

UNDERSTANDING PIMS: PERSONAL INFORMATION MANAGEMENT SYSTEM

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ABSTRACT

This present study aims to discover how *"better" to manage personal information* – both in what William Jones calls KFTF, keeping found things found (Jones 2007); and how *"better" to get things done* GTD (Allen 2003). Based on observation of various mechanisms used to support the personal knowledge management of knowledge workers, it identifies PIMS with the Individual Information Systems IIS of (Baskerville 2011) and the User Generated Information Systems UGIS of (DesAutels 2011). It suggests that PIMS / IIS / UGIS are only useful insofar as they enable properly informed initial action, action to correct errors, and reflective learning.

JEL CLASSIFICATION & KEYWORDS

■ M11 ■ M15 ■ PIMS ■ PERSONAL ■ INFORMATION ■ KNOWLEDGE ■ UGIS

INTRODUCTION

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 century 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 2007); and how *"better" to get things done* GTD (Allen 2003).

When we have a purpose to achieve, we need and decide to take action. In order to act reasonably rationally we marshal the data that we need. We apply our knowledge, values and abilities to the data that we have and we decide a course of action which we wish or need to undertake. We catalogue the resources and tools available to us to undertake the action. We identify the process by which we will carry out the action. The action may be individual or it may require the cooperation of others in an ad hoc team brought together to carry out a project including many actions. We then together or alone undertake the actions. As we do so, we update the data we maintain, whether that be in formal organisational information systems (such as student records systems or learning management systems) or in less-formal personal information management systems. What we do may be informed by or evolve in accordance with the changing data.

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 process, which we can summarise as concerning decision making and problem solving, has previously been identified primarily in the organisational context (Simon et

al. 1987); (Simon 1996). In our work, we are concerned with the individual knowledge worker and manager.

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. We learn from our success, but much more from our failure; see (Ackoff 1987; Ackoff 1999; Ackoff 1997). Russell Ackoff's stance was initially similar to that of Simon; subsequently he broke from the discipline of operations research which he and Simon had helped to establish (Ackoff 1979). Thereafter Ackoff's stance was that of a systems thinker and practitioner, no longer concerned to identify algorithms but rather to understand heuristics – practical approaches to variably intractable problems – in what he termed systemic "messes" (Ackoff 1997)¹. 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.

Thus it appears that we are reflective actors in a goal-oriented (teleological) system that decides, plans, acts, evaluates and learns. We apply knowledge (both theoretical and practical) to carry out informed and decisive action. Our experience causes us to learn – our knowledge changes. We apply our developing knowledge to relevant data so as to make informed decisions and to solve problems.

Personal information management and individual information systems

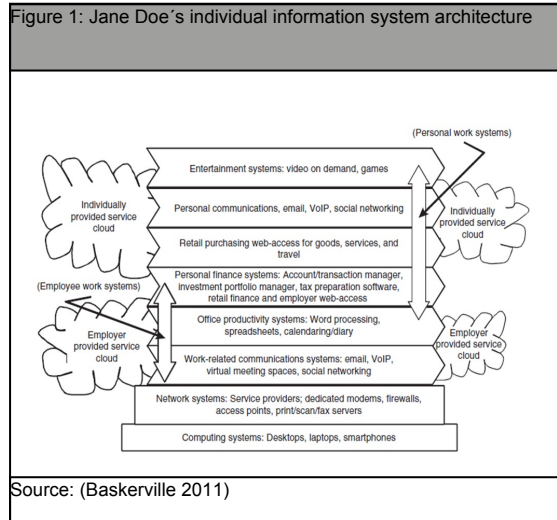
Thus, the phenomenon we are strongly motivated to study is this: *how people manage their personal information, particularly using computer-based tools, and how they can learn to do this better, that is, how they can extend their personal knowledge concerning personal information management.*

Some might hold that this is a trivial, "obvious" phenomenon; certainly the area is little researched by academics.

¹ Russell Ackoff's stance moved from that of an originator of the discipline of operations research towards that of a systems thinker and practitioner, no longer concerned to identify algorithms but rather to understand heuristics – practical approaches to variably intractable problems – in what he termed systemic "messes" (Ackoff 1997). (Fendt et al. 2008) highlighted the influence of pragmatism on Ackoff's work. See also (Sachs et al. 2006).

Because it is little researched, it is not difficult to identify research gaps.

