The Logic of Use and Functioning of Personal KM-supported Experience Management

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Abstract. Failures of Knowledge Management (KM) Projects are largely blamed for an overemphasis of IT and a knowledge-as-a-resource approach. Experience Management (EM) suggests a more process-oriented focus centering on the capability of 'knowing' to support practices and experiences confronted by changing and diverse contexts. Recent corporate surveys confirm the significance of experience, but also imply a reluctance in engaging in systematic support.
A misguided or implied lack of organizational effort, however, also weakens the underlying KM/EM premise of enabling people to obtain relevant, context-rich information, when needed, to do their unique jobs more effectively. By not delivering on their promises, KM investments are - as consequence - not getting the necessary acceptance from the work force and its leaders.
In recognizing these constraints, predictions of the 'Next KM Generation' focus on utilizing existing and creating new knowledge and on giving more power and autonomy to individuals and self-organized groups. However, such promising scenarios have not materialized yet.
Accordingly, KM's current status quo neither lives up to the new era of knowledge workers' portable, mobile skills and competencies nor to the emerging trend to decide autonomously on where, how, and for whom individuals will put their knowledge to work. Professionals will be increasingly eager to carry - while moving from one project or responsibility to the next - their particular Personal KM System version with them, presenting them with the sovereignty to develop their personal experiences/expertise systematically and sustainably and to voluntarily share it with associates and institutions close to them. Current KM market configurations, however, exhibit a range of potent barriers which prevent Knowledge Workers as well as Knowledge Societies from accessing the full potential of digital opportunities.
The paper approaches the notion of Experience Management from an alternative angle by introducing a novel Personal Knowledge Management Concept and System which incorporates a range of renowned methodologies: Information Space, Cumulative Synthesis, Attention Management, Associative Indexing, and Creative Conversations.

Keywords: Knowledge management · personal knowledge management · experience management · information space · design science · Knowcations.

adfa, p. 1, 2011.

1 A Grass-Roots View of Personal Knowledge Management

The aims of the novel[1] Knowledge Management (KM) concept and prototype to be introduced are to promote Knowledge Workers'[2] creativity, social and intellectual capital throughout his/her academic and professional careers – anywhere - and to support their roles as contributors and beneficiaries of organizational and societal performance. Although the primary goal is to strengthen individual sovereignty and personal applications, it is not meant to be at the expense of Organizational KM, but rather as the means to foster a fruitful co-evolution [5,6].

This ambition is based on the mutually beneficial synergies in the PKM–OKM context and on a solid common ground of renowned and accepted KM methodologies and practices incorporated in the PKM concept and visualized as 'bird's-eye view' representations [1,7] including Popper's Three Worlds [8,9], Kolb's Learning Model [10], the Information-Space Model with its Social Learning Cycle [11], the SECI-Model [12], the JAIST Nanatsudaki 'Seven Waterfalls' Model [13,14], and the Notional Model of the Sensemaking Loop for Intelligence Analysis [15].

This paper's objective is to add a contrasting but complimentary 'grass-roots' and 'experience management' perspective by following up on the concept's premise of meme[3]-based repositories and modifications [19].

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[1] The novelty of the PKM system (PKMS) is based on four major deviations from the traditional Organizational KM (OKM) systems (OKMS) [1,2]: (1) Its Personal Focus ensures one's digitalized knowledge is always at one's disposal and can easily be retrieved, expanded, shared, and re-used independent of changing one's social, educational, professional, or technological environment, (2) Its Bottom-up Focus entails a departure from today's centralized, top-down, institutional KM developments, (3) Its Meme Focus differs from the current document-centric OKMS by turning to the capturing, storing, and re-purposing of basic information structures (memes or ideas) and their relationships (to create knowledge assets and documents) rather than storing and referencing them the conventional way in their containers only, (4) Its Creative Conversation Focus is based on the shared aggregated meme trajectories between PKMS users and its enhanced options to engage in one's topics of interest.

[2] The term 'Knowledge Worker' - as used in this paper – is not restricted to the narrowly defined socio-economic categories of the developed world as, for example, Florida's Creative Class [3]. Instead, it follows Gurteen [4] who places - rather than an individual's type of work - the virtue of responsibility at the center of his reflections: "Knowledge workers are those people who have taken responsibility for their work lives. They continually strive to understand the world about them and modify their work practices and behaviors to better meet their personal and organizational objectives." They "see the benefits of working differently for themselves, […] take responsibility for their work and drive improvement".

