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Mentored action learning applied to personal information and knowledge management - a research in progress

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Abstract:

This paper positions and justifies an ongoing research project, the doctoral research of the first-named author. Two of the authors have previously critically reviewed the literature concerning the relationships between data, information and knowledge (Gregory & Descubes 2011a). This paper introduces personal information management systems PIMS as a mechanism used to support the personal knowledge management of knowledge workers. Its first contribution is to identify PIMS with the recently-identified individual information systems IIS of (Baskerville 2011) and to draw a close parallel with the user generated information systems UGIS of (DesAutels 2011).

Research design based on action research enabled by peer and dialogic mentoring (Bokeno & Gantt 2000) as nourished by reflection and reflexivity, is suggested in a second potential contribution as the basis for further research into PIM systems, effective personal knowledge management and deep learning by those who collaborate in that research and its application in practice. Parallels are drawn to Action Learning (Revans 1998) and distinctions are identified.

Key words: action and reflection in personal knowledge management;
dialogic mentoring; personal information management systems PIMs;
personal work systems PWS

[9059 words]

1. Managing personal information and knowledge: an introduction

1.1. The context: knowledge worker productivity

Writing about knowledge worker productivity (Drucker 1999) holds that “The most important contribution management needs to make in the 21st century is similarly to increase the productivity of knowledge work and knowledge workers”: similarly, that is, to the massive increases in productivity associated with manual work which have been achieved in the hundred years since (Taylor 1911) identified “scientific management”. This present study aims to discover how “better” to manage personal information – both in what William Jones calls KFTF, keeping found things found (Jones 2007b); and how “better” to get things done GTD (Allen 2003).

1.2. Specific research context: learning to act in an informed way

The two-part research question of the first author’s doctoral research is:

1. How do knowledge workers manage their personal information and knowledge?
2. How can knowledge workers be helped to improve their personal knowledge management (PKM) by means of a useful and applicable teaching, learning and evaluation framework?

The assumption underlying the research is that wherever some individual uses information and communications technology to store and manage data – personal to them or stored on or via the computing or communicating devices which are personal to her or him – that *that individual has created an individual information system* (Baskerville 2011) *or personal information management system* (Gregory & Descubes 2011b). We believe that there is potential to improve that personal information management system (PIMS) as

individuals become more aware and knowledgeable about their role in conceiving, designing, implementing, using and reviewing their PIMS.

We have previously discussed what personal information management is and suggested how to audit its effectiveness in (Gregory & Norbis 2008a; Gregory & Norbis 2008a; Gregory & Norbis 2008b; Gregory & Norbis 2009a). The concept of a personal information management *system* is discussed more extensively in (Gregory & Descubes 2011b).

(Gregory 2012) reconsiders the term *Personal Information Management System PIMS* and compares and contrasts it with the similar terms Individual Information System IIS as discussed by (Baskerville 2011) and User Generated Information System UGIS as introduced by (DesAutels 2011). (Gregory 2012) contends (following Baskerville) that it is the personal work system constituted when a human user makes use of a PIMS which exhibits a systemic nature. That paper introduced the specific research questions which relate to PIMS and demonstrated their emergence on the basis of reflection or reflexivity. Its primary epistemological underpinning is the abduction of Peircean pragmatism. Following (Ashby 1956) and (Conant & Ashby 1970), (Gregory 2012) suggested as a potential contribution the theoretical and practical necessity for modelling a PIMS in order that the PIMS constructed using that model be maximally effective for the individual who uses it.

Fundamental to this present paper is the conjecture that mentoring will assist people to achieve more effective personal information management – and the mentor to become more knowledgeable about the phenomenon of PIMS and its use.

1.3. Personal information management and individual information systems

The phenomenon we are strongly motivated to study is this: how people manage their personal information, particularly using computer-based tools,

and how they can learn to do this better, that is, how they can extend their personal knowledge concerning personal information management.

Some might hold that this is a trivial, “obvious” phenomenon; certainly the area is little researched by academics. Because it is little researched, it is not difficult to identify research gaps.

In the March 2011 edition of the European Journal of Information Systems, the then editor in chief Richard Baskerville identifies the phenomenon that he calls individual information systems (Baskerville 2011). He uses a pseudonymous case, that of Jane Doe, whose information system architecture he illustrates by means of Figure 1:

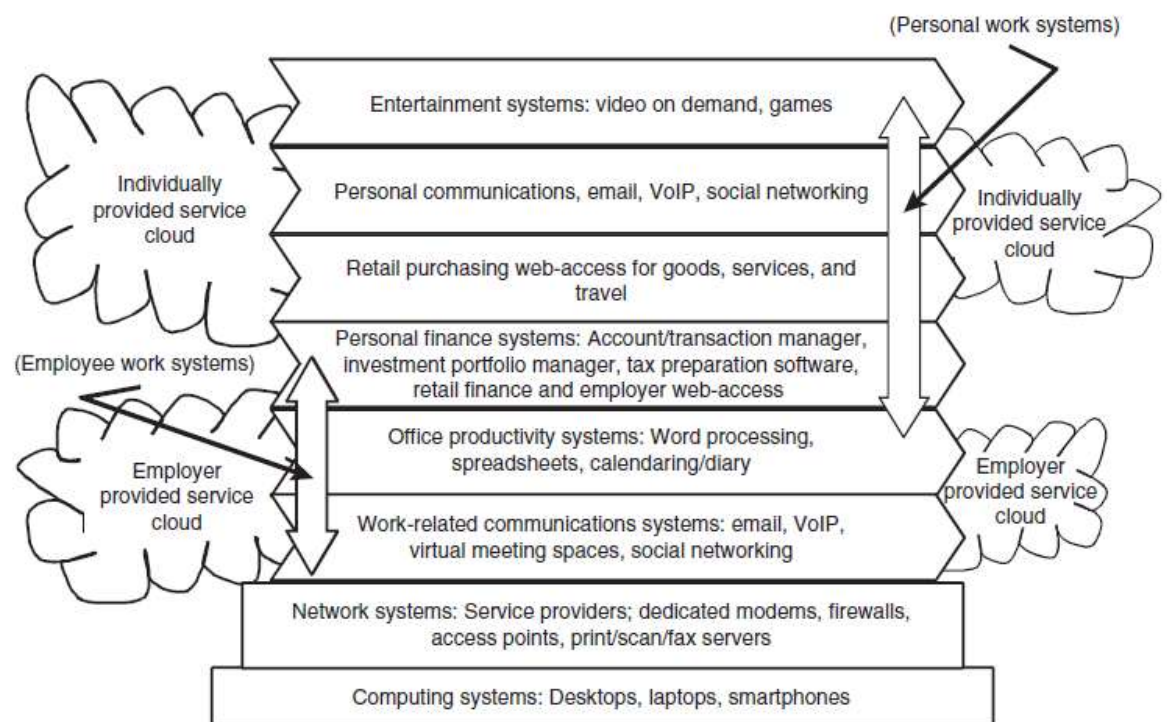


Figure 1 Jane Doe's individual information system architecture

Source: (Baskerville 2011)