(Baskerville 2011) identifies the phenomenon that he calls individual information systems. He uses a pseudonymous case, that of Jane Doe, whose information system architecture he illustrates thus:



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, pp.252–3)

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 (which we for now take to be a synonym for personal information management 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. Baskerville’s paper is at this stage only published as an opinion article, albeit in one of the most-respected journals in the information systems field. That it can only be an opinion article at this time is explained by Baskerville’s conclusion: “Individual IS may well be an extremely large, undiscovered, arena for future IS research.” (Baskerville 2011)

Doing the shopping: an illustration of personal information management supporting an action

Doing the shopping requires the creation of a list of things to buy. If that list exceeds a few items – seven or 10 – we

need to write it down. This is because of fundamental limitations in our cognitive capacities first identified by (Miller 1956), who in his article entitled “The magical number seven, plus or minus two: some limits on our capacity for processing information” demonstrated that the unaided observer is severely limited in terms of the amount of information he can receive, process, and remember. Implicitly or explicitly we attach additional data to our list. Most items might be obtainable from our favourite supermarket, but some might more cost-effectively be obtained from a “hard discounter”, and some might better be obtained on-line. In effect we restructure our data a little like this:

Table 1: A shopping list

Shopping item	Supplier	Quantity
bread	hard discount	2 loaves
pasta	hard discount	1 kg
basic veg	hard discount	enough for 3 days
exotic veg	supermarket	enough for one meal
chicken	farm shop	2.5 kg
Harry Potter DVD	online	2

Source: (Gregory & Descubes 2011)

By giving structure to the list, by the introduction of columns each with their separate column headings, we have given semantic structure which embodies meaning.

We now consider the life cycle of the list as it is used. Many items recur over time, each with a particular frequency. In effect we can recycle or reuse a list, with the date that an item becomes necessary depending upon when it was last purchased and the replenishment period. Thus there can be value in storing the list as – say – a spreadsheet table, and then associating the spreadsheet with a calendar app (application program) on the computer or smartphone on which the spreadsheet and calendar reside. If we store the data appropriately, we can see what we need to buy where and present that information when it is needed: “what must I buy where today?” This refined, targeted data informs our repeated action, which is to go to the right shops on the right day and to buy what we need; and then subsequently to revise our shopping list. Thus we introduce by way of illustration a technique which is a part of personal information management or PIM.

Larger actions and projects – such as studying for a PhD – can be viewed as personal knowledge management in action. Such larger actions require the support of an effective personal information management system.

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

Baskerville identifies “individual information systems”. 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. This name is not original; see (Barreau 1995). Further, we believe that this is the same phenomenon recently identified as a “user-generated information system” or “UGIS” by (DesAutels 2011).

Philip DesAutels suggests as a formal definition: “A user-generated information system is defined as a set of component services, integrated by the user into a novel configura-

tion such that the resulting information service is (1) qualitatively different from its components and (2) offers unique value to the user over and above the value of its inputs" (DesAutels 2011). This definition is itself based on a definition of information system which DesAutels cites from (Berthon et al. 2010), who make the distinction: "An information technology transmits, processes, or stores information; while in contrast, an information system is an integrated and cooperating set of software-directed information technologies supporting human goals".

That definition is inadequate in not distinguishing the emergent systemic property of an information system, that is, that a system is more than the sum of its components – which DesAutels is careful to identify elsewhere in his article concerning UGIS. DesAutels identifies and describes a user-generated information system as a set of components that can include services; elsewhere in his article he makes the useful observation that the fundamental building block of what he calls UGIS is the *service*, technology or human based. DesAutels suggests that users create UGIS: "On the fly, with little forethought, using easily assembled components. Tinkering and adaptation—hallmarks of the bricoleur – is the norm." (DesAutels 2011)

The reference to the bricoleur is a conscious reuse of the language of Claude Lévi-Strauss, who identified in an anthropological context the bricoleur (roughly translated, the do-it-yourselfer) as someone who engages in bricolage (DIY or tinkering). For an application of this language to the strategic planning of information systems, see (Ciborra & Jelassi 1994), where Claudio Ciborra and Tawfik Jelassi identified "serendipitous bricolage" as a common or even normative way of building *strategic* organisational information systems. Here Philip DesAutels is suggesting that the same phenomenon is at work in the construction of *individual* information systems; we characterise that approach as "happy-chance mucking-about" until a useful result is achieved. Thus what Baskerville as an IS expert can quickly characterise and model architecturally as Jane Doe's structured information system (Figure 1) is perhaps more likely to manifest itself as an ad hoc assemblage than the architected product of conscious analysis and design.

