

2 Know or not 2 Know – Knowledge Management?

Per Flensburg

Växjö university, School of mathematical and systems technique, Växjö, Sweden

per.flensburg@msi.vxu.se

Introduction

Today Knowledge Management (KM) usually address the problem of making knowledge explicit and available for everybody within the organisation (Summer 1999). Special attention is being devoted towards making tacit knowledge more explicit. Nonaka (1991) for instance argues that creating new knowledge “depends upon tapping the tacit and often highly subjective insights, intuitions, and hunches of individuals and making those insights available for use by the company as a whole”. This is, due to the nature of tacit knowledge, not always possible. Dave Snowden, CEO for Institute for Knowledge Management at IBM argues that using storytelling is one of the best ways of preserving tacit knowledge (Lotsson 2001). He also argues that storytelling is a genuine human activity and can not be done by computers.

However, there are more to knowledge than tacit knowledge. This essay is an attempt to clarify and make explicit some other aspects of this word based upon classical philosophy. Usually when we talk about knowledge management, we dwell on the method level but perhaps we should go back and find our roots on the content level. My intention is to focus on what knowledge is about more than on different types of knowledge and methods for ensuring the correctness of knowledge.

As a form of general analysis model I will make a distinction between the concepts “*right*”, “*correct*” and “*true*”. The word “*right*” (opposite “*wrong*”) means morally

right, having something to do with what is good or bad. There is a norm behind it, but as Churchman (1971, p 163) says: “In moral matters there are no experts”, this norm is personal. I will also use the word “*correct*” (opposite “*incorrect*”) referring to what is empirically correct, about the same meaning as the Kantian “synthetic statements” (Kant 1781). Finally I will use the word “*true*” (opposite “*false*”) for logical truth, belonging to the realm of logic. Very often we mix those three realms, talking about “true” and applying the logical rules when we should talk about “correct” and apply the common sense instead. From our everyday life we see lots of example that reality is not logic.

Seen from the perspective of KM, this issue is crucial. KM is often used for decision making, providing information about facts and events that have occurred. This information is interpreted by human beings thereby creating knowledge, however, before going into the relation between knowledge and reality we have to examine the nature of knowledge.

An example as starting point

As an introduction to this essay I will tell a story about Hasse, one of my friends. He wanted to be recreation instructor and wanted to attend an academic program within this area. Since we had introduced a computerised admittance system for all academic education in Sweden he was forced to fill in an application form. There he should provide three different codes for every course he applied for: A course code, a registration code and an admittance code where it was the latter that counted. The other ones seemed not to be used. It was possible to apply for 12 different courses and on my advice Hasse applied for all education to recreation instructor in Sweden, despite the fact he was sure to be admitted to the one in Lund. A nice day in July however, he received a letter saying he was the 10th reserve on his first choice: recreation instructor in Lund but was admitted to his second choice: Economy in Umeå. Suddenly Hasse had to make a decision: Work with imprudent boys from senior level at compulsory school or become C.E.O. and earn zillions of crowns! After some consideration, he preferred the zillions and accepted the place on economy. After a while he called the student union in Umeå, asking for living possibilities. Well, it was hard and it was best if he could come there and look at the possibilities. So he did, found a nice apartment, paid a month rent in advance and went home. It cost some 2000 SEK which was much at that time.

When the semester was about to start, Hasse received a new letter from the admittance bureau saying he was admitted at his first choice and thus was cancelled on every other choice! My friend was of course very upset, yelled at the admittance bureau and then become innkeeper in Småland! After a week they called from Umeå, asking if

he would come! The interesting thing is that I took his two letters, went to the admittance bureau and asked for a comment. Despite the fact that the clerks saw it in black and white they insisted: This is impossible! It cannot happen! They denied the reality, they denied the witness of their own eyes! They knew it could not happen, they denied the reality in favour of their knowledge of how it was supposed to be. From a psychological point of view it make perfectly sense, since they were forced to work with the computerised admittance system all the time and if this was not reliable, then their job quality, job satisfaction and the whole ground for their work would disappear. On the psychological level I think it can explained by Festinger's theory of cognitive dissonance (1957).