[3] Memes were originally described by Dawkins [16] as units of cultural transmission or imitation (e.g. ideas, tunes, catch-phrases, skills, technologies). They are (cognitive) information-structures that evolve over time through a Darwinian process of variation, selection and transmission with their longevity being determined by their environment. Koch [17] refers to them as 'Business Genes' and as the "building blocks of know-how, skills and technology in the broadest sense." They "comprise economic information that needs to find a commercial vehicle before it can attain its potential and deliver a valuable product or service" (just like knowledge assets defined as "nonphysical claims to future value or benefits" [18]).

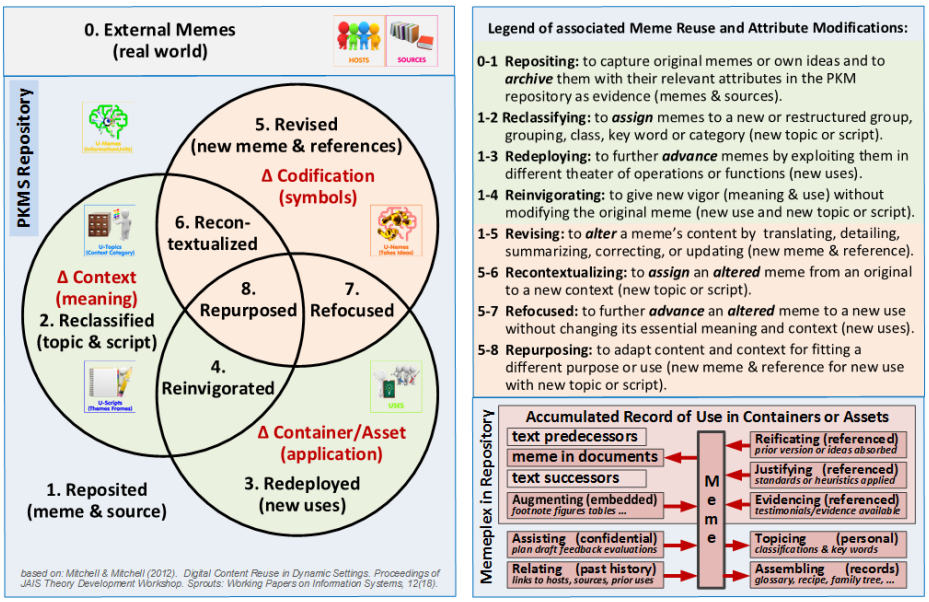

Figure 1: Dynamic Meme Modifications (8Rs) and Memeplexes, based on [2, 20]

At the roots level, the PKMS relies on the digital re-use of captured unique basic information units (ideas, memes, or business genes [19] by embedding them in digital documents via structural references [21]. As briefly stipulated in a prior article [2] and summarized in figure 1, any of these memes and their meta-data can be simply reposited in their original 'as-is' states or changed by modifying their attributes (differentiated by codification, container, or context)[4] to evolve – with repeated utilization over time – into an increasingly complex construct (memeplex, see bottom right in figure 1).

The three basic forward modifications together with linkages between memes, sources, and hosts allow for creating ever more complex information units (from memes over memeplexes to knowledge assets). The trajectories established enable the backward tracing from a meme to their prior version or to other ideas absorbed (usually shown as references), to additional augmented details (e.g. footnotes, figures, tables), or guiding or supporting elements (e.g. standards, heuristics, evidence, feedback) as well as the forward tracing to subsequent re-uses [22,23]. To validate the approach, new publications and presentations have been authored based on the memes and their relations captured in the PKMS knowledge base, exemplified by the paper "How this paper has been created by leveraging a personal knowledge management system" [24].

This paper will use these three basic modification types as the point of departure to briefly introduce some of the relevant key features and philosophies of the PKM approach, before focusing on its implications on experience management.

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[4] The differentiation according to codification (symbols), container (application), and context (meaning) visualized in figure 1 has adopted the recently suggested 'Organizing Typology for Digital Content Users' by Mitchell and Mitchell [20], although the arrangements and terms have been amended to better fit the meme and PKM settings.

1.1 Codification – The Basis of PKM-sustained Cumulative Synthesis

Codified or externalized knowledge can be easily disseminated and stored over space and time. Stewart and Cohen have termed the resulting cumulative archive of human cultural experience and know-how 'Extelligence' [25] able to be accessed and augmented via scholarship. Its quality "depends on wide and rapid dissemination of new knowledge so that findings can be discarded if they are unreliable or built on if they are confirmed" [26] allowing scholars to 'stand on the shoulders of giants' by building "on the earlier work without having to repeat that work. The citation both credits the original discoverer, and provides a link in a chain of evidence" [27].