Personal information management (PIM)

There is a personal information management PIM literature, and a personal knowledge management PKM literature.

Personal information management (PIM) is 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 and to fulfil professional and private roles. Thus people who take time to keep the right information in the right place, in the right form: have more time to make creative, intelligent use of the information at hand in order to get things done, or to simply enjoy the information itself. PIM is very well described by (Jones 2007), and a representative collection of academic papers has appeared as (Jones & Teevan 2007).

The PIM literature is mainly influenced by cognitive science and human computer interface considerations. There are almost no contributions from recognised IS researchers in either the PIM or PKM literatures. Thus there is almost no discussion of PIM *systems* in the PIM literature, and as (Baskerville 2011) suggests, IS research has been almost entirely blind to the phenomenon of what he calls individual information systems.

Personal knowledge management (PKM)

We view personal knowledge management as at least in part a process undertaken by knowledgeable and learning individuals 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*.

There is a large academic literature on organisational knowledge management. Conversely, the literature on personal knowledge management is sparse and mostly recent; a flavour is given by (Barth 2004), (Frاند & Hixon 1999) and (Aphshvalka & Wendorff 2005). The latter draw together definitions of knowledge from the organisational knowledge management literature, notably from (Davenport & Prusak 1998) and (Wilson 2002); thus knowledge is at least "a combination of facts, experiences and perceptions that are being used to make a decision or to select an action by which a situation is changed into a more valuable situation.... knowledge ... is in the mind and only in the mind". Aphshvalka & Wendorff agree with Wilson that:

"Whenever we wish to express what we know, we can only do so by uttering messages of one kind or another – oral, written, graphic, gestural or even through 'body language'... knowledge exists within people, part and parcel of human complexity and unpredictability... Because of these human aspects, knowledge is embedded in an individual's personal, subjective mental space and is strongly related to an individual's psychological features, volition, motivation and emotional intelligence, where emotional intelligence is sometimes even more important than traditional intelligence.... *It is everybody's personal decision, will and responsibility to manage his/her knowledge.*" (Aphshvalka & Wendorff 2005)

The literature on personal knowledge management seems to be closer to that on organisational knowledge management than to PIM. See also (Frاند & Hixon 1999), (Grundspenkis 2007), (Snowden & Pauleen 2008), (Pauleen 2009), (Pollard 2008), (Sauermann 2005), (Schwarz 2006), (Smedley 2009), (Snowden & Pauleen 2008)

Kirby Wright takes an interesting perspective. Convinced of the value of organisational knowledge management, he nevertheless contends that that knowledge is situated in individuals. Thus he makes a very clear link between organisational and personal knowledge management in (Wright 2005) and (Wright 2007). Similar synergistic thinking informs (Zhang 2009).

Concerning the relationship of PKM to personal information management: we observe that a slightly different group of researchers from the PIM community labels itself PKM. (Völkel & Haller 2009) is perhaps the first successful attempt to relate personal information management to personal knowledge management in the literature. A further strength of this article is that it makes a serious attempt to clarify the conceptual data structures required for effective personal information management. For we would ourselves observe that 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 forms a part of (Gregory & Descubes 2011). 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 concep-

tual data structures. There is perhaps no substitute for learning what the possible structures are, at least to the extent needed to be able to choose between them. Our early attempts to itemise and categorise those structures are discussed in (Gregory & Norbis 2008).

What is/is not reflective action

(Schön 1983), in his identification and discussion of what he calls the reflective practitioner, 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 2011). We can summarise our argument in that earlier paper as follows.

We took as our 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 and structured self-observation SSO (Rodriguez & Ryave 2002), 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.