You might of course say that the ladies in the admittance bureau had a bad day, that they were stressed etc. I have had further talks about this and related issues with several other admittance bureaus, and the reaction is always the same: "It can not happened! Hasse must have done something wrong, filled in the wrong code, setting the cross in the wrong position etc." He might have, but as usual, the blame is on the user, not on the system!

Aristotle or the right knowledge

In Greece about 350 BC a man called Aristotle wrote a book that was called the Nicomean Ethics in honour to his son Nicodemus. In this book he described different aspects of knowledge usually referred to by their Greece names (Flybjerg, 1991):

Episteme – Scientific knowledge

Techne – Craft knowledge

Phronesis – Intelligence

Nous – Understanding

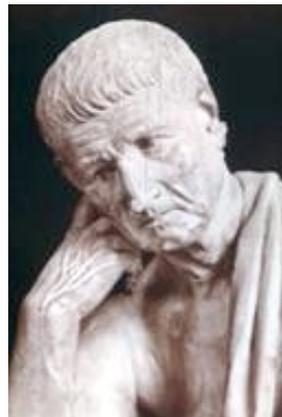
Sophia – Wisdom

In this essay, however, I will use the words of W. D. Ross, who's translation is available on the internet.

Aristotle introduces ethical considerations from the very beginning (Book I:1)

"EVERY art and every inquiry, and similarly every action and pursuit, is thought to aim at some good; and for this reason the good has rightly been declared to be that at which all things aim."

Applied to the example with the admittance system we see a typical replacement of "right" with "true". Since everybody knows "that computers can't lie" it is assumed that output from a computer is "correct". Here it was even supposed to be "right".



Let us now investigate some of the different types of knowledge introduced by Aristotle. In Book I:3 he talks about *judgement* and *education*:

Now each man judges well the things he knows, and of these he is a good judge. And so the man who has been educated in a subject is a good judge of that subject, and the man who has received an all-round education is a good judge in general.

If applied to information systems we see that the end-users are the one who are well educated within the application domain and thus are the one who can make the best judgements concerning this. Judgements however, are person-based knowledge and it might be mistaken insofar as one can change one's judgements later. But in the moment a human being make a judgement it is always right for her. Since the clerks in the admittance bureau every day was responsible for a lot of judgements, in reality made by the data system, they of course considered all judgements as right. When they were confronted with something obviously both wrong and false, they chose the simple way of considering the matter as incorrect. Thus they could maintain there picture of the world.

Aristotle defines five major types of knowledge: *art, scientific knowledge, practical wisdom, philosophic wisdom and intuitive reason*. Let us start examine scientific knowledge. He introduces timeliness first (Book VI:3):

We all suppose that what we know is not even capable of being otherwise; of things capable of being otherwise we do not know, when they have passed outside our observation, whether they exist or not. Therefore the object of scientific knowledge is of necessity. Therefore it is eternal; for things that are of necessity in the unqualified sense are all eternal;

It is interesting to think of data systems in this context. Since you can change the world view of a computer within seconds and since a program with its data and data structures is seen as models of a reality we indeed have something that can be otherwise. On the other hand, the models, the system are unchanged – at least until the next version! Aristotle defines scientific knowledge as (VI:6):

Scientific knowledge is judgement about things that are universal and necessary, and the conclusions of demonstration, and all scientific knowledge, follow from first principles (for scientific knowledge involves apprehension of a rational ground).

Note that scientific knowledge is basically a judgement and it has something to do with persuading people since there is a basic claim in demonstration in order to make things look clear and convincing. In being demonstrated also lies implicitly persistence and stability. For the clerks in the admittance bureau the knowledge produced by the system was obviously scientific and in combination with their judgement the result was true. However, it was not correct, they were unaware of the difference between “correct” and “true”. The system did not helped them to distinguish that either.

When designing systems we use our skill. Aristotle is using the word “art” instead (Book VI:4):

All art is concerned with coming into being, i.e. with contriving and considering how something may come into being which is capable of either being or not being, and whose

origin is in the maker and not in the thing made; for art is concerned neither with things that are, or come into being, by necessity, nor with things that do so in accordance with nature (since these have their origin in themselves). Making and acting being different, art must be a matter of making, not of acting.