However, the familiar problem of information scarcity has recently been substituted by a never before experienced ever-increasing attention-consuming information abundance [28] and while "we have many powerful applications for locating vast amounts of digital information, we lack effective tools for selecting, structuring, personalizing, and making sense of the digital resources available to us" [29].

The PKM concept addresses this gap and its meme-based approach fully subscribes to Usher's Concept of '*Cumulative Synthesis*' and its four iterative interdependent phases (perception of incomplete or unsatisfactory pattern, stage setting, act of insight, and critical revision) [30,31]

1.2 Container – The Source of Unsustainable Entropy and Attention Poverty

The lack of adequate tools to deal with the accelerating complexities and information abundance does not offer any assistance to the fragile human memory and finite attention capacities [2]. As Simon already noted over four decades ago: "In a knowledge-rich world, progress does not lie in the direction of reading information faster, writing it faster, and storing more of it. Progress lies in the direction of extracting and exploiting the patterns of the world - its redundancy - so that far less information needs to be read, written, or stored" [32]. This redundancy originates from the rising share of content which has been replicated in a multitude of digital documents instead of digitally embedding and reusing content via structural references.

As result, digital knowledge repositories are "populated by 'paper-like' document files, resembling linear content in accordance with outdated formatting and storing traditions, while needlessly adding fragmented and redundant copies to the mounting information load" [2], unnecessarily adding to defeating the very attentiveness human cognitive capabilities are able to master [32]. A sound '*Management of Attention*' in personal and organizational life could have been in place by now, if only Bush's seven decades old vision of the 'Memex[5]' had materialized already [33,34,35].

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[5] In 1945, Vannevar Bush (then President Truman's Scientific Research Director) imagined the 'Memex', a hypothetical device acting as a supplement to one's memory, enabling an individual to store, recall, study, and share the "inherited knowledge of the ages", to add personal records, communications, annotations, and contributions, and to record non-fading trails of one's individual interests through the maze of materials available - all easily accessible and sharable with the 'Memexes' of acquaintances [33]. As an inspiring idea never realized, the 'Memex' represents the as-close-as-it-gets ancestor of the PKM concept and system proposed.

1.3 Context (Traceability) – The Need for Curated Associative Indexing

In contrast to traditional KM approaches, the PKMS views knowledge assets and their containers as being made up of relationships between memes in the same manner industrial supply chains rely on technical interrelatedness by connecting discrete parts, ingredients, and labor to their final products and services. Due to the captured relations, any meme can similarly be tracked and traced by creating as-built genealogies either back in history to locate prior usage or an original author or forward into the future to follow-up on subsequent uses and citations [23].

Compared to industrial inventories, however, a meme stored in PKMS repositories as an atomic information-structure is not consumed when utilized or transferred. As a virtual copy, it can be employed infinitely for integration in any type of authoring and sharing activity independent of time, distance, disciplines, and purposes. These memes comprise not only technical artefacts (such as texts, code, charts, audio and video messages), but also classifications as well as the descriptors of people, policies, decisions, relations, and even less tangible things like goals and concepts [23]. Since anything can be expressed in a standardized memetic format and combined, linked distinctive memes of diverse disciplines are able to materialize as a single unified knowledge repository.

If these user-defined content and relationships are shared, an extensive mesh of associative multidisciplinary trails of alternative pathways emerges [33]. It is this notion of '*Associative Indexing*' – as Bush termed it - which allows for cumulative synthesis and the assembly of unique memes to create the PKMS repositories of virtual memeplexes and knowledge assets. Two dedicated articles have compared its potential to the features of conventional books, pdfs, webpages, and citation systems as well as with the 'Library of Babel', a thought experiment about the design space of an imaginary library containing all possible books [22,23].

In a cloud-based network supporting the collaboration of autonomous PKM devices via 'Creative Conversations' [36], an 'Associative Integrity' (in analogy to referential integrity of normalized Relational DBMS) has to be maintained by ensuring that only unique memes populate PKM's cumulative archive of shared extelligence (representing a concretized subset of Popper's abstract World Three [1] or a partially populated archive of the imaginary 'Library of Babel' [23]). In terms of figure 1 it means, that meme types 1, 2, 3 and 4 are based on a single entity/record; if a meme is voluntarily shared and uploaded by a member of the PKMS community and an identical meme already exists in the knowledge base (KB), not the meme is added to the KB but only its complimentary relationships are added to the already existing meme.

This consolidation of contexts is a purely technical process without involving users' experiences. Its purpose is to maintain traceable as-authored genealogies of memes and knowledge assets in support of the cross-cultural and cross-disciplinary PKM concept. It forms part of the mission of the 'World Heritage of Memes Repository (WHOMER)' which is to guarantee continued access to the collective knowledge and ideas voluntarily shared among the PKMS user community as well as to overcome the redundancy, the perishability, and potential fallibility of current online knowledge, services, and providers [23].