(Smith 2009) recalls that Donald Schön's doctoral dissertation concerned the theory of enquiry of the noted American pragmatist John Dewey; Smith contends that the pragmatist framework of Dewey runs through Schön's later work. It is pragmatically, and we hope plausibly, as a result of reflection on systematic personal information management that we started this article with our unsupported contention concerning the relationship between reflective action and personal information management which we here summarise as:

- Decide purpose and plan action
- Marshall the data that we need in organisational or personal information management systems
- Apply our knowledge, values and abilities to the data to yield information which we use to decide a course of action
- Catalogue the resources and tools available to us to undertake the action
- Identify the process by which we will carry out the action
- Undertake the action
- As we act, update the data we maintain in organisational or personal information management systems and modify what we do as we are better informed by changing data
- Evaluate what we have done, taking corrective or additional action if needed
- Reflect on any failure to achieve our original purpose
- Learn from that failure (thus changing our knowledge)

This bald summary might suggest that a step-by-step or algorithmic approach to problem solving is possible. However, that is often not true. Ackoff consciously broke from the often algorithmic approach of early operations research in favour of heuristics and practical approaches to variably intractable problems in what he termed systemic messes (Ackoff 1997). Messes are complex, multidimensional, 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:

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

See also (Ackoff 1987), (Ackoff 1999). Thus we suggest that in our messy, complicated personal lives and work we are reflective actors in a goal-oriented (teleological) system that decides, plans, acts, evaluates and learns. We apply knowledge (both theoretical and practical) to carry out informed and decisive action. Our experience causes us to learn - our knowledge changes.

A case study: undertaking PhD research

Undertaking PhD research is – inter alia – learning in action. We distinguish between what we do, how we act; and the knowledge, information and data which we use as we do or act. When we do something, we act: we carry out specific actions, we carry out an activity. In his work systems framework, (Alter 2003) identifies processes as repeatable prototypes for specific actions. Early systems analysis methodologies, such as (Yourdon & Constantine 1976), make a clear distinction between process and data. In a parallel manner, (Paquette 2010) distinguishes processes from concepts.

We argue the pragmatic necessity to make a clear distinction between these actions and concepts:

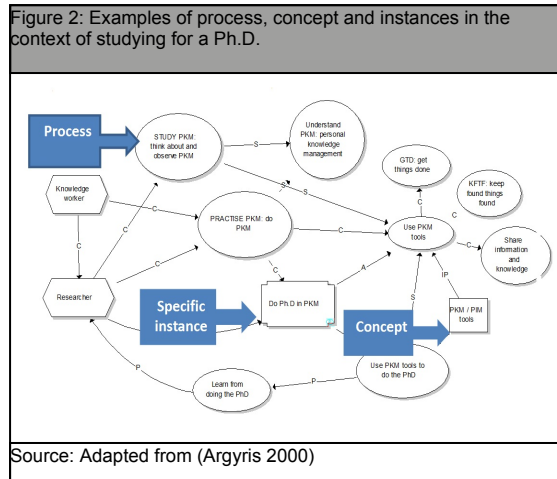
- **what we do:** our actions, activities, processes and work systems (Alter 2002), (Alter 2003)
- **what we act upon:** our stored data and kept information (but also real-world objects)
- **how we act:** our knowledge and our theories-in-use (Argyris 1982); see also (Smith 2001)
- **what tools we use:** the personal data, information and knowledge-representation tools that we use
- **the techniques and methodology** that we apply as we act and as we solve problems in everyday life
- **how we learn:** both at the low-level "how-to", but also at the higher reflective level that leads to deep learning

Whence comes this pragmatic necessity? From what we regard as our professional obligation as teachers to take a systematic and systems-thinking-led approach which learns from well-established principles. Figure 2 distinguish processes (in general) from a specific process (an application of the general), and to contrast processes with actions. The representation technique used is that of (Paquette 2010) as realised in the software tool Mot+; this has been overlaid with explanatory symbols (process, specific instance of process and concept) which are not a part of Paquette's notation.

Just as (Argyris 2000) demonstrated the need for what he called "double loop learning" in the context of organisational

learning, so too our working model of PKM requires an inner-loop and an outer-loop. (For an excellent summary of Chris Argyris' work, we commend (Smith 2001).)

- In an inner loop, we engage in day-to-day doing – we as researchers do work towards a Ph.D.
- We observe ourselves (auto-ethnography and action research)



Double loop learning applied at the individual level: a theory-based approach to deep enquiry

Reflection, upon study and other action, is greatly informed by the discovery of paradox and by learning from mistakes (ours and others); more generally, by reflection as introduced by (Argyris & Schön 1974); see also (Smith 2009). (Smith 1999) considers the origins of the concept of reflection in the work of the American pragmatist John Dewey – see also (Dewey 1933) and (Dewey 1960). Smith also considers the development of pragmatic thinking in (Schön 1983), (Schön 1987). He makes his own contribution by suggesting the significance of emotions in reflection, basing this on (Boud et al. 1985) in the context provided by (Boud 1985).