We note that Aristotle considers design as creation and not as an activity, thereby giving it a special kind of status. We shall also note that all design is related to a designer, but Aristotle fails to recognise that the design (making) is the result of a judgement of the designer. The difference between “making” and “acting” is important. Cook and Brown (1999) points at a similar difference, the relation between “knowledge” and “knowing”. They argue, that in most organisational research, knowledge is treated as something people *possess*, not as something people can *do*. A similar approach is advocated by Blackler (1995). Possessing knowledge is scientific knowledge and doing something is an art, according to the taxonomy of Aristotle. It might, however, be interesting introducing the concept of *quality* of knowledge. This leads us to Aristotle’s concept of “practical wisdom”. It is defined as (VI:5):

Now it is thought to be the mark of a man of practical wisdom to be able to deliberate well about what is good and expedient for himself, not in some particular respect, e.g. about what sorts of thing conduce to health or to strength, but about what sorts of thing conduce to the good life in general.

Practical wisdom is thus directed towards the single man and his desire for a good life. An information system is designed for doing certain tasks, in a predefined way. The designers have “deliberated well about what is good and expedient for...” and here comes the crux of the matter: The users! At least, it is supposed to be for the users, but very often it is deliberated for the designers or the managers giving the assignment to the designer. In fact, in systems design we have two kinds of practical wisdom, one concerning the designer’s interest and another concerning the user’s. In the case of the admittance system we also have a third type of client: Hasse, the victim of the system. However, Aristotle identifies a unique circumstances:

... while there is such a thing as excellence in art, there is no such thing as excellence in practical wisdom; and in art he who errs willingly is preferable, but in practical wisdom, as in the virtues, he is the reverse. Plainly, then, practical wisdom is a virtue and not an art.

A system designer can practice the art of design in an excellent way, but this is different from practical wisdom in design. Now Aristotle considers practical wisdom as a virtue, i.e. having a moral and ethical dimension, pointing direct to a code of conduct for system designers! If applied to the admittance system, the practical wisdom is to design a traditional information system, at that time based upon IBM mainframes, taking over as much work as possible from the clerks. Then nobody can blame you. Maybe Hasse, but he was not mentioned in requirements specification. We see a failure, a moral failure, of not taken the victims of the system into account. The moral dimension is more obvious when Aristotle talks about philosophical wisdom which is of another nature (VI:7):

that philosophic wisdom is scientific knowledge, combined with intuitive reason, of the things that are highest by nature. This is why we say Anaxagoras, Thales, and men like them have philosophic but not practical wisdom, when we see them ignorant of what is to their own advantage, and why we say that they know things that are remarkable, admirable, difficult, and divine, but useless; viz. because it is not human goods that they seek.

Aristotle considers philosophical wisdom more or less useless for the one practising it. If applied to a systems designer philosophical wisdom becomes a paradox, since all professional systems designers have their practical wisdom as their main income. However, interpreted in a not so materialistic way, the philosophical wisdom in systems design might manifest in a code of conduct of very high ethic statue. It concerns the result of the design, it concerns Hasse! In fact Aristotle takes him into account when introducing a new kind of knowledge, called understanding (IV:10):

For understanding is neither about things that are always and are unchangeable, nor about any and every one of the things that come into being, but about things, which may become subjects of questioning and deliberation.

In modern language “explanation” is a better word, since Aristotle delimits himself to phenomenon that can be subject for modern scientific inquiry. If applied to systems design it is surely about the object system, the phenomenon that are to be designed, which simply has to be understood and explained. But understanding has a component of ethics and morality in it (IV:10):

For practical wisdom issues commands, since its end is what ought to be done or not to be done; but understanding only judges.

Aristotle distinguish clearly between “understanding” and “learning” in that “understanding” has something to do with opinion, while “learning” has something to do with scientific knowledge (IV:10):

Now understanding is neither the having nor the acquiring of practical wisdom; but as learning is called understanding when it means the exercise of the faculty of knowledge, so 'understanding' is applicable to the exercise of the faculty of opinion for the purpose of judging of what some one else says about matters with which practical wisdom is concerned...

