

# HOW THIS PAPER HAS BEEN CREATED BY LEVERAGING A PERSONAL KNOWLEDGE MANAGEMENT SYSTEM

Ulrich Schmitt

University of Stellenbosch Business School, South Africa  
P.O. Box 802, Gaborone, Botswana

## **Abstract**

The changing spheres of work demand innovative responses for the self-development of the growing creative class, but institutions seem to be unable to rethink themselves fast enough for these 21<sup>st</sup> century challenges. The question arises: ‘How can the emerging knowledge societies and knowledge workers be better served?’

The author argues for autonomous Personal Knowledge Management (PKM) devices to make the crucial next difference by providing overdue support tools for the problems faced today and an enabling environment for the creative conversations needed tomorrow. The concept proposed gives preference to grass roots, bottom-up, lightweight, affordable, personal applications and furnishes users with the means to aid life-long-learning, resourcefulness, creativity, and team-work throughout their academic and professional life and as contributors and beneficiaries of organizational performance. Due to this technology, a future emerges of autonomous PKM capacities networked in continuous feedback loops, where the individuals are able to determine how their expertise will be used or exchanged with people, communities, or organizations close to them. Such a scenario also provides a wealth of appealing opportunities for other stakeholders in the educational, professional, and developmental context.

With a prototype system about to be converted into a commercially viable PKM system, a series of related papers have been recently published. This paper adds a hands-on perspective and shows how the concept is applied by utilizing the prototype for its creation, by describing the iterative process steps involved, and by visualizing them within the Ideosphere of Boisot’s Information-Space Model.

**Keywords:** Creative Class, Educational Support, Future of Work, Knowcations, Memes, Personal Knowledge Management, Personal Knowledge Management Systems.

# 1 ‘KNOWCATIONS’ AND ITS DUAL REALITY AS SYSTEM AND MEME

The aim of the Personal Knowledge Management System-in-progress (PKMS) to be presented in this paper is to provide knowledge workers with overdue support for aiding life-long-learning, resourcefulness, creativity, and team-work throughout their social, academic, and professional life and as contributors and beneficiaries of organizational and societal performance.

The name crafted for the PKMS prototype is the artificial word ‘Knowcations’ made up of KNOW as a reference to knowledge and know-how and CATIONS as an intended association to the locations or spaces as well as to the vocations or abilities which are vital to further our expertise and careers.

According to Memetics<sup>1</sup>, ‘Knowcations’ qualifies as a Meme<sup>2</sup> which has already morphed into Memeplexes<sup>3</sup> by forming symbiotic relationships with other memes (e.g. PKMS, Information-Space, or Business Plan) and also manifested itself as Registered Trademark, Web Domain, Company Trading Name, and Logo.

To live on, memes have to be able to survive in the medium they occupy and the medium itself has to survive. They can either be encoded in durable vectors (e.g. storage devices, books, great art, major myths, or artefacts) spreading almost unchanged for millennia [1], or they succeed in competing for a host’s limited attention span to be memorized until they are codified (externalized) or spread by the spoken word to other hosts’ brains with the potential to mutate into new variants [28] as depicted in figure 1.

The number of memes sequenced in this paper (contents as stored independently in the PKMS knowledge base) totals 107 memes plus 76 text or figure references to sources.

---

<sup>1</sup> Memetics is the study of ideas and concepts viewed as ‘living’ organisms, capable of reproduction and evolution in an ‘Ideosphere’ [26] which forms an “invisible but intelligible, metaphysical sphere of ideas and ideation” where we engage in the creation of our world. “This means that the substance of the world is idea, which forms, reforms, and transforms itself via the conversations of humankind, synergetically organizing itself as an evolutionary, multidimensional network [with technology just an artefact of idea]. The problem, however, is that the majority of humanity remains the consumer of ideas without being the producer”. Hence, Kimura [16] calls for an ideospheric transformation set off by a synergetic phenomenon that emerges “when individuals in sufficient numbers become authentic, independent thinkers, that is, originators of ideas, producers of dialogues, and contributors to the network of conversations that comprises the world” [28].

<sup>2</sup> Memes were originally described by Dawkins [8] as units of cultural transmission or imitation. They are (cognitive) information-structures that evolve over time through a Darwinian process of variation, selection and transmission. Able to self-replicate by utilizing mental storage in human hosts, they influence their hosts’ behavior to promote further replication. From the meme’s-eye view, every human is a machine for making more memes, a vehicle for propagation, an opportunity for replication and a resource to compete for. But, memes exist only virtually and have no intentions of their own; they are merely information pieces in a feedback loop with their longevity being determined by their environment [28, 1, 6, 2].

<sup>3</sup> To gain an advantage in competing for attention and survival, it pays to form symbiotic relationships with other memes (memeplexes) to mutually support each other’s fitness and to replicate together. The full diversity of memes accessible to a culture or individual is referred to as Meme Pool [11].

## 2 FEATURES AND LEARNING CYCLES OF THE PKMS ‘IDEOSPHERE’

The knowledge bases of the PKM System prototype capture memes, rather than whole documents<sup>4</sup>. Consequently, what is stored and what we have to refer to, is much more compact and distinct, a basic building block of knowledge in the eyes of the beholder (the meme). Captured best in a quasi-atomic state, this information-structure should be perfectly understandable alone by itself but be able to be used at any later time in combination with other building blocks stored without piggybacking irrelevant or potentially redundant information. As Koch [17] reminds us, not the physical script matters but the ideas it contains; "It must be valued, either for its own intrinsic appeal or because it can help to deliver other things that people want, or help to deliver them at a higher quality level or using fewer resources". Any meme captured in a pure or pre-edited state has to be enabled to further evolve as a referenced, re-purposed, and/or already re-combined memeplex version according to the user’s individual preferences and objectives.