2 Bridging PKM's Micro and Macro System Environment

The task of employing the 'grass roots' micro approach presented as a sound foundation for effectively addressing the 'bird-eye' macro level challenges of the PKMS environment represents a so-called 'wicked' problem (ill-defined; incomplete, contradictory, changing requirements; complex interdependencies) where the information needed to understand the challenges depends upon one's idea for solving them.

The methodologies applied are rooted in the paradigms of Design Science Research[6] (DSR), a claim validated in a dedicated article against parameters of relevance, utility, rigor, and utility. The article also presents the chain of macro and meta-arguments elaborating on the central PKM ideas (incorporating notions of complexity, Popper's three worlds, Digital Ecosystems (DE), and a United Nations scenario of knowledge mass production over time) [1]. It also incorporates Levy's scenario of decentralized autonomous PKM capacities, networked in continuous feed-back loops to enable creative conversations which facilitate the emergence of distributed processes of collective intelligence, which in turn feed them [36].

The resulting PKM concept[1] represents a paradigm shift from today's institutional, top-down, centralized KM developments towards a personal, bottom-up, decentralized solution. It also overcomes the narrow individualistic confinement of current Personal Information and/or Knowledge Management System (PIMS & PKMS) approaches [37,38,39] and, instead, aims to contribute to Levy's scenario of a decentralizing KM revolution that gives more power and autonomy to individuals and self-organized groups [36].

As the meme-based references indicate, the concept is closely aligned to the notions of 'Memetics' which views ideas as 'living' organisms, capable of reproduction and evolution in an 'Ideosphere' [40], an "invisible but intelligible, metaphysical sphere of ideas and ideation" where we engage in the creation of our world [41]. This metaphor reinforced the author's view that: "if memes and their inbuilt ideas are able to flourish in a virtual 'Ideosphere' as their habitat of operation, PKM Systems aiming at supporting individual capacity and repertoire for innovation, sharing and collaboration are well advised to utilize the very same space and resources and to form a digital counterpart of this 'Ideospere' [19].

By reducing redundancy and entropy and widening access and participation, attention management can be strengthened, opportunity divides narrowed, and unsustainable developments defused [1]. This feature affords the tracing of relationships and trails (links or sequences from one knowledge entity to another) and of versioning (a knowledge entity's evolution or use in space and time.

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[6] DSR aims at creating innovative IT artefacts (that extend human and social capabilities and meet desired outcomes) and at following thorough design processes (as evidence of their relevance, utility, rigor, resonance, and publishability). Since 2012, over thirty publications have been presented and received feedback from a wide range of multi-disciplinary conferences and journals and have shown that the novel trans-disciplinary approach and scope of anticipated outcomes offers appealing opportunities for stakeholders engaged in the context of curation, education, research, development, business, and entrepreneurship.

3 Current State of Knowledge and Experience Management

As laid out in Earl's 'Seven Schools of KM' framework, KM Systems have focused on externalizing tacit knowledge, on combining explicit knowledge, or – if these approaches proved futile – on mapping to locate and socialize tacit knowledge, and on instituting behavioral interventions or appropriate 'creative spaces' [42,43].

Arising KMS failures have largely been attributed to an overemphasis of IT. A 2014 study among KM experts worldwide, hence, stresses the growing importance of enabling interactive KM technologies with priorities set as: combining human and technological factors, effectively using appropriate tools and systems, focusing on practical relevance and systematic instruction, and bridging of generational divides [44,45].

A differing reason cited for failing KM systems is their pre-dominant premise of knowledge-as-a-resource which exists prior to practice or is capturable and storable independent of practice to be transferable between people without variances. The complementary approach suggested focuses on knowledge-as-a-process or the capability of 'knowing' [46] emphasizing experience representations to support practice by describing "the actual knowledge item (e.g., a problem and a solution), the contexts in which it has been extracted and applied and information about its validity in these contexts" [47].

Accordingly, 'Experience Management (EM)' - as a special form of KM - incorporates the "methods and technologies that are suitable for collecting experiences from various sources (documents, data, experts, etc.), recording/packaging, reusing, adapting, and maintaining experiences - including the respective organizational and social measures" [47].

The results of a 2016 online survey among managers in German-speaking countries confirm the status of experience as an important resource for success and productivity (85%) and for fostering innovation (50%). However, it also revealed that little is done in terms of systematic support (if it implies additional effort) or by IT (possibly due to the articulated wide-spread disenchantment with modern KM methods) [48].