This could be seen as the first description of a systems design method! According to Aristotle it is not possible to learn neither practical nor philosophical wisdom. They are both considered as virtues, but nothing is said about the origin of these virtues. In this context they belong to the realm of morality (deontology) and applied to systems design it surely deserves attention, even today!

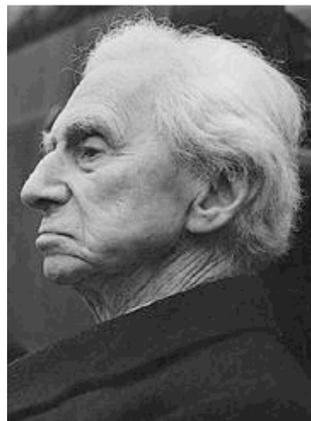
So to summarise Aristotle’s epistemology I have constructed the following table:

<i>Scientific knowledge</i>	Stable, general knowledge about things that not change, the requirements specification in systems development
<i>Art</i>	Skill, ability to make something, design is included
<i>Practical wisdom</i>	Ability to act in such a way that it is beneficial for the actor in the long run, manage the project well
<i>Philosophical wisdom</i>	Ability to act in such a way that it is beneficial for the mankind in the long run, take other things into account than only the requirements specification.
<i>Understanding (explanation)</i>	Judgement of what is object for practical wisdom, exploring the use situation and take users into account
<i>Learning</i>	Use of scientific knowledge, applying a development method

We see that “knowledge” already 2350 years ago was something very differentiated. We also note that Aristotle talks about different kinds of knowledge and do not discuss their eventual truth or correctness. He is not interested in the conditions for obtaining knowledge or how to ensure the knowledge is correct. Instead he discusses the right (i.e. the moral aspects) knowledge.

Russell and Wittgenstein - the correct knowledge

The question about the relation between reality and knowledge was automatically raised when philosophers (for instance Descartes, 1637) begun to be interested in the empirical world. From one point of view it can be argued that things we can't obtain knowledge about are meaningless and thus the epistemological perspective is the most basic one. On the other hand: If there is nothing to have knowledge about, then the knowledge is meaningless. When designing information systems we first design a model of a certain part of reality and this model is later implemented as a computerised information system. As we saw in the example above, it might happened that the model for those people working with the computerised information system have a higher degree of confidence than the reality. Therefore the question of how to gain knowledge about reality is a highly relevant one.



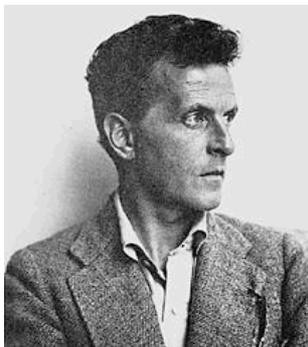
We shall start this task by quoting one of the greatest philosophers in the 20th century, Bertrand Russell. He (1912) clearly distinguishes between “the real thing” and our knowledge about it. He introduces an important distinction between *sensations* and *sense-data*:

Let us give the name of 'sense-data' to the things that are immediately known in sensation: such things as colours, sounds, smells, hardnesses, roughnesses, and so on. We shall give the name 'sensation' to the experience of being immediately aware of these things. Thus, whenever we see a colour, we have a sensation of the colour, but the colour itself is a sense-datum, not a sensation. The colour is that of which we are immediately aware, and the awareness itself is the sensation.

We see a dichotomy between the neuro-signals from our eyes and the brain's interpretation of them as the colour green. But if we see a green apple, can we conclude that there is an apple independent of our observing it? Or as the clerks in the admittance bureau: Based on the fact they see two pieces of paper can they conclude that what they indicate has really happened? Obviously not.