Baskerville suggests:

“

Thus far, we have yet to seriously introduce our knowledge about complex IS into these individual versions. How has Doe designed her system above? Why has she made the choices, initiatives, and investments apparent in her individual information system? How does she plan and control this complicated architecture? How can our extant body of knowledge improve Doe's individual information system? What are the important relationships between Doe's system and other IS (e.g., individual or otherwise)?

” (Baskerville 2011, p. 253)

There are many other questions which go unanswered in the existing literature. The research gaps are in fact so large that it is premature to ask certain "obvious" questions. Thus it is, we contend, impossible to know at this stage how many individuals maintain a recognisable individual information system and to what quantifiable extent this makes them more efficient or effective. Why? Because many hundreds of millions of people now have personal computers and smartphones (which are themselves computers used for communication but which store much personal data); but since we do not know exactly what constitutes an individual information system, we are not yet in a position to undertake a meaningful survey of a sample of those people. Instead, we need answers to Baskerville's questions and to others, which must initially be sought by *exploratory research aimed at a fuller understanding of what the phenomenon is*. As Baskerville concludes:

“Individual IS may well be an extremely large, undiscovered, arena for future IS research.” (Baskerville 2011)

1.4. Other names for individual IS: PIM systems PIMS and user-generated information systems UGIS

Baskerville identifies “individual information systems”, IIS. We suggest that this is the same phenomenon that we have chosen previously to name “personal information management system”, abbreviated to “PIM system” or even PIMS. See (Gregory et al. 2010) for our first published use of the phrase “personal information management system”; the idea is developed in (Gregory & Descubes 2011a), (Gregory & Descubes 2011b) and (Gregory 2012). Further, we believe that what we call a PIMS and Baskerville an IIS are very similar to the recently identified “*user-generated information system*” UGIS of (DesAutels 2011). However, UGIS may extend to multiple users and are partially or primarily developed by the user herself. In these respects UGIS have strong similarities to the situational applications discussed in (Gregory & Norbis 2009b).

1.5. What is Personal Information Management (PIM)?

An interdisciplinary group of academic researchers and practitioners federated by a website called “Tales of PIM” (Tales of PIM 2010) have collaborated to introduce personal information management in two books, one intended for a more popular audience (Jones 2007b) and one which consists of a collection of academic papers (Jones & Teevan 2007).

(Jones & Teevan 2007) state:

“*Personal information management (PIM)* refers to both the practice and the study of the activities people perform in order to acquire, organize, maintain, retrieve and use information items such as documents (paper-based and digital), web pages and email messages for everyday use to complete tasks (work-related or not) and fulfil a person’s various roles (as parent, employee, friend, member of community, etc.).”

PIM researchers meet every eighteen months or so in a workshop setting. The paper (Gregory 2012) was given at the most recent such workshop.

We posit that there are two key activities associated with personal information management. These are getting things done – action; and keeping found things found – personal data. This reflects the process / data dualism which dominated early information systems literature and practice in the seventies and eighties.

1.6. A discussion of personal knowledge management PKM and personal information management PIM

There is a personal information management PIM literature, and a personal knowledge management PKM literature. The PIM literature is mainly influenced by cognitive science and human computer interface considerations. There are no contributions from recognised IS researchers in either the PIM or PKM literatures. Thus there is little discussion of PIM *systems* in the PIM literature, and as Baskerville suggests, IS research has been almost entirely blind to the phenomenon of what he calls individual information systems.

We view personal knowledge management as a process undertaken by knowledgeable and learning individuals, in part as they design and use personal information management systems which are built using information and communications technology (ICT). Thus *personal knowledge management PKM is a process which may involve PIM personal information management.*

Concerning the relationship of PKM to personal information management: we observe that a slightly different group of researchers from the PIM community labels actually itself PKM. (Völkel & Haller 2009) represents perhaps the first successful attempt to relate personal information management to personal knowledge management in the literature. The literature on personal information management generally takes an uncritical view of what data, information and knowledge are. Our own earlier attempt to increase the precision of vocabulary surrounding data, information and knowledge appears

in (Gregory & Descubes 2011a). A lack of clarity has many damaging consequences. Most notably, we believe that the practical application of personal information management requires that practitioners understand the possible structures of information, what (Völkel & Haller 2009) refer to as conceptual data structures. Their paper makes a serious attempt to clarify the conceptual data structures required for effective personal information management. There is no substitute for learning what the possible structures are, at least to the extent needed to be able to choose between them. Our very early attempts to itemise and categorise those structures are discussed in (Gregory & Norbis 2008b).

2. Personal information management systems and personal work systems

2.1. Is personal information management a ‘problem’?

(Jones & Teevan 2007) quote Benjamin Franklin’s autobiography, in which he outlines 13 virtues. The third, order, was the one that gave him the most trouble:

"Order... with regard to place for things, papers etc., I found extremely (sic) difficult to acquire".

Blue-collar automation has made enormous strides over the most recent decades. By contrast, there is evidence that white-collar productivity has not increased at anything like the same pace, despite the huge investment in information and communications technology made across the world. Furthermore, the efficiency of individual enterprises and of whole countries in benefiting from the enormous investments is extremely variable: see (Strassmann 1997); (Strassmann 1999). There may well be an equivalent productivity paradox concerned with investment in individual systems. One of the few discussions of the economics of PKM (and of PIM – the article is much wider in its scope than the title “Cost-Benefit Analysis for the Design of

Personal Knowledge Management Systems” suggests) is provided by (Völkel & Abecker 2008). They provide a cost-benefit analysis (CBA) model, but this has yet to see wide application. The question of what constitutes benefit or value is clearly important. (Völkel & Haller 2009) appear to view benefit and value as broadly similar. Concerning value they cite in translation (North & Guldenberg 2008) as defining knowledge work as work based on knowledge with an immaterial result; value creation is based on processing, generating and communicating knowledge. We ourselves view value as arising both from knowledge work in these terms and from conventional products or services. We also recognise that people value entertainment and culture; so value may not easily translate into monetary terms.

