Philosophy and IT for Knowledge Management

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Abstract: This paper addresses the question of . . .

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1 Introduction

For centuries, philosophy has been a mine of ideas used to fertilize other disciplines such as mathematics or physics. Being the “mother of sciences”, Philosophy addressed the notion of knowledge, the generation of knowledge, its transfer, with its prospects and limitations for quite a while. Recently, Knowledge Management is being academically pursued in diverse disciplines and is gaining increasing importance in all business activities. However, the multidisciplinarity of the approaches and the complexity of the notion of “knowledge” raise many issues that are often simply ignored or treated offhandedly. What, then, seems better than turning to and examining the potential of contributions of philosophy to Knowledge Management and search for mutual promotion and synergy? The philosophical notion of “ontology”, which gained considerable impact in the information sciences, is such a “success story”.

First activities labelled as Knowledge Management in that sense can be identified in the late 1970s [Leo95]. Stader and Macintosh [SM99] define Knowledge Management as “the identification and analysis of available and required knowledge assets and knowledge asset related processes, and the subsequent planning and control of actions to develop both the assets and the processes so as to fulfill organizational objectives”. However, there is not much doubt that mankind used knowledge and, thus, somehow managed knowledge already long before (cf. [Bur02]).

Since a while, also people from a Computer Science and Artificial Intelligence background got involved into Knowledge Management. Information Technology (IT) is regarded an enabler for many aspects of Knowledge Management solutions. IT systems can be seen as its technical backbone.

Due to the IT background of the authors their foremost interest is the benefit of Philosophy for IT for Knowledge Management, i.e., for building and maintaining “systems”.
To start with a crisp idea, the authors hope to draw from Philosophy mainly. They seek “better knowledge about knowledge”.

Hauk [Hau98] introduces Philosophy as “the quest for certainty in knowing”. This quest requires us to look at three ingredients, phrased by [Fal00] as being of the world, the universe as we perceive it, and the universe as we conceive it. These three ingredients in mind, Falconer [Fal00] notes that “it has been persuasively argued that the universe as it really is and the universe as we conceive it are largely unknown territory”. In Knowledge Management, we, as sense–making subjects, started out to chart this unknown country by using such tools as concepts of the world to describe existence as we perceive it. We do not even try to think about the universe as it really is.

Antique Philosophy started by replacing step by step mythos, extending rationality. Rationality, here, means to adhere to a certain strictness in thinking. Since then, Philosophy used its time to elaborate. The authors like Hauk’s (of course, simplifying) overview, dividing philosophical development into four historical successive phases [Hau98]: 1) The search for the being of the world. 2) The supplement of this with epistemology, i.e., the consideration that human insight is confined by cognition. 3) The supplement of this with language criticism, resolving a couple of issues as mere misunderstandings. 4) The abandonment of the search for absolute knowledge, and its replacement with iterative, laborious furthering of existing assertions.

So, today the quest for a safe and absolute fundament of knowledge came to an end: for epistemological reasons it is obvious that absolute knowledge cannot exist. There were also new aspects added, e.g., by Popper who says: A theory does not need to be true, only successful. New theories are not necessarily accepted because of being better but because they find enthusiastic supporters, who believe in them and advocate them. Old theories sometimes die, not being falsified, but simply because their representatives die. Many irrational factors like intuition, enthusiasm and hope often play a crucial role [DGSW00].

A rather novel view on knowledge, called memetics, is described in [Hey93]: “[..] knowledge can be transmitted from one subject to another, and thereby loses its dependence on any single individual. The death of an individual carrying a certain meme (i.e., a piece of knowledge) no longer implies the elimination of that piece of knowledge […]. As long as a meme spreads more quickly to new carriers than that its carriers die, the meme will proliferate, even though the knowledge it induces in any individual carrier may be wholly inadequate and even dangerous to survival. And, Heylighen continues, [… ] a piece of knowledge may be successful (in the sense that it is common or has many carriers) even though its predictions may be totally wrong, as long as it is sufficiently “convincing” to new carriers.” But the most important change of view on knowledge is that […] the subject of knowledge has lost his primacy, and knowledge becomes a force of its own […] That this is realistic can be illustrated by the many superstitions, fads, and irrational beliefs that have spread over the globe, sometimes with frightening speed.”

**** und was fangen wir damit an?

In their projects, the authors find that not many IT people have a sense for non–technical issues. Even if they cause serious difficulties, notions and ideas from philosophy that could

1http://communication.sbs.ohio-state.edu/sense-making/
contribute tend to be refused. But IT people need skills embedded in Philosophy or, at least, based on philosophical grounds: intelligent systems for Knowledge Management are based on (formal) models of (parts of) the universe (as we perceive it) and the human conception of it.