Russell (1912) seems to agree with Kant (1781) insofar as there are certain primitive categories (colour, form, sound etc.), called *a priori knowledge*, from which we obtain *immediate knowledge*, a special sort of primitive knowledge used as building blocks in more complicated knowledge systems. We can in fact compare with knowledge in a database, where the a priori knowledge is defined as object classes and attributes in the database. The structure of the object class “customer” defines what is immediately possible to know about the customer such as name, address, latest order etc. Thus in fact a computerised information system defines what is possible to talk about, it defines an a priori knowledge about the world. Human beings might however have other

supplementary a priori systems and thereby a possible contradiction is introduced. My friend Hasse was a typical victim of this, since the system the clerks at the admittance bureau was using, defined their empirical knowledge, the supplementary knowledge Hasse supplied was not accepted or realised.



In general: *A data system provides sentences about reality but it is not reality!* Using such a system can in the long run produce this belief, thus the stubbornness of the clerks in the admittance bureau not to accept the reality!

Russell has described sensations. But what do we do with the sensations? Here we turn our attention to Wittgenstein and his Tractatus (1921) where he argued that everything could be explained in elementary sentences. We shall follow part of his reasoning.

Wittgenstein clearly bases his reasoning on logic and he tries to investigate how we can express reality with help of our language, based on an implicit assumption that

language and reality are logical in their nature. Later on¹ he realised this approach could not say anything about reality and in his “Philosophical Investigations” (1953) a very different picture is presented.

We first see a connection to Russell’s sensations in section 3.1: “In a proposition a thought finds an expression that can be perceived by the senses.”

Our sensations find their expressions in a proposition. It is guilty the other way round too, as Wittgenstein states in section 4 and in the subsequent sections 4.01 and in 4.06 he also states that “true” is equal to “correct”.

4 A thought is a proposition with a sense

4. 01 A proposition is a picture of reality. A proposition is a model of reality as we imagine it ...

4.06 A proposition can be true or false only in virtue of being a picture of reality

However, he seems not to realise that reality might be unlogical, or rather if that is the case, it is nonsense! Wittgenstein also thinks, in accordance with Descartes (1637) that the world is possible to divide into simple parts:

4.21 The simplest kind of a proposition, an elementary proposition, asserts the existence of a state of affairs

4.26 A complete description of the world is given by listing all elementary propositions, and then listing which of them are true and which false

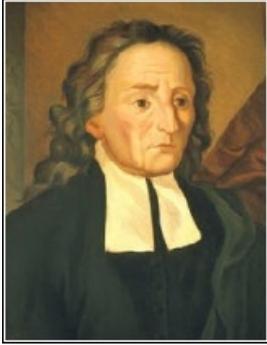
And finally he ends up with section 5:

5. A proposition is a truth-function of elementary propositions.

In the section 6 he describes the logical form of a proposition. Wittgenstein argues thus, that based on elementary propositions we can describe the whole world and gain all knowledge that is possible. We should immediately start finding those elementary propositions, but there is at least one problem: Nobody has ever been able to give any example of an elementary proposition! But still, I argue that those elementary propositions points at *factual statements*, telling something about reality, something everybody can agree upon *if they understand what is meant*. The last “if” is important, it requires some sort of common a priori knowledge, which is developed in a social interaction among people (Berger & Luckmann, 1966). This lead us into hermeneutics and phenomenology, but first let us summarise Russell and Wittgenstein:

Sensations	Interpretation of the sense-data captured by our senses.
Propositions, Facts	Statements about the state of affairs, about what actually “is” such as “My computer is a Macintosh”.

¹ In fact it can be argued that he realised this also in Tractus, since he concluded it with the famous words: “*What we cannot talk about we must consign to silence*”.



Vico and Husserl – to experience knowledge

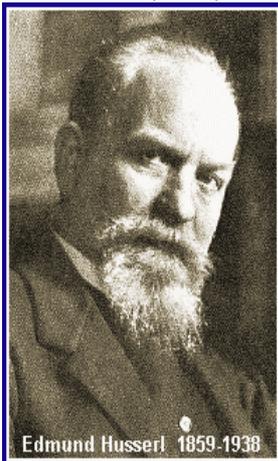
Russell and Wittgenstein starts from the scientific knowledge of Aristotle and proceeds by using reduction and simplicity. But there is another trend starting from “judgements” and “explanation” and proceeding towards holistic knowledge. Here we shall meet Vico and Husserl.