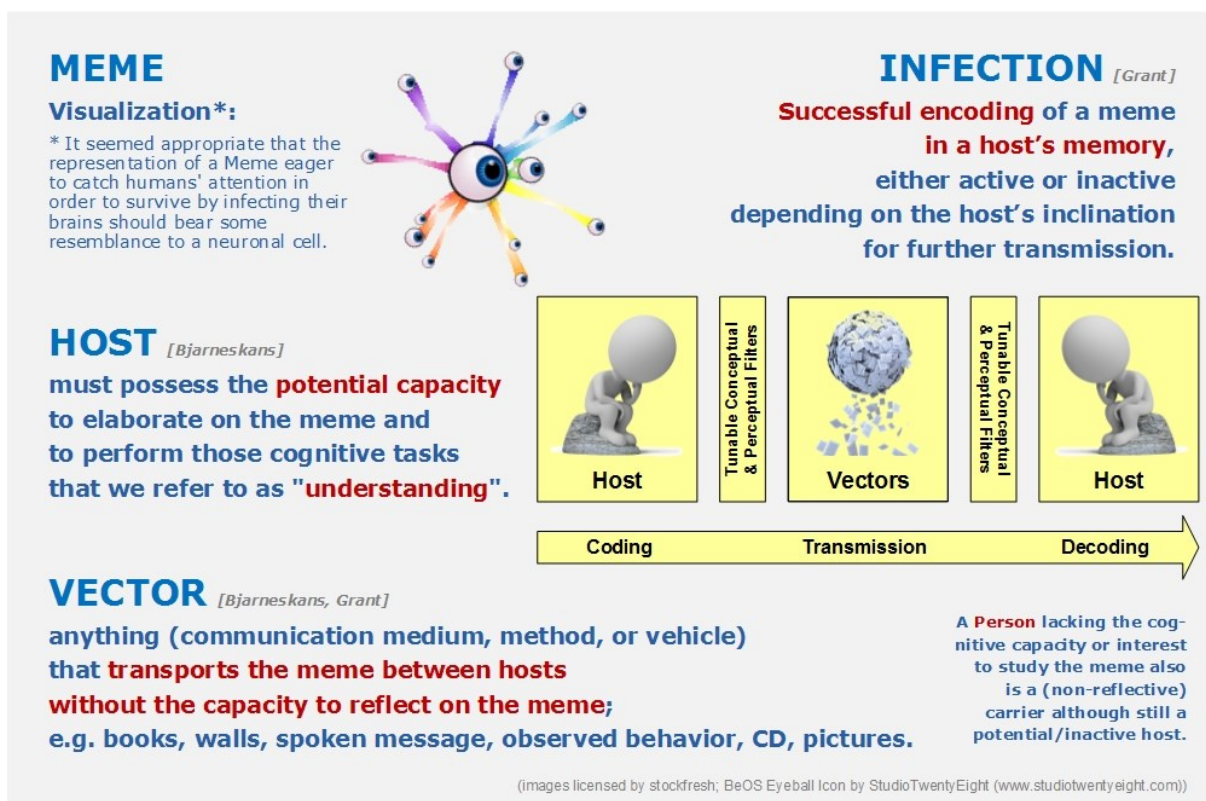


Fig. 1 The Transmissions of Memes between Hosts via Vectors.

<sup>4</sup> If memes and their inbuilt ideas are able to flourish in a virtual ‘Ideosphere’ as their habitat of operation, Personal Knowledge Management Systems aiming at developing 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’ [28].

Thus, the meme-based PKMS focuses on the relevant textual, visual, audio, or video memes a document or message contains, conserves them with their relevant frames of references (e.g. origins, titles, formats, licenses) and embedded in a more-dimensional classification system for subsequent easy retrieval. By digitally capturing, referencing, and visualizing these basic information units, the system allows the user to recall, edit, sequence and combine stored units with his/her own new meme creations ('nemes') for integration in any type of authoring and sharing activity he/she would like to pursue. As a result, the user obtains the means to retain and build upon knowledge acquired in order to sustain personal growth and facilitate productive contributions and collaborations between fellow learners and/or professional acquaintances [28]. This novel meme-based approach entails a departure from current document and knowledge management practices.

The 'Ideosphere' where these iterative processes take place as continuous learning cycles has been visualized in figure 2 using a three-dimensional matrix, known as an Information or I-Space<sup>5</sup>. The I-Space incorporates the cycles with their PKMS's key constituents which include a foraging loop<sup>6</sup> {steps 1-2} and sensemaking loop<sup>6</sup> {steps 3-8} as well as added PKMS support functions {steps a to k}.

'Knowcations' I-Space has been subdivided into five levels (from bottom to top):

1. Part of the meme pool inhabiting hosts as uncodified and tacit knowledge.
2. Memes codified in vectors as part of the private and shared World Extelligence<sup>7</sup>.
3. Personal Extelligence captured representing Intellectual<sup>8</sup> and Social<sup>8</sup> Capital.
4. The user's individual Intelligence<sup>7</sup> and Emotional<sup>8</sup> Capital.
5. The combined shared knowledge bases of networked users based on the linkages to other compatible autonomous PKM systems resulting in shared repositories, collaborative opportunities, and creative conversations.

---

<sup>5</sup> Boisot's '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 [4].

<sup>6</sup> The Foraging and Sensemaking Loop form a cornerstone in Pirolli's and Card's 'Notional Model of the Sensemaking Loop for Intelligence Analysis' [24]. A prior paper [34] demonstrated that these two model loops are fully supported by the PKMS concept; the associated terms are co-used whenever applicable.

<sup>7</sup> Stewart and Cohen introduced the term 'Extelligence' for externally stored information; it represents the cumulative archive of human cultural experience and know-how accessible and augmentable by any individual who knows how. In their concept, Extelligence forms the external counterpart to the intelligence of the human brain/mind and deals in information whereas intelligence deals in understanding; together they are driving each other in a complicit process of accelerating interactive co-evolution [38].

<sup>8</sup> In 'The Shift', Gratton [12] analyses the changing patterns of work and assesses the implications for professionals. Her advice is to write a personal career script that can bring fulfillment and meaning by attending to and growing one's three sources of human capital: Intellectual, Social, and Emotional Capital.

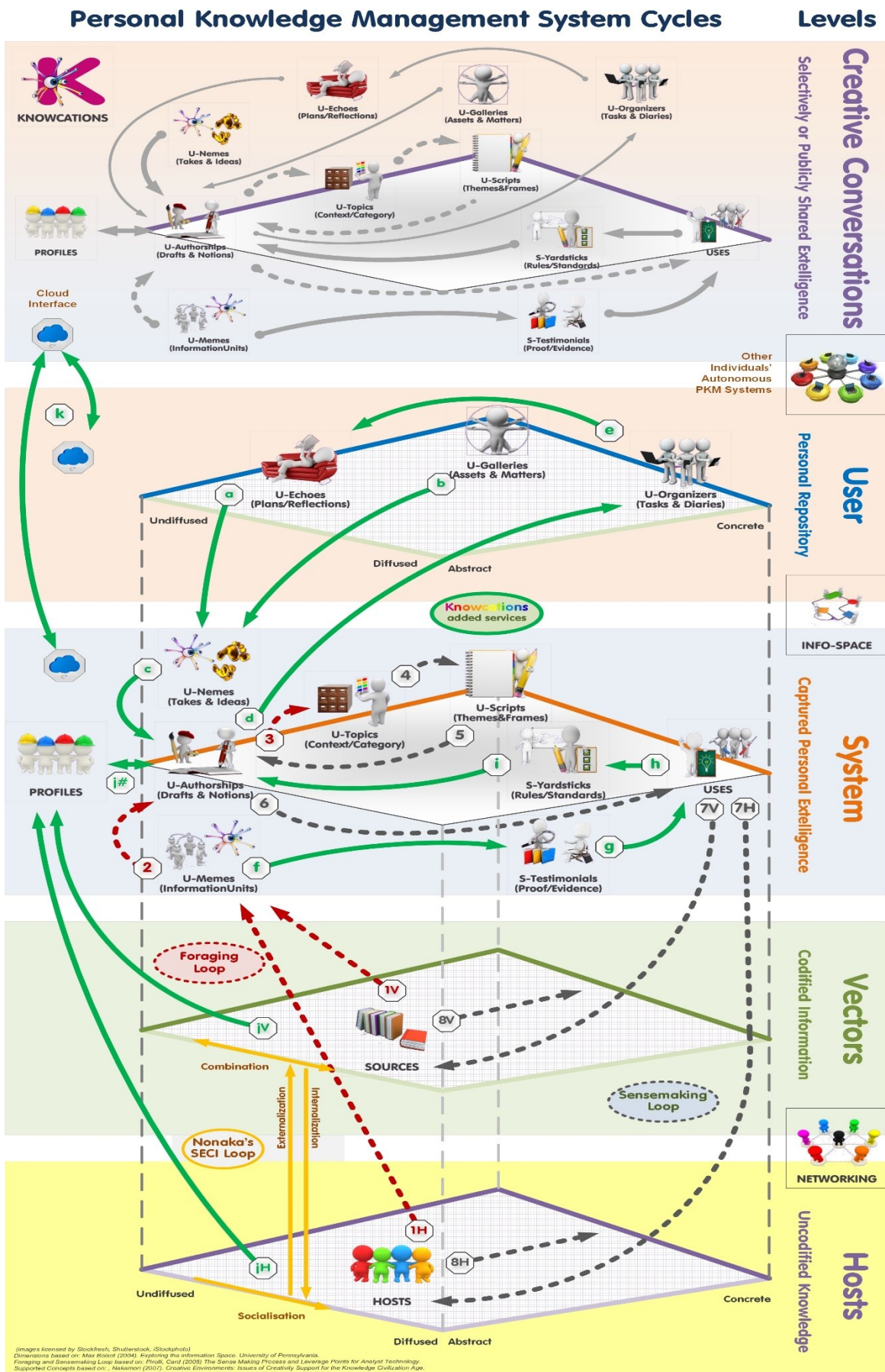


Fig. 2 PKM's 'Ideosphere' shown in the Information Space [28].