Unfortunately, such misguided or implied lack of organizational efforts are failing the underlying KM/EM premise of "enabling people to obtain relevant, context-rich information, and connection with appropriate experts easily, when they need it, so that they can be more effective doing their unique jobs" [49]. But, by not delivering on their promises, KM investments are also, of course, not getting the necessary acceptance from the work force and its leaders.

Counter-productively, KM's current status quo neither lives up to the new era of knowledge workers' portable, mobile skills and competencies nor to the emerging trend to decide autonomously "on where, how, and for whom [individuals] will put their knowledge to work" [50]. Professionals will be increasingly eager to carry - while moving from one project or responsibility to the next - their particular Personal KMS version with them, presenting them with the sovereignty to develop their personal expertise systematically and sustainably and to voluntarily share it with associates and institutions close to them. Current KM market configurations, however, exhibit a range of potent barriers [51] which prevent Knowledge Workers as well as Knowledge Societies from accessing the full potential of digital opportunities [5,52].

4 Experience Management and PKM System Support

The performance, capability, and further empowerment of knowledge workers depends on cumulatively synthesizing and reflecting on countless small iterative individual 'nano-actions' with their quality determined by their actor's competences and skills, his/her individual intellectual, social, and emotional capitals as well as the structural Intellectual Capital (IC) assets available to him/her (e.g. PKM System). In turn, the accumulation of these innumerable individual 'nano-actions' govern - if effectively combined, consolidated, and proceduralized - any viability and advancement of organizational (knowledge economy) and societal performances (knowledge society) [53].

Wiig's grass-roots 'nano-action' thinking fits well with the Memetics' perspective and affords a transparent point of departure for promoting digital Personal KM and EM. Since the knowledge-as-a-resource view has been briefly covered in sections 1.1-1.3 and detailed in prior publications [6,1], the focus in the remainder of the paper shifts to the 'knowledge-as-a-process' experience-practice-in-context scenario alluded to.

4.1 Experience & Procedure: The Logic of Use versus The Logic of Functioning

As a brief EM introduction and base for further discussion, Brezillion's and Pomerol's differentiation in a Logic of Use (activity and practices which foster growing experiences) and a Logic of Functioning (institutional efforts to organize tasks and establish procedures) has been visualized in figure 2 [54,55].

Actors confronted with a problem or charged with an assignment are facing a situation in a specific context (defined as "what constrains something without intervening in it explicitly" [55]). The contextual elements encountered - depending, for example, on agents' preferences, the assignment's brief, or resources available – are considered as either external knowledge or contextual knowledge with only the latter to be deemed relevant for a potential solution and, hence, ensuing further analysis (establishing a current focus of attention). The relevant elements are organized into a plan of action (proceduralized context) to carry out related practices in a systematic manner in order to arrive at a satisfactory solution. Failures might occur due to misjudging situational complexities, dynamic events and interventions, or conflicts among collaborative agents.

A problem or assignment successfully solved might be documented in form of a procedure (a described sequence of reasoning or secure actions) in order to assist tackling similar tasks and/or other not equally experienced agents. Establishing a procedure requires identifying the reusable part of the successful practice and solution, a generalizing (decontextualization) of the approach taken to fit a wider class of tasks, and – as stated in section 3 - describing "the actual knowledge item (e.g., a problem and a solution), the contexts in which it has been extracted and applied, and information about its validity in these contexts" [47].

A similar problem or assignment in the future is now able to trigger the utilization of the procedure which, however, needs to be adapted or tailored (contextualized) to be integrated in the appropriate practices (proceduralized context) in order to fit the specific work context as described in the second paragraph of this section.