2.2. Personal work systems

Individuals, teams and organisations need to carry out business and personal processes; they have to act, to Get Things Done: GTD, as identified by popular authors such as (Allen 2003).

To do this, they need to Keep Found Things Found: KFTF. KFTF, as defined by (Jones 2007a; Jones 2007b), means that they must store data, manage information, and act to enhance their knowledge.

They must also share their information with the people with whom they work and play.

(Alter 2002a) defines a Work System as “a system in which people and/or machines perform a business process using resources (e.g., information, technology, raw materials) to create products/services for internal or external customers”.

While approving of Alter’s very helpful notion of work systems, we suggest a slight revision of his definition for our purposes. We agree with Baskerville’s suggested terminology, that of *personal work systems*. (Baskerville 2011)’s diagram of the architecture of an individual information system, reproduced

earlier as Figure 1, distinguishes between personal work system and employee work system without however defining the terms. Based on Alter's definition of a work system, we use as our working definition of a personal work system:

“The system by means of which and as the vital component of which a person, using her knowledge, works individually or together with other persons to perform a business process or other activity using resources (e.g., information, technology, raw materials) to create value, for example in the form of products/services for internal or external customers”.

2.3. Work systems and information systems

A work system is not to be identified with an information system. (Alter 2002a) illustrates the relationship between information systems and work systems in a figure which we reproduce as Figure 2.

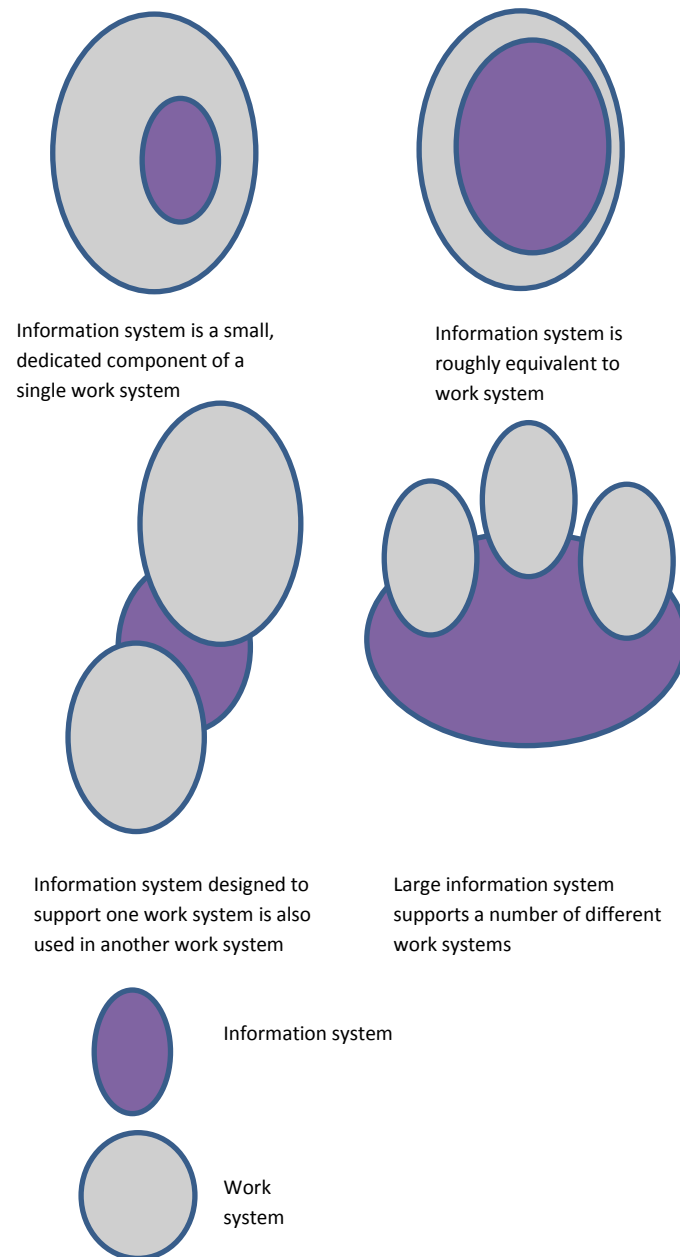


Figure 2 How work and information systems relate. *Source: (Alter 2002a)*

2.4. Personal information management systems and personal work systems

Alter's discussion of work systems focusses on organisational work contexts. Baskerville usefully distinguishes between employee work systems and personal work systems but without defining either.

2.4.1. Personal information management systems PIMS

We suggest the existence of a personal information management system PIMS; personal, that is, to one individual. Such a situation is so common that it is almost banal so that, as Baskerville notes:

“Individuals and family units are building complex and... relatively large-scale individually owned-and operated IS. Have we failed to notice the individuation of IS? Do individual persons independently own and operate complex IS?” (Baskerville 2011)

It may also be that individuals have failed to recognise that they have become more or less knowledgeable operators and even architects of individual information systems; that they have become the creator and curator of a personal information management system, a PIMS. We think it may be useful to suggest the existence of a single personal information management system for each individual. As Figure 1 suggests, Jane Doe’s personal information management system encompasses many component elements which may be highly integrated but perhaps only in and by the mind of Jane Doe. For example it may in practice be quite hard to integrate the contacts stored in Jane’s home email system with those in her work email system. Pragmatically, Jane may attempt to solve this problem by duplicating both on her smartphone. However, she will then need to spend time reconciling those contacts with her work email system, her home email system and her favoured social networking service. Thus our conceptual singular personal information management system may be fragmented across multiple platforms (e.g. home desktop computer, work-provided laptop and Internet-linked servers), incorporate multiple services and be shared with many other individuals and organisations.

2.4.2. Personal information management systems and work systems

Baskerville's architecture distinguishes personal work systems from employee work systems. It also separates layered components, which he groups as employee work systems and personal work systems. These appear to be based on a platform of network services and computing services. Baskerville separately identifies the employer provided service cloud from the personal service cloud. We would suggest that the layers in his diagram approximately equate to the services identified as one among several key architectural components by (DesAutels 2011), summarised as Table 1.