### 3 SUPPORTING THE CREATIVE CLASS OF KNOWLEDGE WORKERS

In ‘What matters now’, Hamel states: “Today, no leader can afford to be indifferent to the challenge of engaging employees in the work of creating the future. Engagement may have been irrelevant in the industrial economy<sup>9</sup> and optional in the knowledge economy<sup>10</sup>, but [in today’s creative economy<sup>11</sup>] it's pretty much the whole game now” [14].

These profound shifts in our perception of working and living have been triggered by the progress and widespread diffusion of Information and Communication Technologies (ICT) and its global impact on organizational, commercial, social, and legal innovations.

Florida [10] describes the effects in the ‘Rising Creative Class<sup>11</sup>’. With the evolving clusters of domain-specific knowledge and the growth in specializations, “the vertical hierarchy and traditional career ladder have been replaced by sideways career moves between companies, [a more horizontal division of labour], and a horizontal labour market”. The identification of people has shifted from their company to their occupation and profession and, unlike manual workers, they are able to choose where, how, and for whom they will put their increasingly distinctive<sup>12</sup> and mobile knowledge and expertise to work [25].

However, time and concentration to become masterful<sup>13</sup> is in short supply. The familiar past problem of information scarcity (few sources/channels, high associated costs) has been substituted by a never before experienced ever-increasing attention-consuming<sup>14</sup> information abundance<sup>15</sup>. Work is undergoing a process of fragmentation which will continue to accelerate [12].

---

<sup>9</sup> Just a century ago, Frederick W. Taylor, considered to be the father of scientific management, stated: “In our scheme, we do not ask the initiative of our men. We do not want any initiative. All we want of them is to obey the orders we give them, do what we say, and do it quick” [40].

<sup>10</sup> “In the world of the modern knowledge worker, it has become necessary for individuals to maintain, develop and market their skills to give them any chance of competitive advantage in the job market in both the short and long term” [23].

<sup>11</sup> In addition to the traditional division of the workforce into an agricultural, working, and service class, Richard Florida introduced the concept of the Creative Class as a rising and driving force of economic development. Estimated to be one third of the workforce in the United States, their economic function is to create new ideas, new technology, or new creative contents as well as to engage in complex problem solving that involves a great deal of independent judgment and requires high levels of education or human capital [10].

<sup>12</sup> Florida [10] refers to Barley’s observation that bosses – unlike in the old days – do not know their business better than their subordinates any more.

<sup>13</sup> Gratton cites psychologist Daniel Lvitin's study of people who have achieved mastery in their role as composers, basketball players, fiction writers, ice skaters ... and master criminals. Lvitin found that, despite their very different areas of skill, they shared a common capacity “to concentrate on developing their skill for long periods of time.” Lvitin estimated it to be 10,000 hours for how long it takes to achieve mastery [12].

<sup>14</sup> As Simon [37] already noted over forty years ago, the “wealth of information is creating a poverty of attention and with it a need to allocate that attention efficiently among the overabundance of information sources that might consume it”.

<sup>15</sup> “In 2008, Americans consumed information for about 1.3 trillion hours, an average of almost 12 hours per day. Consumption totaled 3.6 zettabytes and 10,845 trillion words, corresponding to 100,500 words and 34 gigabytes for an average person on an average day” [3].

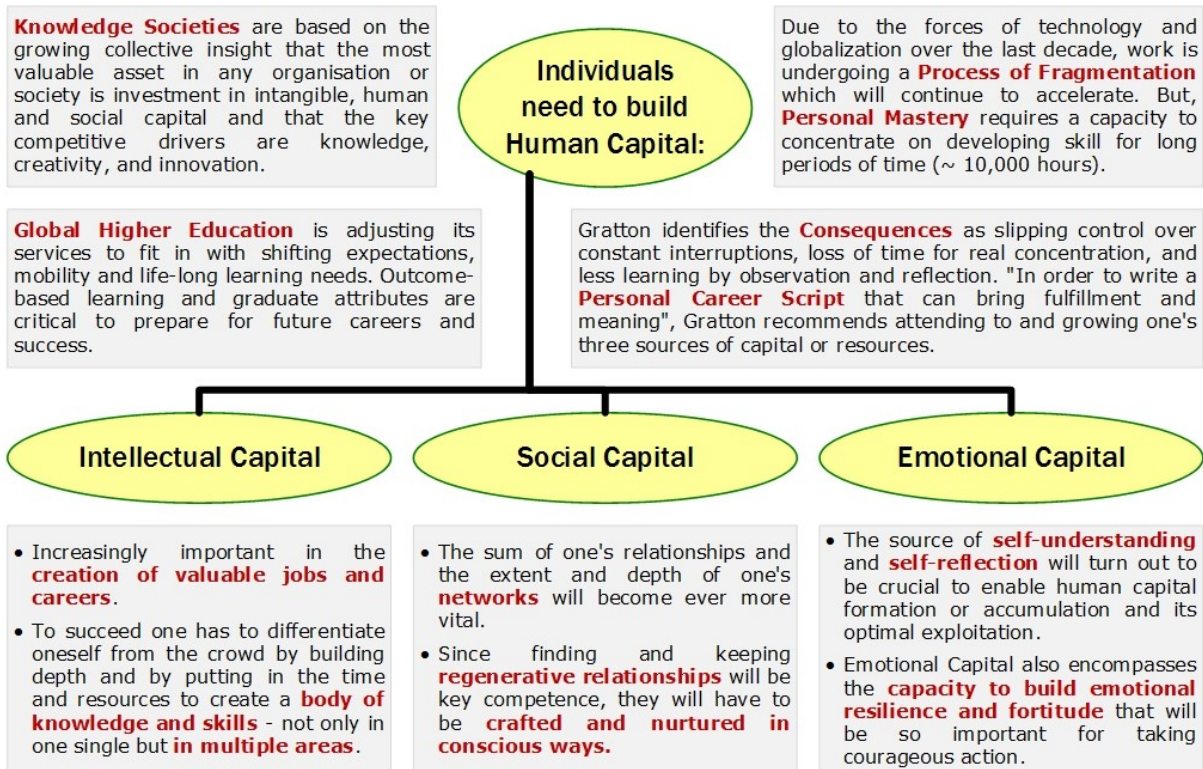


Fig. 3 Gratton's Three Sources of Capital or Resources [12, 32]

Consequently, a PKMS has to cover two kind of needs. Firstly, as knowledge workers move from one project, learning experience, or responsibility to another, it seems obvious, they would appreciate their own portable KM System with their accrued capitals at their disposal. Secondly, self-development and self-reflection have to be encouraged by being able to assess one's knowledge and ignorance as well as by setting priorities for the further development of one's capitals (figure 3). The latter can be based on an understanding of the Extended Ignorance Matrix (as summarized in figure 4) which has been introduced with six learning cycles to follow and seven wastes to avoid in a prior paper [33].