Even though these were just a few paragraphs above asserted to be “unknown territory”, still, such systems are constructed and thus also such models. Often, the authors argue, IT people are not conscious of that aspect of their doing. And, according to Falconer [Fal00] “the artificial intelligence discipline, for many years, ignored the obvious fallacies in their work which their philosophical forebears bequeathed them [...] and soldiered on uselessly. The knowledge management discipline is poised to be victim to the same fallacies [...].”

It is likely that there is some potential for improvements. Thus, perhaps the authors’ first issue presented to the Philosophers is, to give feedback on the thoughts in this article.

****** A nice characterization of the situation today is: “Never before today, there were more professional philosophers in the universities and academies worldwide, never before there was such a differentiatedness of philosophical sub-disciplines, which only experts are able to overview.”[DGSW00]

Maybe, we are idealizing Philosophy and hope to learn from it what Philosophy cannot provide us with, but it is not our task to answer nor are we capable of answering the questions raised in this article. We are merely trying to start a dialog between Knowledge Management and Philosophy on things we deem important and which we are dealing with in our day to day work.

2 “Being of use” to a discipline

Throughout this article it is assumed that there is a whole something that can be conceived of as Philosophy and analogically Knowledge Management. Then, there will be ideas in one discipline, Philosophy or Knowledge Management, that every beginner student knows, that are effectively not known by many people in the other discipline, whether experts or beginner students. Surely, one cannot say generally that (all) Knowledge Management individuals can profit from philosophy ideas. Depending on the circumstances, some would perhaps not profit and some others are already experts in both fields. Even though there are some who might know ideas from the other discipline, one should consider the discipline as a whole, lacking the idea. Thus, what we mean by the above is that philosophy as a whole, i.e. people and ideas, and Knowledge Management as a whole can probably profit from each other. Perhaps one can view this as an issue of Knowledge Management of the knowledge in Knowledge Management and Philosophy.

While thinking about bringing together the two disciplines — groups of people — one should not forget to consider that those two are not homogenous. Even though “mankind” is able to fly to the moon, this requires a team of some very specialized people. More often we have to deal with weaker variants. For instance, to the authors experience rather often software in companies (i.e., systems) is constructed by just the young and inexperienced who we found likely to prefer to start from scratch, not knowing or understanding the
available status quo. Some (accidental) success provided, they can become very stable
deniers of helpful input. Well, perhaps it is even better, if they don’t change their winning
strategy. Bill Gates started young (too late for the authors to copy him) and with a strategy
not known to that date . . . and suddenly there is the question whether his business success
is desirable, and for whom. But, who is the judge? In practical Knowledge Management
such questions do not come up very often and, thus, we probably left the authors’ home
field and we got confused. Perhaps Philosophers can help here?

Rephrased and with a focus on Philosophers to help IT, this becomes the following. Assumed that Philosophers can help (at all) in issues of Knowledge Management IT people,
there are different situations to anticipate:

1. Some IT people have concrete issues, formulated problems, that can be attacked.
   Perhaps Philosophers are challenged by such a problem, perhaps it can be solved
   with a more basic Philosophy lesson.

2. Some IT people do not see a problem, but Philosophers or other IT people diagnose
   some sub–optimum and can convince them that Philosophy can help them to improve.

3. A solution of Philosophers to a frequently occurring sub–optimum is more publicly
   “marketed” and IT people recognize it as being of value.

4. A solution of Philosophers to a frequently occurring sub–optimum succeeds to be
   incorporated into standard IT procedure.

We consider “ontology in IT” as the third or fourth of the above, because we think it has
probably changed (improved) the lives of many (i.e. they were reached) who did not even
wanted their lives changed (a strong barrier was crossed).

A further consequential issue now is: is it obvious about which topics Knowledge Manage-
ment and Philosophy should talk? Are there open questions of IT/of Philosophy negotiated,
agreed and phrased?

A last conclusion, perhaps more private than business relevant is: what can I draw from
the “accident” that above we chose Bill Gates for the one example? As the head of a
group, can I “grow” such a person (can I grow “creativity”), and can Philosophers com-
http://www.rbs0.com/create.htm] with theoretical support here?

Certainly we did not yet make explicit the obvious, basic problem, the necessary funda-
ment to be solved prior to everything else. Philosophers and IT for Knowledge Manage-
ment people need to establish a basis for communication. They need to learn to talk and
understand each others languages (in which they have to anticipate the others issues) and
they need to develop a sense for each others cultures (without which, to our experience,
humans tend to get angry rapidly [Paper über EU Projekterfahrungen]).