Table 1 Architectural concepts *Based on (DesAutels 2011)*

<i>Term as used by DesAutels</i>	<i>Definition</i>	<i>Our commentary</i>
Service	A service is two-way in nature; this is enabled by the capabilities of state, identity, and contribution. State enables a service to support multiple concurrent interactions. Identity allows a service to recognize a user, so as in the case of an email service the user gets customized content and protected access. Contribution allows a user to add and/or alter content on the service.	<i>A service is offered by an information system.</i>
Platforms	Platforms enable connectivity and communications within and between services, aggregators, users, and other platforms. The foundational platforms are communications networks such as the Internet, the GSM network, and the public switched telephone network (PSTN). They provide fundamental communications capabilities (DesAutels 2011).	<i>An alternative term is infrastructure.</i>
Aggregators	Aggregators are the tools that allow UGIS to be built in a literal sense. They serve as the enabling element for the creation and use of UGIS. Aggregators encapsulate the technical aspects of composing services into easy-to-use abstract forms, enabling mashups of services to be built by the masses. They offer a means by which users can easily compose those services together to form meta-services of their own. All aggregators offer input, output, and processing capabilities, although the latter may vary widely in range. A fundamental attribute of aggregators is their ability to encapsulate technical complexity into simple abstract forms that are easily accessible by users. By doing so, they facilitate the integration, composition, and orchestration of multiple services and platforms by non-technical users via simple, interface-driven features and do not require—but may allow—programming in the traditional sense.	<i>Following (Yu et al. 2008), we suggest that aggregators may take concrete form as, for example, Excel macros or JavaScript scripts. Thus an aggregator can also take the form of a function which transforms an input to an output. Such a transformation can only be general if both the input and the output are formally defined (that is, their syntax and semantics are explicit and constrained) and if a thinker defines a suitable transformation and that transformation is then implemented and tested for all reasonable combinations of input and output. Where both services are sufficiently widely used, then there is an interest (perhaps commercial) in creating an aggregating device or service. (Yu et al. 2008) discusses the phenomenon of mashups; these provide end-users with the ability to integrate at the webpage presentation level.</i>

DesAutels does not discuss *information systems* or *work systems*. We suggest the existence of a single work system personal to Jane Doe: one in which she takes a more (or less) unified view of the “work” (broadly defined) she needs to do in a professional sphere and in a personal one. This again is no more than a conceptualisation, but one which has concrete implications in terms of what devices Jane uses, what services are needed on each such device, and the extent to which she manages her own platforms and infrastructure and the extent to which she (and her employer) depend on cloud-based services, platforms and infrastructure.

2.5. Data in the service of action

We have previously discussed the relationships between data, information and knowledge in (Gregory & Descubes 2011a). In that paper we based our discussion on (Kettinger & Li 2010) who extended the much earlier work of (Langefors 1980). We would summarise our then argument as: information is the joint product of the application of knowledge to data. We now regard that discussion as incomplete. It is a useful summary of the use and diffusion of existing knowledge. We would now add, on the basis of a Peircean abductive or retroductive logic of enquiry - see (Psillos 2009) – that in the creation or recognition of new knowledge, data is processed to yield information and that this can then inform new knowledge. The process by which we achieve new knowledge can be labelled as learning. Discussions of data, information and knowledge cannot be divorced from their use to inform specific actions or ongoing sets of actions which we might label processes. So we argue the pragmatic necessity to make a clear distinction between these actions and concepts:

1. *what we do*: our actions, activities, processes and work systems (Alter 2002b), (Alter 2003)

2. *what we act upon:* our stored data and kept information-things (Jones 2007a)
3. *how we act:* our knowledge and our theories-in-use (Argyris 1982); see also (Smith 2001)
4. *what tools we use:* the personal data, information and knowledge-representation tools that we use
5. *the techniques and methodology* that we apply as we act and as we solve problems in everyday life
6. *how we learn:* both at the low-level "how-to", but also at the higher reflective level, how we learn to continually improve – the double loop learning originally identified by (Argyris & Schön 1978)

2.6. Learning: knowledge assimilation and creation

Learning can be viewed as adaptation - see (Ackoff 1999). Learning can also be regarded as conversion of explicit information to personal tacit knowledge - see (Nonaka & Konno 1999).

In order to improve learning - individual, team, wider – we suggest that:

- The human agent, working with his or her information and knowledge base, is but one agent in a complex network of interacting intelligent agents
- She has her own memory, augmented by her personal information management system
- She works in a local network: her team, her community of practice
- The global network of semantic agents (human, and nascent artificial intelligence) also has

access to a memory system: this is the classical library infrastructure as extended by the social web (now – Web 2.0) and the augmented or extended semantic Web (soon – Web 3.0; see (Shadbolt et al. 2006))

- Learning itself can occur via planning: (De Geus 1988)

But how can we best bring about knowledge dissemination and knowledge creation concerning personal information management systems PIMS? The intensely personal nature both of the PIMS phenomenon and of the learning required to exploit it and to understand it suggests a mechanism, that of *mentored action learning*. The remainder of this paper introduces and fleshes out this mechanism or learning approach.

3. Towards mentored action research designed to investigate and improve PKM

3.1. Mentoring: knowledge sharing and transfer

One source of external information and indeed knowledge is mentoring. But mentoring is more than information or even knowledge exchange. (Bozeman & Feeney 2007) give as their definition:

“Mentoring: a process for the informal transmission of knowledge, social capital, and psychosocial support perceived by the recipient as relevant to work, career, or professional development; mentoring entails informal communication, usually face-to-face and during a sustained period of time, between a person who is perceived to have greater relevant knowledge, wisdom, or experience (the mentor) and a person who is perceived to have less (the protégé).”

The mentor may indeed observe, diagnose and intervene, more or less actively, in support of the protégé (sometimes called the mentee).

Mentoring can be viewed as agency (Giddens 1986) in effective learning. (Bokeno & Gantt 2000) identify what they call *dialogic mentoring* in the context of organisational learning. They identify the need to “learn to learn” in order to achieve what we see as the same “double-loop” generative, or transformational response to turbulent environmental conditions that this present research is based upon following (Argyris & Schön 1978). (Bokeno & Gantt 2000) hold that relational development and community building which cultivate exploration, experimentation, and risk are foundational to the organisational learning enterprise. They offer a conception of mentoring as a dialogic practice and as a core relational practice for learning organisations, arguing that dialogic mentoring has advantages over both conventional mentoring relationships and extant practices for generative learning in organisations.