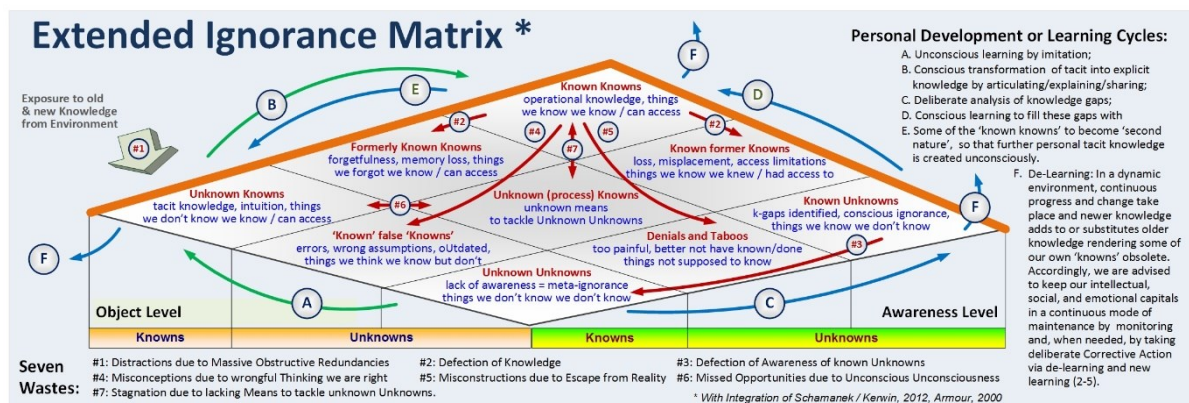


Fig. 4 From Unknowns and Knowns - The Extended Ignorance Matrix [33]

## 4 SUPPORTING RECALL, SENSEMAKING, EXPRESSIVE CREATIVITY

The ‘Knowcations’ idea originated<sup>16</sup> during the author’s PhD studies in the early 90s. Since then, the resulting prototype has been continuously expanded and used personally for career support as a management consultant, scholar, professor, and academic manager.

With the development platforms and cloud-based services available now, an innovation opportunity has presented itself for converting and advancing the prototype into a commercially viable PKM system across multiple platforms benefitting individuals, institutions, and society.

In parallel to this ongoing software engineering and migration process, over a dozen recent papers published, accepted, or currently under review have explored related PKM issues<sup>17</sup> and also formed one of the case bases to be used for system demonstrations.

Before the PKMS was employed, the author (referred to as user from now on) - like most of us - had taken copies and stored them in diverse arrays of devices or had made mental notes only. Over time, copies deteriorated, memories faded and with it the ability to recall the locations and contents of these fragmented personal knowledge inventories and archives. Nevertheless, one is unable to part with one’s accumulated hard and soft copies which slowly but steadily lapse from potential value towards dead ballast<sup>18</sup>.

With a PKMS, interesting memes encountered can be stored in a more appropriate manner. Currently, 2,882 of the memes populating the Knowledge Base are actively contributing to the PKMS theme and combine to 15 publications referencing 164 sources and their 168 authors. The memes have been incorporated in the papers to a varying degree<sup>19</sup> as either an original or modified version based on this paper’s authoring cycle to be further detailed {labels in curly brackets below will reference respective cycle steps and knowledge bases depicted in figure 2}.

---

<sup>16</sup> The need for such PKM devices has been articulated already back in 1945. Vannevar Bush (then President Truman's Director of Scientific Research) imagined the ‘Memex’, a hypothetical sort of mechanized private file/desk/library-device. It is supposed to act as an enlarged intimate supplement to one’s memory, and enables an individual to store, recall, study, and share the “inherited knowledge of the ages”. It facilitates the addition of personal records, communications, annotations, contributions as well as non-fading trails of one’s individual interest through the maze of materials available - all easily accessible and sharable with the Memexes of acquaintances [5]. Davies acknowledges that “PKM is a real and pressing problem”, but also concludes - sixty-six years later - in ‘Still building the Memex’: “Yet it does not appear that Vannevar Bush's dream has yet been fully realized on a wide scale” [7].

<sup>17</sup> In acknowledging the transdisciplinarity of the PKM notion, the papers received feedback from and addressed a wide scope of conference themes, including Knowledge Management and Knowledge Technologies, Management and Social Sciences, Higher Education and Human Resource Development, Innovation and Creativity Support Systems, Organizational Learning and e-Learning, as well as Future Studies.

<sup>18</sup> The Extended Ignorance Matrix (figure 4) identifies this effect as Waste #2, ‘Defection of Knowledge’ which marks the lapse of ‘known Knowns’ into ‘formerly known Knowns’ or ‘known former Knowns’ [33].

<sup>19</sup> The sources most cited (25 times each) in all 15 publication are Levy [19], Gratton [12], and Steward and Cohen [38] closely followed (24 times each) by Boisot [4] and Wiig [39].



#### *4.1 Foraging Loop: Knowledge Identification, Acquisition, and Preservation {1-3}*

Memes are uncovered via desk research {1V} or field research {1H}, but are usually packaged or absorbed in complex ways inside larger vectors {Vectors} or recorded conversations and observations {Hosts}. The user collects the relevant material from the sources accessible to him/her and stores it in a Shoe Box or Case File {U-Memes}. The outcome will resemble a disorganized pile of memeplexes<sup>20</sup> in need of further examination.

Then, based on his/her interests, knowledge and editorial literacy, the user consciously selects suitable materials gathered, captures their memes' intended original 'messages' {2} and stores them in a dedicated Knowledge Base {U-Authorships}. To ease re-usability any meme captured and codified should be ideally, as pointed out already, in an atomic state which requires the variation and replication of an original meme in a creative manner. Additionally, references (e.g. origins, authors, publishers, contact details, titles, formats, licenses) are stored {jH, jV} in the knowledge base {Profiles} and linked {j#} to the respective memes {U-Authorships} in support of their searchability and referencing later.

To enhance their accessibility further, the user qualifies a meme by linking it to matching key words of a multi-dimensional classification system, made up of pre- or user-defined abstract Meme Types (e.g. area, concept, process, tool) or already created topics and memeplexes (e.g. decision methods, logistics, ecology) {3} to be stored in a Topics and Schema Base {U-Topics}<sup>21</sup>.

In order to represent the user's social capital, hosts (individuals, teams, communities, and organizations) can be linked to each other, further qualified as actors in research/project-related, industrial, service-oriented, and geographic settings, and/or linked to meme-accommodating vectors (knowledge sources and uses). Accordingly, a wide range of social relationships<sup>22</sup> can be expressed and called upon<sup>23</sup> by accessing the {Profiles} base.

---

<sup>20</sup> At this stage, the user is acting like any host with a limited attention span and memory, but with the potential cognitive capacity to single out and understand a meme, to elaborate on it, and to create groups of memes from diverse sources, mutually supporting each other for further replication. With a PKMS, however, this activity does not only take place mentally but is supported by the PKMS functionalities and the more reliable storage and retrieval facilities of the underlying knowledge base and engine [31].

<sup>21</sup> Thus, memes and/or sub-topics are only a few clicks away and can be more easily and speedily retrieved and repurposed. Because any entity with a focus is displayed on a user's screen with its immediate entity neighborhood, the more qualified memes stocked impart constant mental refreshers about their usage and are better memorized [31].

<sup>22</sup> The knowledge base, as indicated by its acronym P.R.O.F.I.L.E.S., allows for the recording of Professional Experience, Research Activities, Outcomes & Results, Formal Education, Innovation References (k-uses), Leadership & Achievements, Exploration References (k-sources), and Structural Relations [31].

<sup>23</sup> Already digitized information of relevant entities (e.g. directories, lists of ingredients) can be uploaded and integrated for convenience. Current datasets used include: World's Countries, Regions, and Cities; International Universities; ERA Journals and Conferences; Standard Research as well as Industrial Classification Codes; Higher Education Standards and Audit Criteria; Food, Cocktail, and Genealogical Datasets [31].

#### *4.2 Sensemaking Loop: Knowledge Goals, Development, Diffusion, and Use {4-8}*

During the authoring process, the accumulated meme pool is scanned to activate appropriate 'candidates' for composing a planned Script (e.g. article, lecture, or presentation) {4} to be stored in a Scripts and Hypotheses Base {U-Scripts}.

Any gaps will be filled with a provisional 'known-unknown' meme as a reminder for work to be carried out in order to direct the iterative processes alluded to {5}.