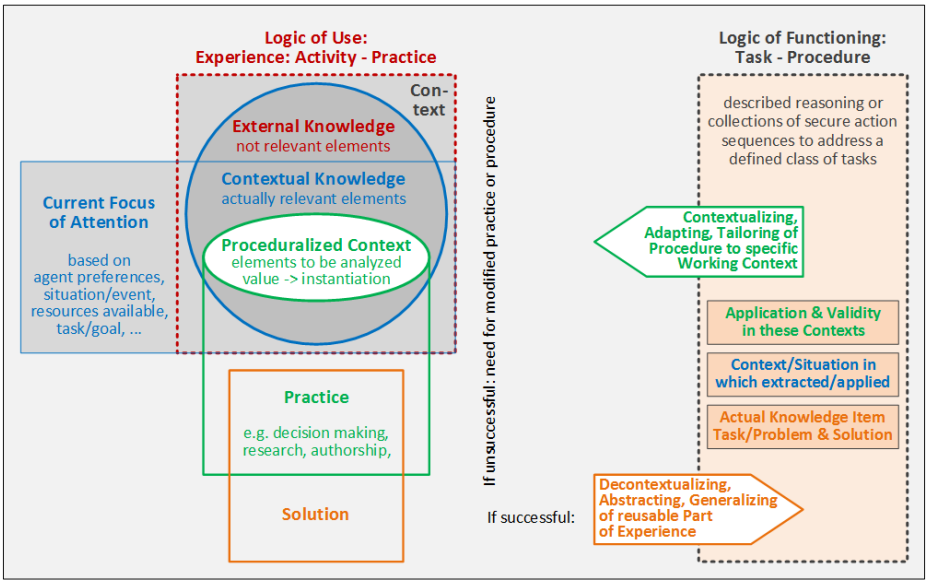

Figure 2: Experience, Context, and Procedures [based on 54,55].

4.2 Assistance for Practicing: The Affordances conferred by the PKM System

Based on the understanding formed in 4.1, several affordances can be identified where and how the PKM concept and system is supporting EM's requirements. To provide a systemic account, figure 3 presents a complimentary perspective to the 'bird-eye' visuals alluded to and repurposes Boisot's Information Space Model[7] [11] as the basis[8] to depict the relevant PKMS workflows and processes. The example is based on the task of answering a 'Call for Papers (CfP)':

- **1A** (codified document with linear sequence of embedded memes and external references covering semi-abstract content): The CfP attracts the attention of a PKMS user and triggers initial vague ideas for a hypothesis to be researched and/or a paper to be submitted. Relevant memes from the CfP and initial ideas are captured in the PKMS.
- **2V** (non-codified abstract memeplexes): To guide this endeavor, the user might look for an appropriate methodology to follow, capture or select (if already available in the PKMS repository) the methodological steps and link them to the stored 1A-memes.
- **3P** (codified generalized procedures): For adapting and tailoring (contextualizing) the chosen procedure in line with the CfP and the personal and external circumstances, the user is afforded PKMS-features of capturing his/her forethoughts and intentions to be

[7] Boisot's original 'Information Space' or 'I-Space' model entails a three-dimensional matrix formed by the axes of codification, abstraction, and diffusion. The original model depicts the dynamic flow of knowledge assets following a 'Social Learning Cycle' through six phases: scanning, codification, abstraction, diffusion, absorption, and impacting [11].

[8] Boisot's dimension of diffusion had to be substituted by the scale of embeddedness (referring to memes in single or combined states, or in complex knowledge assets).

subsequently followed by self-evaluations and reflections, depicted in figure 3 as **0U** (codified, abstract, concrete, semi-embedded memes).
⇨ EM Logic of Functioning leads to ⇨ EM Proceduralized Context

- Followed by incremental and iterative tasks 4I to 8F to carry out ⇨ **EM Practices:**
  - **4I**: External facts are identified via desk research or by locating relevant memes stored in one's own or accessible external PKMS repositories. They are captured and/or linked to the appropriate task-specific memes.
  - **5Q**: People are observed or questioned via field research. The transcribed notes are handled in the same manner as 4I above.
  - **6C:** Own ideas, insights, and interpretations are formed, captured, or revised according to the eight Rs stipulated (figure 1). Apart from authorship, these activities also incorporate project scheduling and management, including (1) searching, identifying, finding, contacting, observing, screening, filtering, evaluating and documenting of sources, (2) reassessing memes and relationships already captured in light of potential new hypotheses, assumptions, and information needs and gaps, (3) maintaining to-do-lists and progress reports concerning the quantity and quality of work outstanding with deadlines and responsibilities for completion at any aggregation level of memes or relationships.
  - **7R**: Paper drafts emerge and evolve, further facilitating a progressing learning curve leading potentially to the revision of initial plans and intentions, including the realization that facts, theories, or methods needed are not available or too costly to obtain and have to be developed by oneself or with expert assistance.
  - **8F**: Responses from peers or evidence provided can further strengthen the draft paper or report. In recurring or action-research style projects, co-workers' or clients' feedback may cause the need for re-work, expansion of the initial agenda, investigations of alternatives and next steps, or the continuous monitoring and reporting of dynamic processes, causing changes of the overarching goal, theory, mental model, or concept or the triggering or cancellation of further activities.

- **0K** (codified, abstract, concrete, distinct memes/topics): To support self-reflection, retention as well as the creative conversations taking place in a PKMS user community, keywords, topics, scripts, roles, and meme types (as used by Rs 2, 4, 6, 8 in figure 1) provide opportunities to classify and cluster any meme and content[9].