In this research, we reapply their finding in the context of personal rather than organisational learning. We suggest that mentoring is more or less personal in any event, but all the more so where that mentoring:

“derives from a dialogic understanding of the nature of relationships, and differs sharply from the conventional understanding of professional developmental relationships. In so doing, this understanding contributes to a communication foundation for genuine transformational practices in organizations aspiring to learn.” (Bokeno & Gantt 2000, p. 239)

This dialogic mentoring is sometimes to be employed in the current research; however, we shall also use peer mentoring within the fostered online community also identified as necessary for this research. We do this precisely

to counteract any power-dominance between mentor and mentee (but also to distribute the mentoring workload).

3.2. The application of action research in information systems (IS) research

This section summarises the literature concerning action research, reflection / reflexivity and mentoring as the necessary basis for a research design which synthesises the approaches in its final section 3.9.4.

The originator of action research was Kurt Lewin (Lewin 1946). See also (Lewin 1951).

Seminal articles on Action Research and IS are summarised as Table 2:

Table 2 Articles concerning action research and information systems

(Flood 1998)	Takes a systems approach to action research in the management and systems sciences
(Flood 2001)	Considers the relationship of 'systems thinking' to action research
(Checkland 1991)	Checkland suggests that framing experience is at the heart of the learning that can be achieved through action research.
(Baskerville & Wood-Harper 1996)	Adopts a critical perspective on action research as a method for information systems research.
(Avison et al. 1999)	<p>They find that "action research combines theory and practice (and researchers and practitioners) through change and reflection in an immediate problematic situation within a mutually acceptable ethical framework. Action research is an iterative process involving researchers and practitioners acting together on a particular cycle of activities, including problem diagnosis, action intervention, and reflective learning." (Avison et al. 1999)</p> <p>A particular significance of this article is its identification of five major strands in the application of action research in an IS context, these being the Multiview contingent systems development framework of (Avison et al. 1998), the soft systems methodology SSM of (Checkland 1981; Checkland 1999; Checkland 1991; Checkland 2000); the Tavistock School's sociotechnical design; Scandinavian research efforts intended to empower trade unions and strengthen the bargaining positions of users in systems development; and the Effective Technical and Human Implementation of Computer-based Systems (ETHICS) participative and ethical approach to information systems development of (Mumford s. d.).</p>
(Mumford 2001; Mumford 2006)	Enid Mumford's use of action research was not confined to information systems and their development. These articles report her socio-technical perspective.
(Checkland & Holwell 1998) (Checkland & Poulter 2006; Checkland & Poulter 2010)	Discuss action research, which is at the heart of most applications of Checkland's soft systems methodology SSM.
(Shah et al. 2007b; Shah et al. 2007a).	<p>The former identifies the learning achieved by means of action research, the latter concentrates on the associated knowledge management issues.</p> <p>Discussions of action research in the context of doctoral research include (Zuber-Skerritt & Perry 2002) and (Dick 2005).</p>
(Papas et al. 2012)	Contrasts action research and design science.

3.3. Action Learning: Similarities and Distinctions

There are clear parallels between the approach we are suggesting and the ideas concerning Action Learning introduced a generation ago by Revans and recently summarised as (Revans 1998) and developed by (Pedler 1997). However, the action learning sets we will use in our research differ in that the research audience consists of an online community some of whom are mentored, some of whom are not, and none of whom necessarily meet face-to-face.

3.4. Reflection and reflexivity as an essential part of the research process

(Schön 1983) powerfully argued for *reflection* in and on practice a generation ago. A similar but distinct concept is that of *reflexivity* (Van de Ven 2007). We have identified the necessity for reflection and reflexivity in research elsewhere (Gregory & Descubes 2011a). We can summarise our argument there as follows.

That paper takes as its starting point a reconsideration of the relationship between data, information and knowledge, particularly as recently restated by Kettinger and Li in their KBI Knowledge Based Information general information processing model (Kettinger & Li 2010). It suggests that engaged reflection, particularly in the form of systematic self-observation, can inform teaching and research. It recalls earlier findings by W. Ross Ashby, specifically his law of requisite variety (Ashby 1956) and by W. Ross Ashby and Roger Conant on the significance of model building for understanding and controlling organisational processes (Conant & Ashby 1970). Model building itself needs to be informed by the researcher's self-observation and reflection. Among the modelling techniques which can be useful in structured self-observation is concept mapping, e.g. as identified by (Paquette 2010). Our earlier paper's propositions are illustrated by a case, the teaching of an undergraduate module in business information systems analysis and practice.

Revisiting the law of requisite variety arose or emerged from reflection on that teaching.

3.5. Reflection in action

When we have a purpose to achieve, we need and decide to take action.

When we have completed the planned action, we evaluate what we have done and decide to what extent we have achieved our purpose. Frequently we find that corrective or additional action is needed. This corresponds to Argyris' corrective action or single loop learning (Argyris 2000).

Sometimes we evaluate what we have attempted and conclude that there is some element of failure: some or all of our purpose has not been achieved. ***We reflect on that failure;*** it may be that our purpose was not achievable with the resources available, or it may be that the purpose was in some sense incorrect or inappropriate, ***or it may be that the knowledge that we applied to the situation was inadequate or defective.*** Thus as reflective actors in a goal-oriented (teleological) system that decides, plans, acts, evaluates and learns, we not only apply knowledge (both theoretical and practical) to carry out informed and decisive action, but our experience causes us to learn – ***our knowledge changes.*** This corresponds to Argyris' outer learning loop (Argyris 2000).

3.6. Action, knowledge and pragmatic enquiry: (Goldkuhl 2012, P.139)

Göran Goldkuhl's restatement of the role of pragmatism in IS research builds on the pragmatism of John Dewey and links it to the work of Peirce:

“

Action has, as (Dewey 1931) states, the role of an intermediary. Action is the way to change existence. To perform changes in desired ways, action must be guided by purpose and knowledge. The world is thus

changed through reason and action and there is an inseparable link between human knowing and human action.