The process of deep enquiry also draws upon the work of (Argyris & Schön 1989). In a critical review of what they see as the somewhat unreflective organisational learning literature, Chris Argyris and Donald Schön suggest that observer and participant can each tell equally plausible, but conflicting, stories about the same intervention. Prospective imitators of a reflective organisational learning intervention require both an operational description of what the intervention did and critical enquiry into the causal attribution of its achievements to specific features of that intervention.

In their review, Argyris and Schön suggest that a particular danger associated with unreflective intervention arises because the theoretical explanation espoused by the interventionist is not in fact a theory in use. Instead, "undiscussibles" exist but are not admitted to by the participants. Indeed, attempts are made to hide them. Thus it is possible that claimed learning is what they describe as a single loop phenomenon. What needs to be encouraged is what Argyris identified in other work as double loop learning (Argyris 2000).

(Smith 2001) goes back to (Argyris & Schön 1974) to suggest that people have mental maps with regard to how to act in situations. This involves the way they plan, implement and review their actions. Furthermore, they – Argyris and Schön - assert that it is these maps that guide people's

actions rather than the theories they explicitly espouse. Thus (Argyris & Schön 1974) state that:

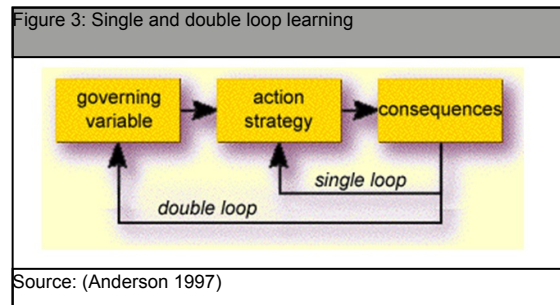
"When someone is asked how he would behave under certain circumstances, the answer he usually gives is his espoused theory of action for that situation. This is the theory of action to which he gives allegiance, and which, upon request, he communicates to others. However, the theory that actually governs his actions is this theory-in-use."

It is in reflecting upon action that efforts must be made to reveal the theory-in-use, to examine the closeness of fit to the theory espoused, and to seek greater congruence – typically in a subsequent cycle of action research. Quoting (Argyris & Schön 1974) Smith suggests that:

"When the error detected and corrected permits the organization to carry on its present policies or achieve its present objectives, then that error-and-correction process is single-loop learning. *Single-loop learning* is like a thermostat that learns when it is too hot or too cold and turns the heat on or off. The thermostat can perform this task because it can receive information (the temperature of the room) and take corrective action. *Double-loop learning* occurs when error is detected and corrected in ways that involve the modification of an organization's underlying norms, policies and objectives."

The need to encourage deep and reflective learning

We wish here to draw an analogy with the distinction between what Argyris and Schön identifies as model I theory-in-use and Model II. The terminology they employ is governing values, action strategy and consequences. When an action results in outcomes which do not match intention, a single-loop loop response is to change the action only, but not to put into question the governing variables. A double-loop response critically examines the governing values that may have led to the failed outcome:



We can characterise model II as including the ability to call upon good quality data and to make inferences. It looks to include the views and experiences of participants rather than seeking to impose a view upon the situation. Theories should be made explicit and tested; positions should be reasoned and open to exploration by others.

The more general issues surrounding the importance of reflection in and on action, highlighted inter alia by (Schön 1983) are summarised by (Smith 1999). We can note here the importance of considering theory of action, initially by articulation, subsequently by uncovering assumptions, reflecting critically upon them, and reviewing and restating this espoused theory as the basis for a theory-in-use of action.

Applying this framework to the case of PhD research

Very loosely following (Habermas 1987), we speculate that this process of theory explication is best pursued in dialogue with an action research partner or mentor. Support

for this speculation is provided by peer and dialogic mentoring (McAuley et al. 1999); (Bokeno & Gantt 2000). The first-named author's ongoing PhD research is based upon action research in which he mentors knowledge workers as they work and reflect, as he is himself mentored by his PhD supervisors.

We suggest in Figure 4 an application of inner loop and outer loop concepts to the case study, a PhD in personal knowledge management concerning personal information management. Since that research is incomplete and ongoing, we can as yet draw no firm conclusions concerning its efficacy.

Conclusion

We have introduced personal information management systems PIMS as a mechanism used to support the personal knowledge management of knowledge workers and identified PIMS with the previously-identified individual information systems IIS of (Baskerville 2011) and the user generated information systems UGIS of (DesAutels 2011). We have suggested that PIMS / IIS / UGIS are only useful insofar as they enable properly informed initial action, action to correct errors, and reflective learning.