We want to close with an observation, the interpretation of which is not clear to us, but we
feel it somehow relevant. The authors, when they happen to read elder articles, e.g. from
artificial intelligence, sometimes have the impression that there are a number of issues some of which have even been phrased and targeted already in the 1960s but seem not to have fundamentally evolved since then. What is required to do better today?

3 The Potential Role of Philosophy for Knowledge Management

The mutual consulting of two disciplines is almost always beneficial, we think, “... methods, notions, issues and arguments, which succeeded to practically prove their intellectual stringency and plausibility in other places, are neglected or accepted only very delayed in related sciences.”[OeZ00] Thus, the import of methods, notions etc. has a good chance to be a boost for a discipline. The mutual consulting of two disciplines is rather elaborated elsewhere, e.g., in the symbiosis between Artificial Intelligence and Cognitive Science. There, the agreed part of Artificial Intelligence is the practical experimenting with Cognitive Science theories [Mit98].

Although our focus here is on the potential benefit of Philosophy for Knowledge Management, Philosophy can, hopefully, also profit from Knowledge Management as well. (There are some suggestions enumerated in [SW01].) We think that, generally, where the experience in qualitative thinking of Philosophy could relax, i.e., enhance, the focused attention of Knowledge Management IT to quantity, the quantitative and formal experience of Knowledge Management IT are aspects that could yield new power to Philosophy. Also, Knowledge Management can bring philosophical ideas to bear and give them the chance to prove successful. Finally, perhaps some Philosophers would like to use Knowledge Management systems, simply to support them to master the knowledge they already have.

In the following we try to shed light on the realm of IT for Knowledge Management and respective issues of the authors, especially on modelling issues and lateral thinking.

3.1 Philosophy is the Fundament of any Model Construction

All tasks in Knowledge Management related to model construction, we feel, need (at least some) philosophical grounding. Once the construction of a formalized model is finished, Knowledge Management is rather experienced in what can be done with it.

To work on a conception of things, other than variables and data structures in software, was widely not accepted for a long time in IT for Knowledge Management. And, the necessity was not easy to motivate, as trial and error had brought Knowledge Management rather far in many cases. So, one could ask: why complicate things?
3.1.1 Model Construction Perspectives

The import of the notion of ontology into Knowledge Management has greatly improved the issue of modelling [CJB99]: “Ontologies are important because ontological analysis of a domain clarifies the structure of knowledge and ontologies enable knowledge sharing”. So, today, ontologies are used to represent models conceived of domains, even if those models are simple taxonomies.

The role of models is also targeted by Philosophers. Bailer–Jones [BJ00] pointed out drawbacks of a traditional view on scientific models in which models were exclusively hypothetical with only temporary value during knowledge acquisition, and reality was described with theories, not models. More recently, models have become mediators between theory and real world, and theories can only be applied to reality by using models.

Scientific models interpret empirical phenomena in a way that eases the understanding of the discussed phenomena. Interpretation can mean processes of idealizing, simplification, or analogical reasoning. A model provides (preprocessed) information to relate different phenomena to each other and to share them with other users of a model.

Of course, models are often imprecise, inconsistent, and aspect–focused — (negative) properties of models that were the major cause of rejecting models as describing reality. But models are used as a representation of reality because there are more characteristics to consider: function, selection, and correspondence with empirical data. Whether a model is a good representation depends on the intended function. Not all aspects are or need to be represented by the model, some aspects of the phenomenon may even be misrepresented. The representation also depends on the amount of information available at a given time.

In the end, the users of a model decide about the quality of a model regarding its function, selection, and correspondence with empirical data. Absolute knowledge is impossible to reach. There will always be a multitude of models coexisting.

There are examples of philosophers providing successful guidance to IT people for model construction, e.g. [GW02].

3.1.2 The Lack of Modelling

It is suggested here to judge model construction as being crucial and to arrange enough resources for it. Only if one has a model, one has an account of the entities which constitute the problem. And only then one can get a grip on it in order to design a solution. According to Falconer [Fal00] Knowledge Management strives for “solutions to largely unstated problems”. Not having a model of the problem and, thus, of the domain is a serious obstacle to a solution.