This means also that actions and their consequences are keys to cognitive / conceptual development and clarification. One of the foundational ideas within pragmatism is that the meaning of an idea or a concept is the practical consequences of the idea/concept. The meaning of a specific concept is the different actions, which we conduct, based on the belief in this concept. In his classical article ‘How to make our ideas clear’, (Peirce 1878) formulated this pragmatic principle: ‘Thus, we come down to what is tangible and practical as the root of every real distinction, no matter how subtle it might be; and there is no distinction of meaning so fine as to consist in anything but a possible difference of practice’

”

3.7. A research design based on action research and reflection

Russell Ackoff believed action research to be very well adapted to dealing with what he calls “messes” (Ackoff 1997). Messes are complex, multi-dimensional, intractable, dynamic problems that can only be partially addressed and partially resolved. They are “systems of problems” requiring planning rather than individual problem-solving. He commends an interactivist approach:

- Design an idealised future for the system being planned for
- Design the implementation of a decision as an experiment that tests its effectiveness and that of the process by which it was reached

Do issues of this complexity arise at the individual level? Huge complexity arises at any level, including what used to be called fundamental particles. Thus we suggest that action research may very well be adopted at the level of personal action.

3.8. Specific research context: learning to act in an informed way

As we stated above (section 2) the two-part research question of the first author's doctoral research is:

1. How do knowledge workers manage their personal information and knowledge?
2. How can knowledge workers be helped to improve their personal knowledge management (PKM) by means of a useful and applicable teaching, learning and evaluation framework?

Fundamental to the associated empirical research is the conjecture that mentoring will assist people to achieve more effective personal information management – and the mentor to become more knowledgeable about the phenomenon of PIMS and its use. For this reason, the first author's PhD has as its sub-title: *“Learning to act in an informed way”*.

3.9. Background to research design: the application of Action Research

3.9.1. Learning modes

Since a conjecture fundamental to this research is that mentoring assists people to achieve more effective personal information management, it is necessary to establish two communities:

- **MENTORED MODE: RESEARCH VOLUNTEERS**
A community of people who are actively mentored by the principal researcher, and who have the possibility to mentor one another; thus the actively mentored

community has two subsets, one being those who choose to make themselves visible to other members of the community, the other being those who choose to remain anonymous to those other members of the community. Only the visible members are permitted to take part in the forum associated with the community.

- **INDEPENDENT MODE: RESEARCH ASSOCIATES**
Other people, a control group, who choose not to be mentored or who cannot be accepted for mentoring because of a lack of resources on the part of the principal researcher but who still wish to take part in the research.

3.9.2. Action Interventions by means of dialogic mentoring

The action research *mentor* works with the action research *volunteer* or *partner*. They work together to establish what she or he knows about personal information management, personal knowledge management and the way that she works. The mentor measures the mentee's current level of competence and then talks through the possibilities that exist with the mentee. The mentor does not hide from the volunteer the fact that different levels of competence are needed for the different possibilities that exist. The mentee decides what level of competence she wishes to achieve, and in what timescale. The mentor and the mentee work together to establish an action plan that will take the mentee from her current level of competence to an achievable and desirable level of competence within a reasonable timescale. The objectives should be set such that the desired level of competence can be reached within 2 to 3 months as an absolute maximum (more normally, one month). If the required level of competence cannot be achieved within the agreed timescale, then an initial lower level of competence is established.

This is done because there is otherwise a great danger that the volunteer will become discouraged and will give up.

(Dreyfus & Dreyfus, 1980) identify various levels of expertise. Normally, a volunteer will move on to a second objective and cycle at the same overall expertise level; however, after having achieved several outcomes at one level, it will be sensible to move on to the next higher expertise level in another cycle of action research.

The volunteer commits to the action plan, which will always include as an element the maintenance of a journal (or a blog). The action plan also sets out an initial schedule of review meetings. (Those meetings will normally be online.) In the journal, the volunteer will record everything of relevance to the experiment. The journal is a trace of knowledge. Its textual elements can be analysed using suitable text mining tools. It should also be extended by visual models, such as rich pictures or more-formal typed concept maps (Paquette 2010).

In fact, the process of effective action research requires that the action research volunteer goes much further in documenting what they do and reflecting upon their learning. The volunteer undertakes deep enquiry into her own practice.

(Smith 2001) draws an analogy with Aristotle's distinction between technical and practical thought. Thus (Argyris 1982) suggests that in single-loop learning, reflection may not be rigorous. In double-loop learning, which is more creative and reflexive, and involves consideration of notions of the good, reflection becomes more fundamental:

“The basic assumptions behind ideas or policies are confronted... hypotheses are publicly tested... processes are “disconfirmable” and not self-seeking.”

3.9.3. Learning actions and learning action cycles

According to (Riel 2010), whose focus is on students as actors in action research which is largely focussed on their own actions:

“Action Research is a way of learning from and through one's practice by working through a series of reflective stages that facilitate the development of a form of ‘adaptive’ expertise. Over time, action researchers develop a deep understanding of the ways in which a variety of social and environmental forces interact to create complex patterns. Since these forces are dynamic, *action research is a process of living one's theory into practice.*”

Riel summarises action research diagrammatically in Figure 3:

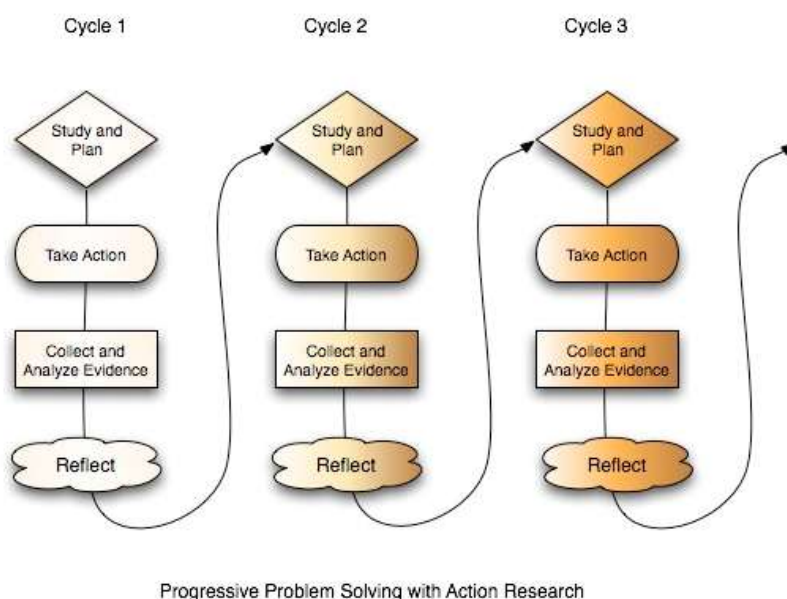


Figure 3 Progressive problem-solving with Action Research. *Source:* (Riel 2010)