Any finalized script can be converted into a presentation, pdf or paper version for publication and wider distribution {6} and stored in a Report or Presentation Base {Uses} in order to be shared selectively or to become part of the public world extelligence {Hosts & Vectors}.

After publication and diffusion, the novel insights are shared by oral presentation from person-to-person {7H} or via newly codified vectors {7V} and lead to shared new learning experiences and behaviors. As a consequence, knowledge and memes are absorbed by the human brains of the people reached and can become 'intangible', 'uncodified', or 'tacit' knowledge {Hosts} as well as personal or organizational extelligence {Vectors}.

Eventually, the abstract knowledge absorbed makes an impact by becoming embedded in concrete practices, either in codified formats such as documents or products {8V} or uncoded formats such as unwritten rules or patterns of behavior {8H}.

#### *4.3 PKMS Support Functions: Knowledge Measurement and Management {a-i}*

The iterative process described {1-6} is driven by the user's intentions, self-understanding, and self-reflection. While individual performance histories (own and others) are recorded and tracked via the {Profiles} base<sup>22</sup>, three further bases at the {User} level are supporting the authoring projects in progress: the {Galleries} base keeps references to personal assets and matters of interest, the {Echoes} Base stores longer-term plans and objectives and related thoughts and responses, and the {Organizer} Base deals with shorter term tasks and diaries. Connected in a feedback cycle {a/b-c-d-e}, they allow for the scheduling and monitoring of progress via dedicated fields for comments and to-do-lists regarding any entity in the knowledge base. This way, outstanding 'work to be carried out' (meme gaps to be filled) is evaluated against progress, and decisions can be made or revised (e.g. if already captured memes have to be utilized, further suitable external memes need to be found, new memes have to be self-authored or re-purposed from personal repositories). This process also uses 'silent' (not to be published) memes linked to particular memeplexes which contain, for example, annotations, further ideas, feedbacks from colleagues or supervisors.

Supporting evidence of any relationships can be stored separately {f - Testimonials - g} and attached to the user's output {Uses} at the end for dissemination to back up any statements or claims made.

Any finalized script published can be retained in the knowledge base. It offers a format with all reference links kept intact and instant access to the underlying information-rich contributing memes, their sources and alternate uses. This type of digital document - if the content is appropriate for the purpose - is also ideal for storage in a Benchmarking and Standards Base {Yardsticks} which is able to feed forward {h & i} to related subsequent projects and activities by providing, for example, templates, samples, best-practice methods, proven heuristics<sup>24</sup>, regulations, tutorials, evaluation criteria, or trial assessments.

#### *4.4 Centring one's Attention on Creativity and on Creating new Knowledge*

In the way described, considerable time currently lost in dealing with redundant findings and on mundane tasks of sorting, ordering, and referencing is passed on to the PKMS, so that the user is able to focus his/her attention more on investigation and innovation. In memetics<sup>1</sup>, the related knowledge conversion and learning processes are attributed to two factors which are also facilitated by the PKMS approach presented: recombination and mutation<sup>25</sup>.

---

<sup>24</sup> For example, one particular 'benchmark' memeplex chosen for this paper is Mostert's Six Levels of Appreciation [20] which describe the extent to which - in this case potential PKM stakeholders - internalise learning content and examine application opportunities. To make a more compelling argument, the paper has a 'hidden agenda' and attempts to follow (as closely as possible in the context) the appreciation levels 1 to 6 by pitching sections 1 to 6 accordingly.

"Level 1: Aesthetic Elegance. [Readers] appreciate the ideas proposed in the learning space as though they are observing an inanimate object. They can see the innovation and creativity the ideas represent and give recognition to the insight of the idea, but, there is not yet a resonance with the idea.

Level 2: Schematic Resonance. [Readers] not only appreciate the quality of the idea, but also find agreement with it. There is a philosophical match between the fundamentals of the ideas and the views of [readers].

Level 3: Contextual Relevance. [Readers] who appreciate an idea at this level can identify examples of the phenomenon of the idea in their own world experience. [Readers] who are sufficiently engaged with the concepts believe that the ideas describe accurately some dimension of their experience, which lends credence to the validity of the ideas. The ideas are therefore relevant to the [reader's] experience, while, at previous levels, the ideas may be valid, but not relevant.

Level 4: Opportunity. This level shows a clear sensing by [readers] of an opportunity for possible personal and/or organisational growth. The idea is not only relevant, but also presents a realistic chance of adding value.

Level 5: Responsibility. [Readers] experience a personal sense of responsibility for the development and implementation of the ideas. The [readers] have an emotional drive for and attachment to the ideas. They agree that it can be done (not only that it should be done), and that they should indeed execute it personally.

Level 6: Enactment. [Readers] start taking action. They develop a rudimentary plan and already identify contingencies to some of the barriers anticipated. This level is more than a personal sense of responsibility; it amounts to the first steps towards implementation. While the previous level stops with an emotional obligation, this level sees [readers] designing and even taking the first steps towards accomplishment."

<sup>25</sup> As Distin [9] points out in "The Selfish Meme": "In recombination, existing memes are appropriately recombined in new situations, creating new ways of thought and novel effects, perhaps as the result of previously recessive memes' 'effects' being revealed in the reshuffle". As a result of mutations, "copies will not always be exact, and the idea or skill in question may change in some way en route". In science, for example, "existing theses are reshuffled perhaps in the light of new evidence - and this may lead to unforeseen consequences, or even to a fresh hypothesis".

## 5 SUPPORTING MUTUAL BENEFITS VIA CREATIVE CONVERSATIONS

The previous section has focused on our longing to find suitable means for advancing our three capitals, to better identify and fill knowledge gaps and to draft those thoughts we would like to convey for diffusion via publication and presentation.

On the one hand, this role has been likened to being a dwarf perched on the shoulders of giants, because we are supposed to use the prior knowledge of our predecessors to avoid ‘re-inventing the wheel’. This role is fully supported by the PKMS although the giants’ essential memes ought to be provided by their publishers in more instantly digestible, digital formats.

On the other hand, innumerable small actions by individuals are responsible for the overall performance and viability of societies and enterprises<sup>26</sup>. “The root objective of PKM [then] is the desire to make citizens highly knowledgeable. They should function competently and effectively in their daily lives, as part of the workforce and as public citizens” [39] which calls for, “one of the most important functions of teaching [to] therefore be to encourage in students the sustainable growth of autonomous capacities in PKM“ [19].

Such a role is best served if the iterative sequential PKMS processes {1-8, a-j} of many individual users are allowed to proceed simultaneously in a networked or cloud-based setting, so that real-time collaboration between any subgroup of individuals can take place. Levy’s [19] term ‘Creative Conversations’<sup>27</sup> best describes this scenario and inspired the sketching of an exemplary network of autonomous individual PKMSs depicting potential conversation clusters, beneficiaries, and benefits (figure 5).

The scenario is present in figure 2 as the top level {Creative Conversation} symbolizing the presence of other users (each with his/her own {User} and {System} level) and linked to the four levels discussed by an arrow and cloud icon {k}. It follows that any link referred to between constituents of the individual’s PKMS (bottom four levels) in the previous section, either the creating or the receiving counterpart can be - in a shared and collaborative environment - substituted by the compatible constituent(s) of other cooperating autonomous PKMSs (top level linked via k) if the respective access rights are in place.

---

<sup>26</sup> As Wiig [39] reminds us, “small personal 'nano actions' combine with larger departmental actions that combine to create consolidated enterprise actions that result in the performance of the whole organization. [Hence,] the quality and extent of knowledge possessed by people - their competence - and structural Intellectual Capital (IC) assets available to them determine the realized enterprise performance.”

