims to promote the highest form of knowledge; the welfare organizations claim to be motivated by that faith. In this context the word *knowledge* may be ambiguous and the concept *knowledge management* can be perceived by organizational members as somehow containing or diminishing the truths these organizations espouse. Yet it is clear from these case studies that these organizations do manage knowledge. A means of connecting the observed world to the faith world is needed to enable KM techniques and practices to be used with integrity.

An earlier draft of the model was presented by the author to a national conference of welfare agencies in late 2007 using a series of slides to explain the various components of the model and how they interact. It was well received, but constraints of time precluded any discussion or formal evaluation. Feedback from one interviewee responsible for information systems suggested that the model helped him to think of his data in a wider context. The model as presented at the 9th European Conference on Knowledge Management in September 2008 has been modified to recognise the capabilities of machines and systems as knowledge artifacts.

While all the organizations under investigation have reasonably robust budget planning and monitoring processes, none have more than a cursory information strategy. They are conscious of the need to catalogue the skills and capabilities held within their organizations and to identify gaps. If this were done in the context of the knowledge domain model it may lead to a wider review of their knowledge holdings, needs, and processes.

8. Conclusion

Knowledge management occurs in third sector organizations regardless of whether the concept is formally recognized and adopted. Third sector organizations are constrained by resource limitations and rely largely on staff recruitment and development strategies to acquire the skills they need. Policy and procedural documentation record explicit knowledge and communications technologies and opportunities for personal interchange are used to disseminate knowledge. There is widespread support for the discovery of knowledge, but it is subject to diverse interpretation and consensus on how to apply it is difficult to achieve.

The knowledge domain model proposed in this paper attempts to explain the relationships between different types of knowledge. It shows how knowledge objects or artifacts relate to the 'real (or imagined) world' being observed and recognises that knowledgeable people are needed to utilise knowledge within communities and organizations. It is suggested that this model will assist organizations to take a holistic approach to knowledge issues, enabling them to relate objective data to their values. This model can be tested in the context of the continuing case studies and action research being undertaken by the author.

References

- Achterbergh J, Vriens D J, 2002 "Managing viable knowledge" *Systems Research and Behavioral Science* 19 223-241
- Agger B, 1991 "Critical theory, poststructuralism, postmodernism: their sociological relevance" *Annual Review of Sociology* 17 105-131
- Alavi M, Leidner D E, 2001 "Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues" *MIS Quarterly* 25 107-136
- Argyris C, 1993 *Knowledge for action* (San Francisco)
- Benz M, 2005 "Not for the profit, but for the satisfaction? – Evidence on worker well-being in non-profit firms" *Kyklos* 58 155-176

- Blackman B, 2008 "Uniquely Barbara", in *Compass*
- Boulding K E, 1956 "General systems theory - the skeleton of science" *Management Science* 2 197-208
- Cecez-Kecmanovic D, 2004 "A sensemaking model of knowledge in organisations: a way of understanding knowledge management and the role of information technologies" *Knowledge Management Research & Practice* 2 155-166
- Cook S D N, Brown J S, 1999 "Bridging epistemologies: The generative dance between organizational knowledge and organizational knowing" *Organization Science* 10 381
- Duncan R, Weiss A, 1979 "Organizational learning: implications for organizational design", in *Research in Organizational Behavior* Ed B M Staw pp 75-123
- Fahey L, Prusak L, 1998 "The eleven deadliest sins of knowledge management" *California Management Review* 40 265-276
- Firestone J M, McElroy M W, 2003 *Key issues in the new knowledge management* (Boston, MA: Butterworth-Heinemann)
- Grayson C J, O'Dell C S, 1998 "Mining your hidden resources" *Across the Board* 35 23-28
- Handzic M, Hasan H, 2003 "The search for an integrated KM framework", in *Australian studies in knowledge management* Eds H Hasan and M Handzic (Wollongong, N.S.W.: Wollongong, N.S.W.) pp 3-34
- Hansmann H B, 1980 "The role of nonprofit enterprise" *The Yale Law Journal* 89 835-901
- Helmig B, Jegers M, Lapsley I, 2004 "Challenges in managing nonprofit organizations: a research overview" *Voluntas: International Journal of Voluntary and Nonprofit Organizations* 15 101-116
- Hirschheim R A, 1985 "Information systems epistemology: An historical perspective", in *Information systems research: Issues, methods and practical guidelines* Ed R Galliers (Oxford: Oxford) pp 28-60
- Holland J H, 1995 *Hidden order: how adaptation builds complexity* (Reading, Mass.: Addison-Wesley)
- Holsapple C W, Joshi K D, 2002 "Knowledge manipulation activities: results of a Delphi study" *Information & Management* 39 477-490
- Kakabadse N K, Kakabadse A, Kouzmin A, 2003 "Reviewing the knowledge management literature: towards a taxonomy" *Journal of Knowledge Management* 7 75-91
- Kolb D A, 1976 "Management and the learning process" *California Management Review* 18 21-31
- Lee J-H, Kim Y-G, 2001 "A stage model of organizational knowledge management: a latent content analysis" *Expert Systems with Applications* 20 299-311
- Lehaney B, Clarke S, Coakes E, Jack G, 2004 *Beyond knowledge management* (Hershey, PA: Idea Group Publishing)
- Leonard-Barton D, Sensiper S, 1998 "The role of tacit knowledge in group innovation" *California Management Review* 40 112-132
- McAdam R, McCreedy S, 1999 "A critical review of knowledge management models" *The Learning Organization* 6 91-101
- Mekhilef M, Kelleher D, Olesen A, 2003 "Terminology", in *European Guide to Good Practice in Knowledge Management* pp 1-16
- Meyer B, Sugiyama K, 2007 "The concept of knowledge in KM: a dimensional model" *Journal of Knowledge Management* 11 17-35
- Moteleb A A, Woodman M, 2007 "Notions of knowledge management systems: a gap analysis" *Electronic Journal of Knowledge Management* 5 55-62
- Nonaka I, 1998 "The concept of 'ba': building a foundation for knowledge creation" *California Management Review* 40 40-54
- Nonaka I, Takeuchi H, 1995 *The knowledge-creating company* (Oxford: Oxford University Press)
- Polanyi M, 1966 *The tacit dimension* (Garden City, NY: Doubleday)
- Popper K R, 1979 *Objective knowledge: an evolutionary approach* (Oxford: Clarendon Press)
- Spender J-C, 1996 "Making knowledge the basis of a dynamic theory of the firm" *Strategic Management Journal* 17 45-62
- Tsoukas H, Vladimirou E, 2001 "What is organisational knowledge?" *Journal of Management Studies* 38 973-994
- Weick K E, 1990 "Technology as equivoque: sensemaking in new technologies", in *Technology and organizations* Eds P S Goodman, L S Sproull and Associates (San Francisco: San Francisco) pp 1-44