Giambattista Vico lived between 1668 and 1740. He introduced history as a science and with it a new view on science. Cassirer (1960) says about Vico:

... But what he did see clearly, and what he defended with complete decisiveness against Descartes, was the methodological uniqueness and distinctive value of historical knowledge..

A characteristic property of this science is, according to Robbins (1999), to “not take for granted the sense given at a particular time and place as self-evident.” This is very often the case in systems development and we saw the result when Hasse’s papers were shown to the admittance clerks, they took for granted that it was incorrect and the system was correct. We can trace this back to the requirements specification or maybe to the programming, where some incorrect rules were entered into the system. Despite this, the system was, and is, true! We can easily agree with Encyclopedia Britannica which characterise Vico’s knowledge as “The knowledge-making process deals almost entirely with invention.” Vico's concepts deal mostly with the relationship between truth, knowledge and the origins of language. This emphasise the social aspect. Kreis (2000) means that one of Vico's most crucial insights – insights that appear full blown in the work of Hegel and Marx – lays in his claim that the various aspects of a society's life are intrinsically connected with one another.

Vicenzo (2001) means that Vico’s new science involve the idea that this science is a



science of man's engagement with, or response to, an essential exteriority or otherness to man. Only by an understanding of the beginning can one rightly identify the natural state out of which words were given their sense and meaning and humanity were given their origins. Taken down to our example; if we want to investigate the admittance example in the spirit of Vico we might discover that when Hasse applied for the first time he wrote his registration code on his second alternative a little unclear, so a “4” was interpreted as a “9” when entered into the computer. This could be used as a hint for making better input controls, for instance give the operator a hint about disparate applications,

maybe indicating some sort of typing error. But this was not done, since it has not happened!

About 200 years later another philosopher, Husserl (1859-1938) gave birth to another approach, the *phenomenology*.

He means there is an objective world out there; but since we are experiencing subjects we define that objective world. Truth lies, (Husserl 1917) not in the mind, nor in the real objects, but in the interaction between the two. As soon as we encounter the world, we, as conscious subjects, start to give it meaning. When the clerks at the admittance bureau enter their job, they give it a meaning according to the computerised admittance system. A solid foundation for knowledge can only be secured by a rigorous method that returns us to the immediate experience of consciousness – *the phenomena*. This is not the actual object, it is the impression of the object which passes through the mind. A phenomenon include every kind of sensuously meant or objectivated thing. That the concept includes “all ways of conscious of something means that it includes, as well, every sort of feeling, desiring, and willing with its immanent ‘comportment’ (Husserl 1917). Phenomenology is therefore the study of those phenomena which pass through the mind. Also “phenomenology would investigate in the same way how what is collected looks in the collecting of it; what is disjoined, in the disjoining, what is produced, in the producing; and, similarly, for every act of thinking, how it intrinsically ”has” phenomenally in it what it thinks” (ibid)

Husserl (1917) distinguish between two types of experience:

To the objects which are obviously correlated to each other, of these contrasted sciences there correspond two fundamentally different types of experience and of intuition generally: immanent experience and Objective experience, also called ”external” or transcendent experience. Immanent experience consists in the mere viewing that takes place in reflection by which consciousness and that of which there is consciousness are grasped.

The whole nature is suspended in favour of the phenomena. However, those phenomena are basically individual consciousness and how can science be carried out in such a world? Husserl (ibid) says “Science cannot be solipsistic. It must be valid for every experience subject” so there must be a solution. It is in fact like Euclidian geometry; pure phenomenology proposes to investigate the realm of pure consciousness and its phenomena not as de facto exists but as pure possibilities with their pure laws.

Phenomenology applied to the admittance example might investigate what it really means to admit somebody to a course. For the clerks it was not only an ordinary job, it was some sort of devotion, it was not just ordinary admitting, it was Admitting, with a lot of judgements, considerations, fairness etc. Some of this was captured in the data system, but still, admittance was their responsibility and criticising the system, was the same as criticising their job, devotion, judgements etc. They did not distinguish between immanent and transcendent experiences. Crucial for phenomenology are the

agreements. In database research Gruber (1991) defines an ontology as a vocabulary of representational terms with agreed-upon definitions, in human- and machine-readable forms. The similarities are striking!