Currently IT culture does not really realize that [ASR99]: “Many IT developers have a tendency to be technology-driven: they have a nice tool, such as knowledge technology (but many other IT examples exist as well), and want to push this technology into the business. In contrast, we want to emphasize the need to be problem-driven: first identify current knowledge–related problems (apart of the knowledge management process) and from there recommend solutions, that might (or might not) include knowledge systems.”
This situation is not only an obstacle to the solution of problems. It is also an obstacle to the spread, reuse and evolution of solutions and ideas. Often technologists from slightly different computer science areas do not even understand each other. Generally, the level and terminology on which technologists describe their solutions is not the level on which one easily transfers them to slightly varied problem situations. Model construction is thus considered by us also always a basis for communication, i.e., the transfer and negotiation of ideas. In the Multi–agent domain, ontologies are the basis of any communication between agents of one and, even more, between agent societies.

### 3.1.3 Model Construction Issues

Knowledge Management has principally accepted that a basic aspect of models is that they ought to be shared among groups of people. Smith and Welty [SW01], for instance, refer to the import of the notion of “ontology” into Knowledge Management: “Finally, more than just a select few information scientists are realizing that perhaps Philosophy does have something useful to say about the objects of their work.”

But the status in Knowledge Management concerning the failed strive for objective truth (of models) does not seem to be really clear. E.g., Smith and Welty do only focus on the superiority of ontology “over the ad–hoc, case–by–case methods previously used”. Thus, at least for the moment, they do not emphasize that this is again only temporarily and locally successful. The naive reader can be misled to the antique quest of philosophical ontology for the one and for all truth.

*** The computational complexity of AI methods seems to be a insurmountable barrier at first glance, but it did not prevent computer scientists to search for heuristics that allows to apply those methods.

*** From an AI point of view, theories in AI fall into two categories [CJB99]: mechanism theories and content theories. Ontologies are content theories about the sorts of objects, properties of objects, and relations between objects. An ontology is a representation vocabulary that can be characterized in different ways. Chandrasekaran, Josephson, and Benjamins list three main characterizations: epistemic vs. heuristic as described by McCarthy and Hayes, information processing level, strategy level, algorithms and data structures level, and physical mechanisms level as defined by Marr, and Newell’s knowledge level vs. symbol level [New81].

Models of different people and groups will initially differ, which raises some issues in IT for Knowledge Management, where Philosophy could possibly help out with some expertise:

1. Ontology merging: IT for Knowledge Management is currently heavily struggling with methods for the uncovering of ontology mismatches and their removal through negotiation.

As one special issue here, the assumption of, e.g., Smith and Welty [SW01] that the merging of two ontologies requires to have one top–level ontology, seems to us to be at least questionable.
2. Ontology maintenance: A growing practical problem in IT for Knowledge Management is the maintenance of models (represented with ontologies), i.e., their adaptation due to changes. This problem is especially complicated, as the needs for change must be coordinated with the existing formalized model.

3. Ontology evaluation (“quality”): After experts have installed a system, users are left alone with it. Practice shows that serious deterioration occurs because of deficits in maintenance. This is in contrast to expensive machines, where losses are immediately quantifiable and where such qualitative deterioration does not occur.

3.2 Philosophy Enhances Lateral Thinking

We regard Philosophy as a chance to extend Knowledge Management “culture” with complementing opportunities to reason and thus to progress. Only the leaving of the traditional, prescribed paths of one’s discipline allows one to see and approach traditional shortcomings of the discipline. This is what we mean by “lateral thinking”.

Of course, for the authors also holds what Kuhn [Paj98] formulated, namely, that, “contrary to popular conception, typical scientists are not objective and independent thinkers. Rather, they are conservative individuals who accept what they have been taught and apply their knowledge to solving the problems that their theories dictate. Most are, in essence, puzzle-solvers who aim to discover what they already know in advance.” And, Kuhn continues: “The man who is striving to solve a problem, defined by existing knowledge and technique, is not just looking around. He knows what he wants to achieve, and he designs his instruments and directs his thoughts accordingly.” Knowledge Management encounters issues which are yet unsolved. The authors hope to get the instruments from Philosophy to model the problems of Knowledge Management and to solve (at least some of) them.

According to Peirce [DGSW00], “as soon as acquired behaviors lead to failure, uncertainty arises, which we try to overcome, by a detailed review of our assumptions and of our behavior, to come to sensible changes, to come back to the calmness of untroubled behavior”. Thus, one should cultivate the failures of Knowledge Management as chances for detailed reviews of its methods — suggesting to take advantage of philosophical aid.

3.2.1 On the Quantitative–Qualitative–Balance

It is widely demanded and practice in Knowledge Management to evaluate hypotheses quantitatively with test runs of prototypical implementations. We argue that the qualitative aspects are not enough focussed by Knowledge Management research and we hope for support of Philosophy in this concern, to clarify the use of quantitative and qualitative evaluation.