We have suggested the application of double loop learning theory at the individual level. We also suggest that action research enabled by peer and dialogic mentoring (McAuley

et al. 1999), themselves nourished by reflection and reflexivity, should be pursued as a basis for further research into PIM systems, effective personal knowledge management and deep learning by those who collaborate in that research.

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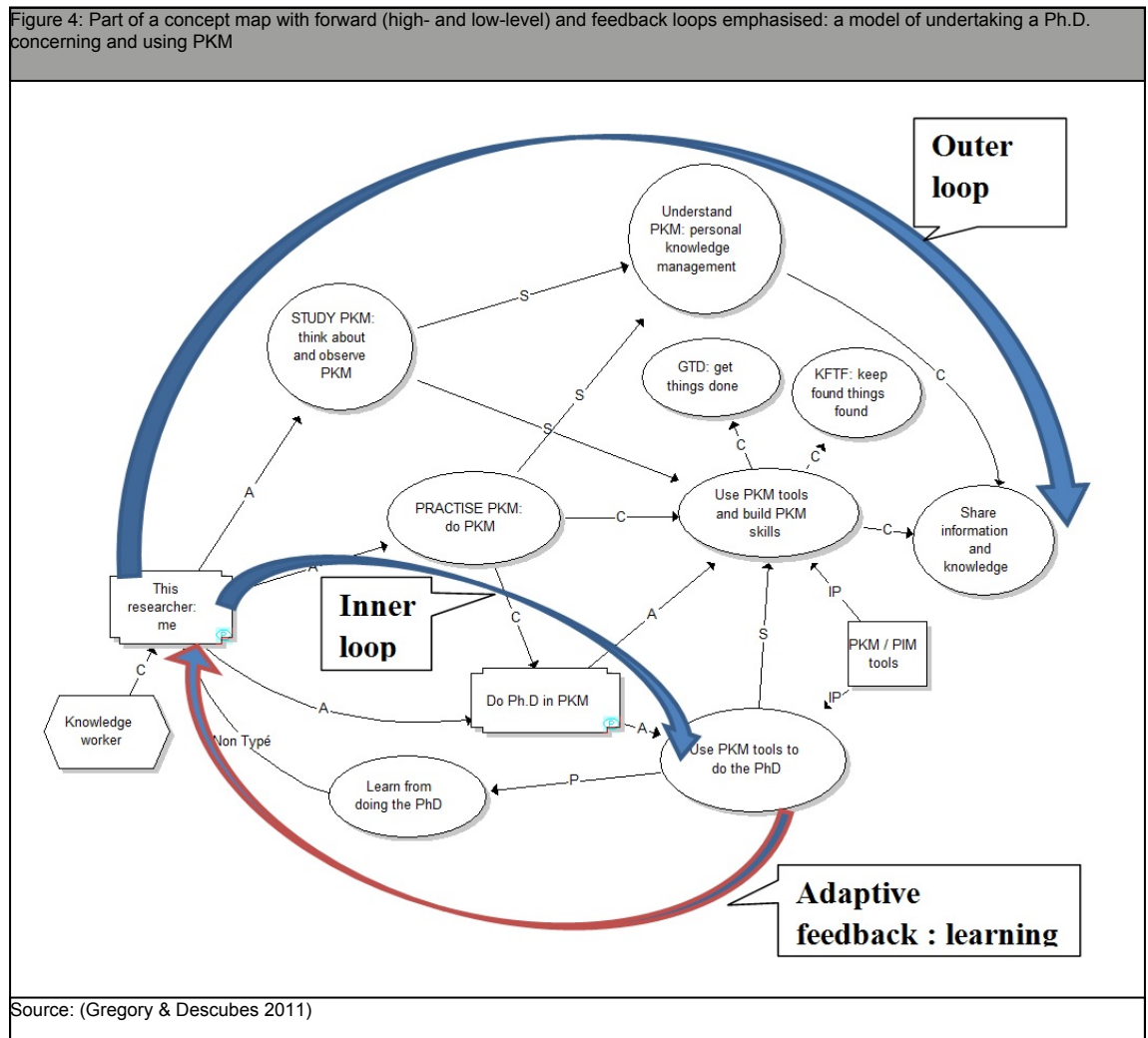
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