<sup>27</sup> “Without denying the importance of collective strategies and the shared visions that support them”, Levy [19] believes “that social knowledge management should be thought of as an emergent level based on the creative conversation of many individuals’ Personal Knowledge Management. [...] And this personal management should be conceived from the outset as the elementary process that makes possible the emergence of the distributed processes of collective intelligence, which in turn feed it”.

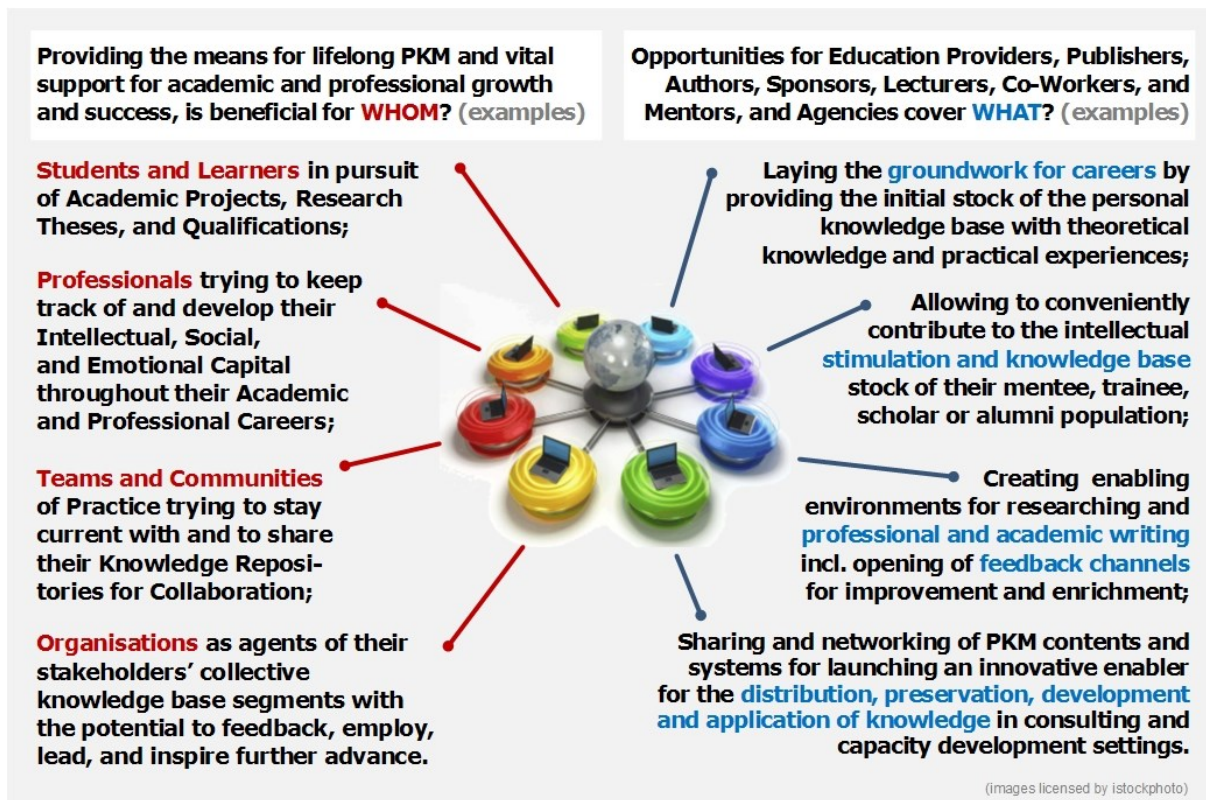


Fig. 5 What's-in-for-whom regarding Creative Conversations between PKMSs [33]

Unfortunately, the scenario described represents an empowering state of extelligence formation which is presently facing severe constraints. In a paper currently under review, seven barriers have been identified [27]. In the context of establishing productive PKMS, they are counterproductive and annoying for wasting time and efforts of individuals, but can be eliminated by initiating sound PKM approaches, shifting paradigms, changing habits, and innovative solutions. The paper questions the current logics and logistics of institutional systems because their centralized, heavyweight, top-down, and prohibitive approaches seem no longer adequate. It suggests remedies and summarizes them in form of Five Vital Provisions (figure 6).

Accordingly, the PKM system proposed gives preference to grass roots, bottom-up, lightweight, affordable, personal devices which offer effective low-cost applications (accessibility easiness<sup>28</sup>), enable the authorship and contribution of own ideas based on one's background (expressive creativity<sup>28</sup>), alone or in collaborative environments with other users/owners (relational interactivity<sup>28</sup>), and with the opportunity to add productively to the world's extelligence (ecological reciprocity<sup>28</sup>).

<sup>28</sup> The terms in brackets refer to Johri's and Pal's four ICT for Development design criteria [15].

Five Vital Provisions to enable Creative Conversations between Autonomous Individual PKMS Devices and associated Effective Services over Users' Academic and Professional Careers:



- Digital Personal Knowledge (Extelligence) is always in Possession and at the **Personal Disposal** of its Owner or eligible Co-Worker.



- Contents are kept in a **Consistent Format** for easy Retrieval, Expansion, Sharing, Pooling, Re-use and Authoring, or Migration.



- Information and Functionalities can continually be used without Disruption independent of User-specific **Changing Environments**.



- **Mutually beneficial Collaboration** Practices and Capabilities facilitate consolidated Team, Community, and Enterprise Actions that convert Individual into Organizational Performances.



- The PKMS is based on a **Concept, Functionalities, and Interventions** which are easily understood and applied in Practice.

(images licensed by stockfresh; BeOS Eyeball Icon by StudioTwentyEight (www.studiotwentyeight.com))

Fig. 6 Five Vital Provisions for Individual Autonomous PKM Systems<sup>29</sup>.

The ‘Standing on the Shoulders of Giants’ notion equally applies to the series of PKMS papers published. 41 references of the current total of 164 sources utilized in all the papers are cited below. Moreover, one of these papers [28] demonstrates that the ‘Knowcations’ concept’s unique meme-based approach is based on an amalgamation of KM building blocks, knowledge types and assets, waterfall spirals, learning, foraging, sensemaking, and knowledge creation loops as well as the integration of further recognized methodologies and heuristics (resulting in the unified process cycles mapped in figure 2).

The reason for the integration is simple: to support users in their role as contributors and beneficiaries of organizational and societal performance, Personal KM and Organizational KM systems are compelled to share compatible models and structures in order to enable continuous feedback loops between individuals and communities or institutions.

<sup>29</sup> “Our view of KM today draws much more on collaborative learning networks using social media than on the administration of central information systems controlled by experts. [...] Rather than knowledge being shut up in silos and balkanized within small closed communities, one of the ideals of social KM is clearly its decartmentalization, exchangeability and commensurability. [...] And the situation is often much worse in big companies and public administrations, whose databases are frequently unable to communicate with each other. With the possible exception of blogs, paradoxically, most PKM tools are centralized by big companies specializing in social media and search engines. Just as computer science underwent a revolution in the 1980s with the widespread use of personal computers, it is possible that KM will in the twenty-first century experience a decentralizing revolution that gives more power and autonomy to individuals and self-organized groups.” [19].

## 6 SUPPORTING ORGANIZATIONAL AND HUMAN DEVELOPMENT

Ecological Reciprocity<sup>28</sup>, the opportunity to enrich the environment (in case of PKM by adding productively to the World's Extelligence) forms the peak criteria in Johri's and Pal's 'ICT for Development Design Framework'<sup>30</sup> [15]. Together with Gurteen's definition of the Knowledge Worker<sup>31</sup> [13] and the WBI's (2008) calling to build Knowledge Economies<sup>32</sup> [41], it shows that PKMS is a concern to anyone anywhere. Fittingly, Nielsen urges us taking advantage of today's online realities by removing barriers that prevent potential contributors from engaging in a wider sharing and faster diffusion<sup>33</sup> of their ideas, sources, data, work-in-progress, preprints, and/or code for the benefit of more rapid iterative improvement<sup>34</sup> [21].