Some modern ideas

Within the area of information systems we have some research, especially in Scandinavia, dealing with epistemological aspects. Bo Göransson has during a long period written about tacit knowledge and skill (cf Aristotle "art"), Hammarén (1999) has written her PhD thesis about judgement and learning, Godlkuhl and Lyytinen have also during a long period written about speech act and even arranged an annual conference within the area, etc. Here I will just point at some maybe less known approaches.

Ruth et al (1999) gives a good review of current knowledge management literature seen in the perspective of university teaching in KM. They write:

"Depending upon the setting or context, a course could emphasize an historical framework beginning with Plato and Aristotle and migrate ... to a point where some of the basic concepts, such as tacit and explicit knowledge, become the natural results of a system of thought that has spanned over two millennia."

This essay clearly belongs to this category. Hoffman et al (1999) argues that KM software must be embedded in processes of knowledge workers' everyday practice. Participation of the knowledge owners and future users is an important factor for success of knowledge management systems. They suggest a design process, which includes ethnographic surveys, user participation in cyclic improvement and scenario based design, in fact they base the approach on Aristotle's practical wisdom, in the same sense as tacit knowledge.

Dubitzky et al (1999) refers to Eastman (1989) and Motro (1987) who distinguish between two kinds of requests for data: *specific requests* and *goal requests*. As an example of the first kind they provide "What is the income of John?". It is a precise, rigid question and most databases are build with that kind of questions in mind. A goal request, on the other hand, describes a target that is concerned with data that is close or similar to that query. For example, "List high cholesterol patients that have a low coronary heart disease risk". The kind of knowledge provided in the two cases are different: In the first case *a fact* was provided, in the other case something close to judgement. Dubitzky et al (1999) propose a concept-oriented database approach based upon goal requests.

Storey et al (1997) propose an interesting idea of creating methodology for acquiring and using general world knowledge about business for database design. They

introduce an ontology according to Gruber (1991) and some formalisms for determine the “distance” between concepts.

We can conclude that researchers today are well aware of tacit knowledge and its importance for the work in the organisations. This insight can be traced back to Vico and Husserl, introducing the subjective side of knowledge. Even in data base design, where the traditions from Russell and Tractatus are kept alive, other ways, as seen in Dubitzky et al (1999), are being introduced. The traditional query establishes a rigid qualification, such a query is concerned only with data that matches it precisely. Typical goal queries contain intrinsically imprecise predicates, involving judgements also. Despite this, Dubitzky et al (1999), propose a formal, concept-based database model.

But the moral side of knowledge, so emphasised by Aristotle seems to be missing in contemporary discussion of knowledge management. Except for the case of personal integrity, we very seldom see discussions about the moral right to collect information about certain phenomenon.

Also a focus on the forms for gathering or disseminating knowledge can be seen, probably as a consequence of the formalistic approach we usually have to information systems and their development. Aristotle was very focused on the content of knowledge, this is today only mentioned as “tacit knowledge”. I argue that in taking the moral dimension into account we also focus on content and the use of information. This will inevitably lead to increased focus on user participation and even user control in systems development and change.

References

- Aristotle: *Nicomachean Ethics*, Translated By W. D. Ross, 350 BC
- Berger P L, Luckmann T: *The Social Construction of Reality*, , 1966
- Blackler F: *Knowledge, Knowledge Work and Organizations: An Overview and Interpretation*, *Organization Studies*, 16/6 pp 1021-1046, 1995
- Burke, P: *Vico*, New York: Oxford University Press, 1985.
- Cassirer E: *The Logic of the Humanities*, trans. C. S. Howe , New Haven: Yale University Press, 1960, p 52.
- Churchman C W: *Design of inquiring systems*, Basic Books, New York, 1971
- Cook S, Brown J S: *Bridging Epistemologies: The Generative Dance Between Organizational Knowledge and Organizational Knowing*, *Organization Science*, Vol 10, no 4, 1999, pp 381-400
- Descartes R: *Discourse On The Method Of Rightly Conducting The Reason, And Seeking Truth In The Sciences*, 1637
- Dubitzky W,. Buchner A G,. Hughes J G,. Bell D A: *Towards concept-oriented databases*, *Data & Knowledge Engineering* 30 (1999) 23–55