Another issue in this context is very important and is already approached by IT scientists with Philosophical expertise since years: the evaluation of the suitability of mathematical approaches like logics for modelling “reality” (and thus for Knowledge Management).
“Qualitative methods involve exploration, the first step in inquiry. Quantitative methods involve verification, the last step. Although preliminary exploration is usually necessary and always helpful, exploration requires verification. The weakness of verification alone is that since experiments and other standardized formats (such as the scale and the standardized interview) are narrow and rigid, one needs to have considerable knowledge before an adequate testing procedure can be designed.” [Sch97]

3.2.2 The Lack of “Qualitativeness” in IT

For our argumentation, we look at the realm of Information Retrieval, one important technique in Knowledge Management. Swanson [Swa88] provides a nice collection of observations: (1) Two information retrieval systems joined in a contest in 1953: 15,000 technical documents, 98 questions, and it had to be agreed before, which documents were the right answers to those 98 questions. “[…] both teams agreed that 1390 documents were relevant to one or more of the 98 questions, but there were another 1577 documents that one team or the other, but not both, considered to be relevant — a colossal disagreement that was never resolved.” Both competitors claimed victory; nobody cared there was a scientific issue. (2) “These authors [Kent, Berry, Luehrs, Perry], and hundreds of IR researchers since, seemed to accept uncritically the idea that relevance is additive. The possibility, for example, that two irrelevant documents might become relevant if put together has never been adequately considered, so far as I know.” (3) “[…] Oliver Lilley at the Columbia library school was investigating the extent to which subject headings assigned to books was predictable by prospective users of the catalog. The results were amazing, 340 graduate students in the library school, asked to chose subject headings appropriate to six books, came up with an average of 62 headings per book, of which 61 were different from the headings actually used on the catalog card.” (4) “John O’Connor at the University of Pennsylvania, […] 1960 […] noted among other things that 11 out of 23 documents properly indexed with the term “toxicity” did not contain any word at all with the stem “toxi”.”

Information retrieval research is traditionally strongly based on quantitative evaluation based on numerical indicators called “recall” and “precision”. But the above observations, we agree with Swanson, demand a different, more qualitative analysis of the problem and the approaches [Swa88]: “More than thirty years ago there was good evidence to suggest that information retrieval involved conceptual problems of greater subtlety than is generally recognized. The dramatic development and growth of online services since then seems not to have been accompanied by much interest in these conceptual problems, the limits they appear to impose, or the potential for transcending such limits […] ”
4 Summary / Discussion / Outlook / Questions

Disciplines and sciences can possibly learn from each other. Due to their respective culture they are always implicitly constrained in the ways they foster argumentation and progress.

“What philosophers (and everyone else) have always known is that people – and no doubt all intelligent agents – can engage in swift, sensitive, risky-but-valuable ceteris paribus reasoning. How do we do it? AI may not yet have a good answer, but at least it has encountered the question.” [Den99]

“The semantic web is not “merely” the tool for conducting individual tasks [...]. In addition, if properly designed, the Semantic Web can assist the evolution of human knowledge as a whole. [...] Human endeavor is caught in an eternal tension between the effectiveness of small groups acting independently and the need to mesh with the wider community. A small group can innovate rapidly and efficiently, but this produces a subculture whose concepts are not understood by the others. Coordinating action across a large group, however, is painfully slow and takes an enormous amount of communication. The world works across the spectrum between these extremes, with a tendency to start small –from the personal idea– and move toward a wider understanding over time.” [BLHL01].

“This chapter introduces the perspective of strategy as the outcome of organizational sememaking, knowledge creating, and decision making. [.....] the capacity to develop organizational knowledge is distributed over a network of information processes and participants. Rather than being centrally controlled and coordinated, the capacity to develop knowledge emerges from the complex, unpredictable patchwork of processes in which participants enact and negotiate their own meanings of what is going on; stumble upon and wrestle with new knowledge to make it work; and creatively improvise and bend rules and routines to solve tough problems.” [Cho01].

One question remains open: assumed it is agreed that Philosophy and CS/AI should come together, should they marry or should they simply consult each other for a while and then split up again? Today, information is so prominently put into the center that the information–related disciplines of Philosophy and CS/AI could be required to be combined on a larger dimension. But also it is possible that a re-organization of the disciplines can be achieved with some effort and both better go on to coexist more separated after that, so as if a company buys some organizational consulting. We do not want to be too biased yet, but in Norway, every student whatsoever, is forced to take at least one lecture in Philosophy.

But after all, maybe we first need to claim our relevancy, if we do not want to be entirely forgotten: “We act automatically most of the time, perhaps always.” “To bridle the automatic reactions is very hard even for openminded people, as shown by quite a few experiments.” [Pau01]
References