[9] The memes captured during the project qualify as information since they represent Data, Relevance, and Purpose. However, the two latter categories only apply in regard to the actor's mind. This tacit (internalized) know-why has to be made explicit (externalized for better retention later or to be more useful to others) by placing the items into context, formatting, interpreting, or summarizing them. It means creating links to the PKMS classification systems (also by adding own keywords) or by adding notes to the contents and references. This process of integrating the memes into relevant frames of reference (topics and scripts) or documents (knowledge assets and containers) further advances memeplexes and creates knowledge.

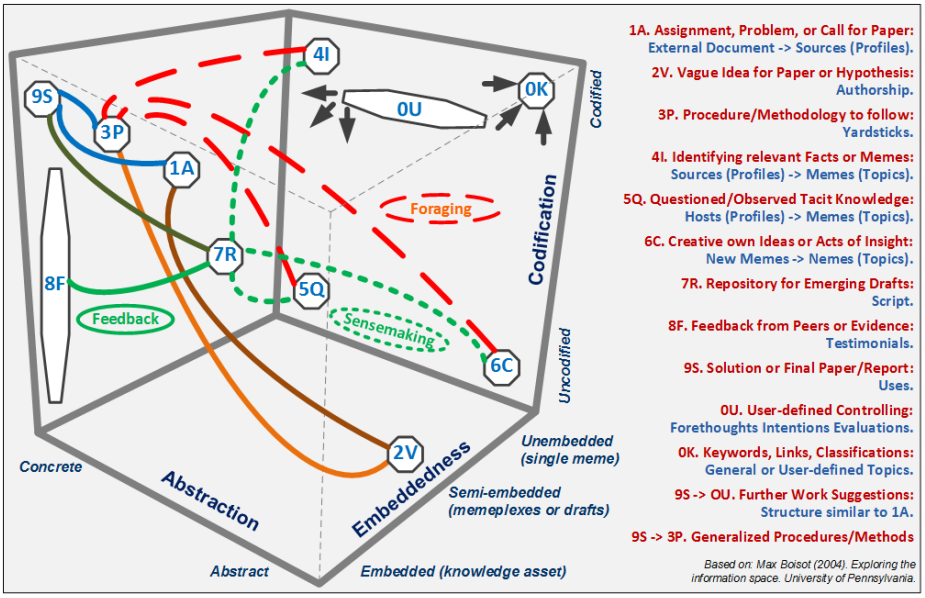

Figure 3: Experience and Context-related Workflows shown in PKM's I-Space

- **9S** (codified document with linear sequence of embedded memes and external references covering concrete content): The final paper submitted presents an initial solution which might have to be revised in response to the peer reviewers' recommendations. ⇨ **EM Solution**
- **9S/OU** (structure similar to 1A): Further work suggestions for the road ahead might be included in the paper or to be captured in the repository for following up in the future.
- **9S/3P**: Additionally, the user might like to amend or newly establish a procedure for future reference bearing in mind the needs for decontextualization alluded to. The PKMS 'Yardsticks' knowledge base stores generic standards and heuristics to assist structured activities. They are either supplied by the PKMS vendor, external agents, or collected by the PKMS user over his/her life time of experience. They cover knowledge management activities as well as other areas, for example, criteria for accreditations or performance management appraisals for assessing institutions, programs, and staff. ⇨ **EM Procedure**

The distinction of PKM Systems, in contrast to its organizational counterparts, "is to enable self-reflecting monologues of its user over life-long-learning periods of educational, professional, social and private activity and experience. In these conversations with self, the knowledge under review is biographically self-determined and presents itself as a former state of personal extelligence captured […] in external extensions of the individual knower's mental storage capacity. Thus, in a personalized setting, the Utopian idea mentioned by Wilson [56] converts into a workable scenario where individuals are indeed autonomous in the development of their expertise, and where they can determine how that expertise will be used or exchanged with people, communities, or organizations close to them" [51].

4.3 Reflection & Conversations: The Constraints of Redundancy and Linearity

Today's knowledge and academic reputation tracking is still based on traditional paper-based citation systems [33,27,57,58] and on the ontology of paper and books as their containers [59,60] justly criticized for their profound shortcomings. The digital repositories established have been fortified by 'walled garden' apps and platforms, counteracting an open and connective web and pleads for a 'new era of networked science' [27]. A silo-mentality has been created based on proprietary digital formats or incompatible semantic ontologies [36] and, as alluded to, "the over-simplistic modelling of digital documents as monolithic blocks of linear content, with a lack of structural semantics, does not pay attention to some of the superior features that digital media offers in comparison to traditional paper documents" [21]. As noted by Mintzberg [61], the continuing fixation on the outdated book-age paradigm still compels us to provide linear accounts of a nonlinear world.