- Eastman, C.: Approximate retrieval: a comparison of information retrieval and database management systems, *IEEE Data Engineering* 12 (2) (1989) 41-45.
- Festinger L: *A Theory of Cognitive Dissonance*, Stanford University Press, 1957
- Flyvbjerg, B. *Rationalitet og magt. Det konkrete videnskab*, Kbh: Akademisk Forlag, 1991
- Gruber T: The role of common ontology in achieving sharable, reusable knowledge bases. Knowledge Systems Lab. Rep. KSL 91-10. Stanford University, Stanford, CA. 1991
- Hammarén M: *Ledtråd i förvandling*, PhD-thesis (in Swedish), Dialoger, 1999
- Hanseth O: Philosophy and Industrialized Software Development, *Scandinavian Journal of Information Systems*, vol 3, 1991
- Hoffmann, M, Loser K-U, Walter T, Herrmann T: *A design process for embedding knowledge management in everyday work*, Proceedings of the international ACM SIGGROUP conference on Supporting group work, 1999, Pages 296 - 305
- Huber, G. P., & Glick, W. H. (1993). *Organizational change and redesign: Ideas and insights for improving performance*, New York: Oxford University Press.
- Husserl E: *Inaugural Lecture at Freiburg im Breisgau*, Translated by Robert Welsh Jordan. In *Husserl: Shorter Works* Edited by Peter McCormick and Frederick A. Elliston. Notre Dame, Indiana: University of Notre Dame Press, 1981. Original 1917
- Kant I: *Krtik der Reinen Vernunft*, Zweite Auflage, Leibzig, 1924 (orig 1781)
- Lo H N: *Giambattista Vico*, . Georgia Institute of Technology, <http://www.lcc.gatech.edu/gallery/rhetoric/figures/vico.html>, 1996
- Lotsson A: *Bästakunskapshanteringen? Berätta historier*, Computer Sweden, no 67, 13 juni, 2001, p 16-17 (in Swedish)
- Motro, A: *Extending the relational data model to support goal queries*, in: L. Kerschberg (Ed.), *Expert Database Systems*, Benjamin/Cummings, Menlo Park, CA, 1987, pp. 129-149.
- Nonaka, 'The Knowledge Creating Company,' *Harvard Business Review*, November-December, 1991.
- Robbins J: *The Enlightenment at the Margins: Giving Place to William Blake and Giambattista Vico*, course material, <http://web.syr.edu/~jwrobbin/VICO.HTM>, 1999
- Russell B: *The Problems of Philosophy*, Oxford University Press, 1912
- Ruth S, Theobald J, Frizzell V: *A university-based approach to the diffusion of knowledge management concepts and practice*; Proceedings of the 1999 ACM SIGCPR conference on Computer personnel research, 1999, Pages 283 - 290
- Storey V, Chiang R, Debabrata D, Goldstein R, Sundaresan S, *Database Design with Common Sense Business Reasoning and Learning*, *ACM Transactions on Database Systems*, Vol. 22, No. 4, December 1997.
- Sumner M: *Knowledge Management: Theory and Practice*, Proceedings of the 1999 ACM SIGCPR conference on Computer personnel research, 1999, Pages 1 - 3
- Verene, D: *Vico's Science of Imagination* Cornell University Press, London 1981.

- Vicenç T: Knowledge-based validation: Synthesis of diagnoses through synthesis of relations, *Fuzzy Sets and Systems* 113 (2000) 267-276
- Vincenzo J P: Vico's New Science: The Unity of Piety and Wisdom, Walsh University, <http://www.bu.edu/wcp/Papers/Hist/HistVinc.htm>, visited 24 mar 2001
- Wittgenstein L: *Philosophical Investigations*, Blackwell, Oxford, 1976 (first edition 1953)
- Wittgenstein L: *Tractatus Logico-Philosophicus*, Routledge & Kegan, New York, 1961 (first edition 1921)