In 'Making PKM Part and Parcel of Higher Education Program and Services Portfolios', the potential benefits for Tertiary Institutions and their Stakeholders have been assessed further by focusing on Academic Value Chains and Qualification Frameworks [35].

The paramount role of education has also been stressed in respect to all public and private organizations. In 'Strategic Management in the Knowledge Economy', the authors urge

---

<sup>30</sup> As pointed out by Johri and Pal [15], current ICT for Development (ICTD) efforts "are [unfortunately] primarily framed in the theory and practice of development and empowerment", signifying "a disproportionate emphasis [...] on fulfilling basic needs of users in low-resource environments without adequate attention to user-motivated concerns which would enrich their lives rather than merely provide access and satisfy basic needs." To overcome this gap, they advance a design framework, named capable and convivial design (CCD) and propose targeting four primary design characteristics, "if ICTD is to satisfy its purported goal of making a real difference in the lives of its intended beneficiaries - those that are significantly disadvantaged in terms of resources as well as opportunities": 1. Access to Artifacts (accessibility easiness), 2. Ability for Self-Expression (expressive creativity), including the ability to use personal energy creatively and to personalize the environment, 3. Ability to interact and form Relationships with other People (relational interactivity), and 4. Opportunity to enrich the Environment (ecological reciprocity).

<sup>31</sup> Gurteen places - rather than an individual's type of work (as in Florida's Creative Class, footnote 11) - 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. No one tells them what to do. They do not take 'no' for an answer. They are self-motivated". To Gurteen's mind, they "cannot be coerced, bribed, manipulated or rewarded and no amount of money or fancy technology will 'incentivize' them to do a better job. Knowledge workers see the benefits of working differently for themselves. They are not 'wage slaves' - they take responsibility for their work and drive improvement" [13].

<sup>32</sup> In introducing their program on building knowledge economies, the World Bank Institute wrote: "The countries that thrive will be those that encourage their people to develop the skills and competencies they need to become better workers, managers, entrepreneurs, and innovators. Today's policy makers must extend their country's existing strengths through careful investments in education, institutional quality, and relevant technology. They must create enterprises that are knowledgeable enough to recognize new competitive opportunities - and skillful enough to convert those opportunities into wealth" [41].

<sup>33</sup> In 'Reinventing Discovery', Nielsen reminds us that, since the 17th century, the academic-paper-based citation system has been the basis for the reputation economy in science. It "allows scientists to build 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" [21].

<sup>34</sup> "If scientists are to take seriously contributions outside the old paper-based forms, then we should extend the citation system. [...] All that's needed for open science to succeed is for the sharing of scientific knowledge in new media to carry the same kind of cachet that papers do today. At that point the reputational reward of sharing knowledge in new ways will exceed the benefits of keeping that knowledge hidden" [21].

addressing learning for creativity and innovation, which are often the spur to enhanced development and progress, and voice concern over the lack of institutionalized mechanisms to capture and nurture evolving ideas which tend to be ‘lost’ in the bureaucratic system rather than accelerate product and process development [18].

Pasher and Ronen agree by pointing out that first generation Organizational KM (OKM) Systems “were about treating knowledge [merely] as an asset, recognizing how it influences strategy, and wanting to make the most of it by managing it properly.” The next KM generation, hence, needs to focus on creating new knowledge and innovation, a process which starts with the “reuse or new use of existing knowledge, adding an invention, and then creating a new product or service that exploits this invention” [22].

What is even more, being able as a company to connect with employees’ PKM repositories could be a strong source for competitive advantage<sup>35</sup>. But, the rewards of collaboratively interlinking and collectively harvesting prior accumulated personal knowledge subsets has to be mutually beneficial<sup>36</sup>. Lastly, providing added value in regard to peoples’ PKM System is also likely to give rise to entirely new product and service categories<sup>37</sup>.

## **7 CONCLUSIONS AND THE ROAD AHEAD**

The objective has been to produce a paper with the very Personal Knowledge Management Technology it describes. On the one side, the output of the system describes the concept’s unique meme-based approach and its Ideosphere, the needs and application areas served, the process loops of its operation as well as the opportunities for collaboration and development. On the other side, the system aided the authoring of a twenty page paper accepted at a conference on Higher Education in the manner described.

---

<sup>35</sup> “If only we knew what we know” has been attributed to many leaders. Employees are hired to fill positions well documented in terms of job descriptions but bring with them a wealth of knowledge and experience which ideally could be utilized and shared - if only known - to advance competitiveness. Prior know-how and experience gained fails to add further value if it stays unnoticed, undocumented, unshared, resulting in the “re-invention of wheels” and the re-living of otherwise avoidable flaws and delays” [33].

<sup>36</sup> For example, “releasing the yields of organizational knowledge creation into the PKM custodies of those contributing or affiliating is likely to build stronger bonds and relationships as well as accelerated and more sustainable value chains or project roll-outs. This applies, in particular, to non-profit organizations, development agencies, and consulting projects in the context of capacity building” [33].

<sup>37</sup> For example, “the distribution channels and content formats between information suppliers and information seekers are equally expected to adapt; rather than leaving the internalization of documents, articles, and books to the limited attention span of the potential user, open access or commercial service providers need to provide added value to clients in the form of document or domain specific essential meme collections or meme subscriptions. A market for similar services already exists in the form of ‘Key Concept’ of ‘Mover & Shaker’ books or ‘Executive Book Summaries Subscriptions’ which offer speedier comprehensions of essentials, but without integration, so far” [33].



However, the features of this one-dimensional and finalized printed or electronic copy<sup>38</sup> are quite different compared to the multi-dimensional virtual version still present in the user's 'Knowcations' knowledge base<sup>39</sup>. Here, the pdf-copy is just a snapshot taken of the work copy, but its memes are ready to be re-used, rephrased, or re-purposed, and their relations are in place to be visited, revised, or expanded. Add the dimension of creative conversations and shared repositories among many users, the networked trajectories of many particular memes provide a multitude of options to engage in one's topics of interest. Thus, collaboratively interlinking knowledge bases to collectively trace, harvest and utilize accumulated knowledge subsets based on shared records will reduce redundant contents and improve the productivity of information seekers and suppliers alike [29].

These aspects are planned to be further elaborated in a future paper, in particular in regard to Nielsen's concerns<sup>33, 34</sup>. While the prototype is in the process of being converted, a further paper planned will present a respective Training and Service Concept for Personal Knowledge Management aimed at Higher Education and Professional Training.

In the author's opinion, a realistic potential exists "that KM will in the twenty-first century [indeed] experience a decentralizing revolution that gives more power and autonomy to individuals and self-organized groups"<sup>29</sup> [19], and Personal KM Systems and their Creative Conversations might even become the "Next Co-evolutionary Driver of Human Development" [30].

---

<sup>38</sup> The printed or electronic copy, shares its features with a book. All the collected pieces of information have been put in a sequence assigned to a particular section. In regard to connectivity, any meme we identify has a predecessor and a successor. The meme might have been linked to references in order to feed back to other past publications, and/or might also have been linked to footnotes in order to reiterate or rephrase essential memes from other sources to achieve a physical proximity among the ideas they contain. Hence, the conversion of the virtual work copy into the pdf or paper format has resulted in one-dimensionality and finality; only in the case where the paper is submitted to be indexed, the paper (not a particular meme) might be enabled to also feed forward to those future publications which have referenced it, as long as they will have been submitted and indexed likewise. The paper or fractions of it, might also multiply electronically to create redundant, fragmented, or distorted copies to populate the result lists of the search engines and consume our attention.