3.9.4. Summary concept map

The concept map Figure 4 summarises the design of the action research diagrammatically:

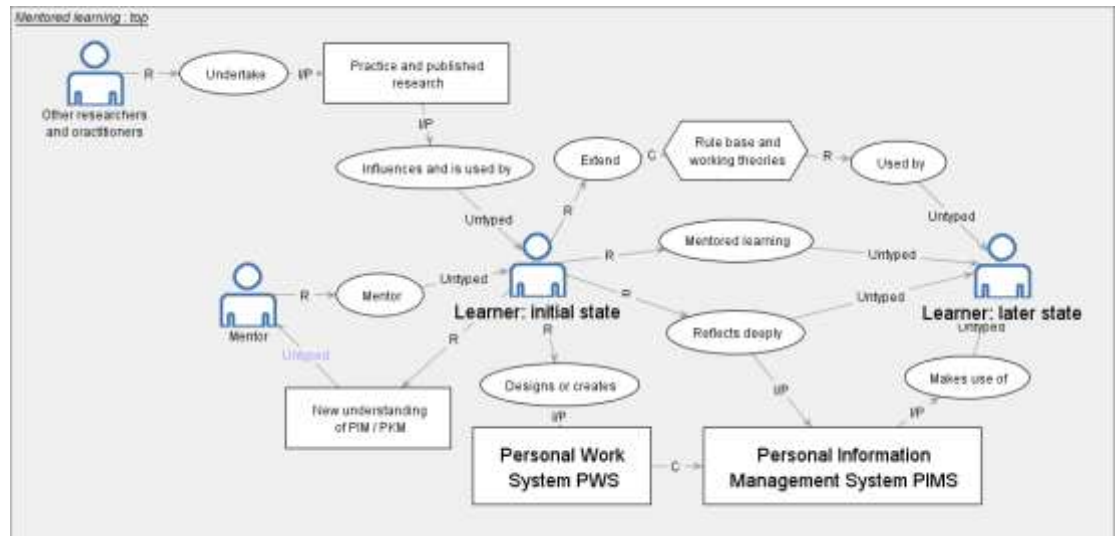


Figure 4 Mentored learning - a summary concept map *Source: authors*

3.10. Design for further research

3.10.1. Action cycle design

Therefore we present as our design for a single cycle of action research:

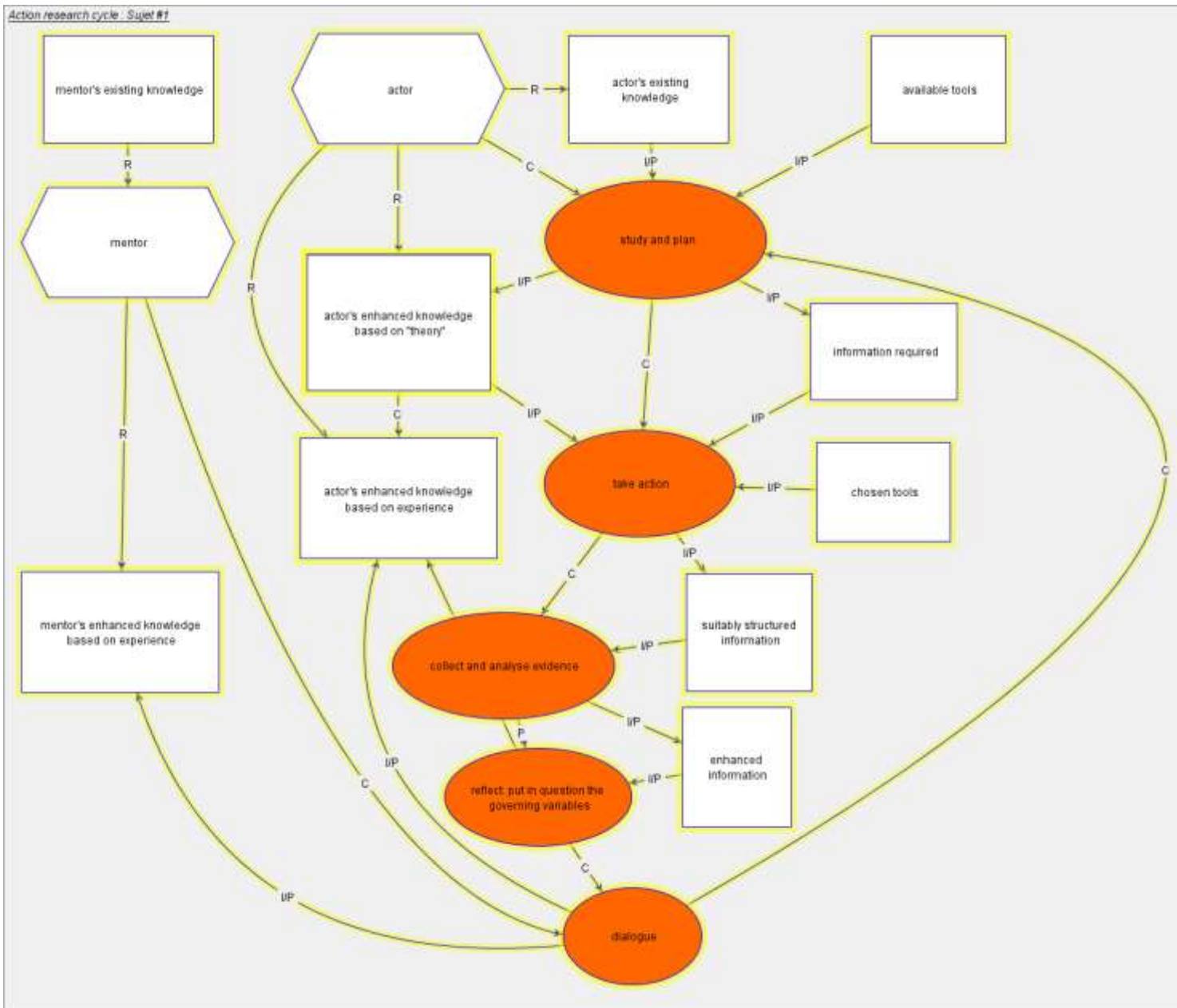


Figure 5 Action cycle design - one cycle *Source: authors*

Figure 5, which uses the Mot+ / GMOT representation introduced by (Paquette 2010), shows how the actions shown in orange are linked to the knowledge and information represented in the other concepts shown in the map.