The novel PKM concept and system offer an alternative. It merges distinctive voluntarily shared knowledge objects/assets of diverse disciplines into a single unified digital knowledge repository allowing for concretizing Popper's abstract World 3 [9,1]. Every shared knowledge item becomes available in its unique meme-representation ready to be utilized for learning, curation, and authorship. While any document or book-like publication can be displayed in its linear structure based on its wholly stored memes and relationships, accessing its virtual copy stored in the PKM repository provides access to the information-rich, multi-dimensional, and transdisciplinary neighborhood of its individual memes based on the relationships of its original author[10] and the subsequent additions of the PKMS community.

Figure 1 has focused on a meme linked to its directly related meme neighborhood (labelled as a memeplex). By shifting the PKMS focus on any of these related memes, the system's attention moves to the particular neighbor and its memeplex representation. Thus, 'Associative Indexing' allows for the easy forward and backward traceability of content (as briefly alluded to in section 1.3 and covered in more detail in a prior article [23]). Since any meme captured or its closer or wider neighboring memes are to be utilized further in the future according to the eight reuse methods (figure 1), the nets of causative references are constantly connecting and evolving in number, scope, and quality[11], but without the currently experienced mounting redundancy, fragmentation, inconsistency, untraceability, corruption, and decay of web-based content [1].

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[10] Citing Bush: An "inheritance from the master [author] becomes, not only his additions to the world's record, but for his disciples the entire scaffolding by which they were erected" [33].

[11] "The PKMS knowledge base and functionalities have been populated and tested with a variety of data sets, including, for example, the author's PKMS publications with their external and self-references; personal contact bases and libraries; personal chronological biographies and family trees; cocktail database; directories of journals, universities, cities, regions, and countries; 'Excellence in Research for Australia (ERA)' database sets; industrial classification systems; standards, criteria, and self-assessment for MBA accreditation" [1]. After completing the test phase of the prototype with its currently 40,000 records, its transformation into a viable PKMS device application and a cloud-based WHOMER server based on a rapid development platform and a noSQL-database is estimated to take 12 months.

5 Conclusions and the Road ahead

The paper emphasizes the authors' view, that KM is currently ill-equipped to tackle the developmental challenge of attention depletion and experience management which is impairing the personal, institutional, and societal fabrics of our emerging Knowledge Economies. The novel PKM concept and system offers an alternative. It merges distinctive voluntarily shared knowledge objects/assets of diverse disciplines into a single unified digital knowledge repository which also opens up new avenues for education.

On the one hand, the availability of these features provides the means to tackle the widening opportunity divides by affording individual knowledge workers with continuous life-long support from trainee, student, novice, or mentee towards professional, expert, mentor, or leader, but might also elicit a profound disruptive market impact[12] [62,63]. On the other hand, the novel PKMS approach adds transparency and momentum to the creative digital asset production and value creation and, with it, to the evolution of knowledge at the personal, institutional, and societal level. In a co-evolutionary PKMS-OKMS context, it is also bound to strengthen the absorptive capacity, ambidexterity, and resulting dynamic capability of organizations considerably, not at the expense of disinterested employees but as a means to motivate them by serving their very self-interests [6,43].

With its emphasis on knowledge-as-a-process and experience management, this article not only contributes to informing a diverse portfolio of audiences about the PKM concept (and the shortfalls of traditional KM), but also to the forthcoming educational activities. The PKM concept covers a multitude of renowned KM methodologies and practices; what might have appeared initially as difficult to reconcile or at odds has been integrated for serving the overarching PKM system architecture. Accordingly, the over thirty publications have been pitched at envisaged face-to-face and e-learning KM course modules, are already part of the PKMS knowledge repository and are about to be aligned to an established Learning Management System [64]. The KM-relevant content gathered allows for KM education in a transparent and coherent manner, including the rationale for how and why some of the original methods had to be adjusted, extended, re-purposed, or merged.

Further publications and posters are also under review or planned addressing a PKMS Sustainability Vision, demonstrations and tutorials/workshops, and how the PKMS concept compares to, can make use of and add to semantic web technologies.

6 REFERENCES

Unique letter designations have been assigned chronologically to differentiate the author's multiple publications in any year and are used consistently for referencing

[12] The current status quo can be well compared to the database market thirty years ago. When faced with the problem of compromised integrity and unmaintainable redundancy, earlier flat file databases were replaced with RDBMS's normalized table structures.

across all publications for better reader guidance. There are gaps in this paper, since not all publications have been referenced.

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