<sup>39</sup> The virtual work copy, by comparison, is information-rich, multi-dimensional, and comprises many more causative references which might still grow further in number and quality. Firstly, any reference to hosts and their role (e.g. authors, editors, information suppliers, organisation) opens up access to their background links as assembled by own or shared data in the {Profiles} base. Secondly, any meta-data generated during the paper authoring project can be kept and accessed and any links with other external entities can be followed, if access rights permit. Thirdly, any meme not newly created points to its original version, so that its neighbouring memes or sections in its original source can be accessed, either digitally or as hardcopy. Any of these original memes might have been used and/or might be used further in the future in the same or different contexts, as an original, paraphrased, or re-purposed version which again can be visited, if access rights permit.

## References

- [1] Bjarneskans, H. G. B., Grønnevik, B. and Sandberg, A., 1999. The lifecycle of memes, *web page*, <http://www.aleph.se/Trans/Cultural/Memetics/memecycle.html>.
- [2] Blackmore, S. J., 2000. The power of memes, *Scientific American*, Vol. **283**, No 4, pp. 52-61.
- [3] Bohn, R., 2009. How Much Information 2009, *University of California*, San Diego.
- [4] Boisot, M., 2004. Exploring the information space: a strategic perspective on information systems, *Working Paper Series WP04-003*, University of Pennsylvania.
- [5] Bush, V., 1945. As we may think, *The Atlantic Monthly*, Issue **176.1**, pp. 101-108.
- [6] Collis, J., 2003. Introducing Memetics, *web page*, <http://meme.sourceforge.net/docs/memetics.php>.
- [7] Davies, S., 2011. Still Building the Memex, *Communications of the ACM*, **53(2)**, pp. 80-88.
- [8] Dawkins, R., 1976. *The Selfish Gene*, Paw Prints.
- [9] Distin, K., 2005. *The Selfish Meme*, Cambridge University Press.
- [10] Florida, R., 2012. *The Rise of the Creative Class – Revisited*, Basic Books.
- [11] Grant, G., Sandberg, A. and McFadzean, D., 1999. Memetic Lexicon, *web page*, <http://www.lucifer.com/virus/memlex.html>.
- [12] Gratton, L., 2012. *The Shift - The Future of Work is Already Here*, HarperCollins UK.
- [13] Gurteen, D., 2006. Taking responsibility, *Inside Knowledge*, **10(1)**.
- [14] Hamel, G., 2012. *What matters now?*, San Francisco: Jossey-Bass.
- [15] Johri, A. and Pal, J., 2012. Capable and convivial design (CCD): a framework for designing ICT for human development, *Information Technology for Development*, **18(1)**, pp. 61-75.
- [16] Kimura, Y. G., 2005. Cosmic Alignment - A Principle of Global Unity, *Kosmos Journal*, [http://www.via-visioninaction.org/via-li/articles/Kosmic\\_Alignment.pdf](http://www.via-visioninaction.org/via-li/articles/Kosmic_Alignment.pdf).
- [17] Koch, R., 2001. *The Power Laws of Business*, Nicholas Brealey.
- [18] Leibold, M. P., Probst, G. J. B. and Gibb, M., 2007. *Strategic Management in the Knowledge Economy*, John Wiley & Sons.
- [19] Levy, P., 2011. *The Semantic Sphere 1*, Wiley.
- [20] Mostert, M., 2013. *Systemic Leadership Learning*, Knowres Publishing.
- [21] Nielsen, M., 2011. *Reinventing Discovery - The New Era of Networked Science*, Princeton University Press.
- [22] Pasher, E. and Ronen, T., 2011. *The Complete Guide to Knowledge Management: A Strategic Plan to Leverage Your Company's Intellectual Capital*, John Wiley & Sons.
- [23] Pauleen, D. J. and Gorman, G. E., 2011. The Nature and Value of Personal Knowledge Management, In: Pauleen, D. J. and Gorman, G. E. (Eds.), *Personal Knowledge Management*, pp. 1-16, Gower.
- [24] Pirolli, P. and Card, S., 2005. The Sensemaking Process and Leverage Points for Analyst Technology, *Proceedings of International Conference on Intelligence Analysis*.
- [25] Rosenstein, B., 2009. *Living in More Than One World: How Peter Drucker's Wisdom Can Inspire and Transform Your Life*, San Francisco: Berrett-Koehler Publishers.
- [26] Sandberg, A., 2000. Memetics, *web page*, <http://www.aleph.se/Trans/Cultural/Memetics/>.
- [27] Schmitt, U., 2014. Overcoming the Seven Barriers to Innovating PKM Systems, *International Forum on Knowledge Asset Dynamics (IFKAD)*, June 11-13, Matera, Italy.
- [28] Schmitt, U., 2014. From Circuits of Knowledge to Circuits of Personal Knowledge Management Concepts, *Conference on Organizational Learning, Knowledge and Capabilities (OLKC)*, Apr 22-24, 2014, Oslo, Norway.
- [29] Schmitt, U., 2014. The Role of Personal Knowledge Management Systems in making Citizens highly knowledgeable, *8<sup>th</sup> International Technology, Education and Development Conference (INTED)*, Mar 10-12, 2014, Valencia, Spain.

- [30] Schmitt, U., 2014. PKM Devices - the next Co-evolutionary Driver of Human Development?!, *International Conference on Education and Social Sciences (INTCESS14)*, Feb 03-05, 2014, Istanbul, Turkey, 978-605-64453-0-9.
- [31] Schmitt, U., 2013. Knowcations - Conceptualizing a Personal Second Generation Knowledge Management System, *8<sup>th</sup> Conference on Knowledge, Information & Creativity Support Systems (KICSS)*, Nov 07-09, 2013, Krakow, Poland, 978-83-912831-6-5.
- [32] Schmitt, U., 2013. Furnishing Knowledge Workers with the Career Tools they so badly need, *International HRD Conference*, Oct 17-18, 2013, Mauritius, 1694-2140.
- [33] Schmitt, U., 2013. Managing Personal Knowledge to make a Difference, *27<sup>th</sup> British Academy of Management Conference Proceedings (BAM)*, Sep 10-12, 2013, Liverpool, UK, 978-0-9549608-6-5.
- [34] Schmitt, U., 2013. Innovating Personal Knowledge Creation and Exploitation, *2<sup>nd</sup> Global Innovation and Knowledge Academy (GIKA)*, Jul 9-11, 2013, Valencia, Spain, 978-1-909507-26-5.
- [35] Schmitt, U., 2013. Making Personal Knowledge Management Part and Parcel of Higher Education Programme and Services Portfolios, *6<sup>th</sup> World Universities Forum (WUF)*, Jan 10-11, 2013, Vancouver, Canada, to be published in *Journal of the World Universities Forum*, 1835-2030.
- [36] Schmitt, U., 2012. Knowcations - The Quest for a Personal Knowledge Management Solution, *12<sup>th</sup> International Conference on Knowledge Management and Knowledge Technologies (i-Know)*, Graz, Austria, Copyright 2012 ACM 978-1-4503-1242-4/12/09.
- [37] Simon, H. A., 1971. Designing Organizations for an Information-Rich World, In: M. Greenberger (Ed.), *Computers, Communication, and the Public Interest*, Baltimore, Johns Hopkins Press.
- [38] Stewart, I. and Cohen, J., 1999. *Figments of Reality - The Evolution of the Curious Mind*, Cambridge University Press.
- [39] Wiig, K. M., 2011. The Importance of Personal Knowledge Management in the Knowledge Society, In: Pauleen, D. J. and Gorman, G. E. (Eds.), *Personal Knowledge Management*, pp. 229-262, Gower.
- [40] Will, G. F., 1997. A Faster Mousetrap, *web page*, <http://www.nytimes.com/books/97/06/15/reviews/970615.15willmt.html>.
- [41] World Bank Institute, 2008. *Knowledge for Development (K4D)*, *The WBI's program on building knowledge economies*, <http://go.worldbank.org/AW9KZWJB10>.