3.10.2.The design of specific action cycles

At the start of each cycle, the research volunteer RV (synonym: research partner RP) has to set an achievable, measurable, short-term (typically less than twelve weeks) goal for that cycle. Normally this has to be set on the basis of relevant metric(s) at the start of that cycle. Having set the objective, the RP (possibly assisted by a mentor) needs to plan how it will be achieved and to access relevant documentary resources. The mentored RP then undertakes the identified learning actions and associated reflection.

3.10.3.Detail of the action research elements

Table 3 immediately following itemises the main elements of the action research now in progress.

Table 3 Action research elements

Description	Interpretation for mentored group: Research Partners (RPs)	Interpretation for independent volunteers: Research Associates (RAs)	Comments
Find people who would like to improve their personal knowledge and information management			Initially by invitation. Subsequently, as people register an interest on the TeamKIM website www.teamkim.org , we may ask some of them whether they would wish to become mentored research partners.
With each individual, choose whether they will work in mentored mode or in independent mode			
Register the individual in the chosen mode, optionally identifying a "team" (cf. the "action set" of (Revans 1998)) with which the individual can interact in a privileged fashion	The individual may or may not be part of the team; it is possible to change team membership at any point	Team membership is not available	
Using identified metrics, establish the needs, current achievements and design proficiency of each volunteer	Provide individualised feedback	Provide some initial feedback, so as to welcome and encourage the individual learner	
Guide volunteers to identify their existing knowledge, significant knowledge gaps, resources needed and timescales	A semi-structured process based on self-audit and on in-depth interview	A structured process based on self-audit	
Establish initial learning plan and design initial learning intervention			

Description	Interpretation for mentored group: Research Partners (RPs)	Interpretation for independent volunteers: Research Associates (RAs)	Comments
Identify and expand upon their regulatory model or system			
Encourage participants to establish or to evolve an existing ontology			It will be possible to use text mining software to give some clues to participants by automatically analysing the vocabulary used in a sample of the documents that they supply
Monitor first cycle	In-depth	Minimal	
Monitor second cycle...			
Carry out post-intervention analysis and reflect on learning experience			

3.10.4. Learning aids: working documents

The mentor has an important teaching role. Thus he will need to provide certain knowledge resources in the form of working documents intended to assist volunteers and to augment this passive repository with active application of relevant material to volunteers in accordance with their specific circumstances and prior knowledge.

The currently-identified list of working documents numbers 21; most already exist, in various degrees of completeness. A feature of the research design and of the website that will support it is that all registered site users (whether research partners RPs, or the more loosely-associated research associates RAs) can comment on working documents; the research mentor RM can then choose to incorporate those comments. At this stage, it is ***not*** intended that this take the form of a wiki, but this question remains open. Instead,

research partners RPs can actually change the content of working documents, subject to the approval of the research mentor.

3.10.5. Encouraging meaningful reflection

Participants will be encouraged to assess the degree of success or failure of each step which they undertake. Specifically on those that they regard as failures, they will be encouraged to undertake deep reflection on underlying causes and on effective and available remedies in subsequent cycles.

More generally, we believe that interaction between the Research Mentor (RM) on the one hand and the Research Partner on the other constitutes a form of dialogic mentoring, conforming to the suggestions outlined in section 3.1.

3.10.6. Use of learning logs and blogs

Each participant in the research will be encouraged to reflect in writing on their learning and development. This reflection can be personal to the participant and the Research Mentor, or be shared with the community of practice by means of a web-hosted blog for each participant.

3.10.7. Model building by participants

Each participant in the research will also be encouraged to reflect on their learning and development by means of modelling, perhaps as rich pictures, more often as concept maps (Novak 2009) or as typed concept maps (Paquette et al. 2006). This reflection can also be personal to the participant and the Research Mentor, or be shared with the community of practice by means of web-hosted modelling tools as appropriate to each participant.

3.10.8. The use of forums

Forums, potentially in the form of wikis, are introduced for pragmatic and theory-based reasons. Systems theorists argue that what makes a system

viable is its capacity to adapt, that is, to develop increased order (negentropy). Thus (Heylighen 1992) identifies a number of cybernetic principles. One among these is what he calls blind-variation-and-selective-retention (BVSR). Accepting as another principle that a stable system is to be preferred to one that decays towards higher entropy (disorder), Heylighen goes on to suggest that BVSR processes recursively construct stable systems by the recombination of stable building blocks. The stable configurations resulting from BVSR processes can be seen as primitive but stable elements which (at least initially) continue to undergo variation. According to Heylighen, some combinations of elements will be more stable, and hence will be selectively retained.

We suggest that online forums and wikis are just such BVSR processes. As such they can fulfil the role of variety amplifiers (forums) and filtering (wikis). Thus it is hoped that forums will act to increase the requisite variety required by Ashby's law (Ashby 1956). Forums and wikis have become a very significant part of the online landscape in recent years, but there is surprisingly little literature as yet on their use and usefulness in the context of online mentoring. (Moore & Serva 2007) discuss what they call virtual community in the various forms of wiki, blog, and Internet Forum. They put forward a list of motivational factors which will be used in the design of the online forum with the explicit aim of increasing member contributions.

4. Interim conclusions and next steps

This paper has introduced, positioned and justified an ongoing research project, the doctoral research of the first-named author. We have introduced personal information management systems PIMS as a mechanism used to support the personal knowledge management of knowledge workers. We have identified PIMS with the previously-identified individual information systems IIS of (Baskerville 2011) and compared them with the user generated

information systems UGIS of (DesAutels 2011). Research design based on action research enabled by peer and dialogic mentoring (Bokeno & Gantt 2000), themselves nourished by reflection and reflexivity, is suggested as the basis for further research into PIM systems, effective personal knowledge management and deep learning by those who collaborate in that research. The website www.teamkim.org will go live early in 2013.

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