

THE ESSENCE OF KNOWLEDGE MANAGEMENT: *A Constructivist Approach*

Marco C. Bettoni

Institute for Methods and Structures, Passwangstr. 31, 4059 Basel, Switzerland

Email: m.bettoni@weknow.ch

Sibylle Schneider

Kanzelweg 7, 4410 Liestal, Switzerland

Email: schneider@luftlinie.ch

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Abstract: We contend in this presentation that more sustainable and successful Knowledge Management (KM) solutions can be built by using the principles of Knowledge Engineering (KE) to understand knowledge in a more appropriate way. We will basically explore five aspects of practical knowledge relevant for promoting the essential Human Factors (HF) involved in KM tasks: the value and function of knowledge, the motor and mechanism of knowledge, the two states and 3 conversions of individual knowledge, the logic of experience (organisation of knowledge) and knowledge processes (wheel of knowledge). We explain their consequences under the form of five principles that we suggest could be used as leading criteria for designing and evaluating KM solutions and systems in a *new* way more appropriate for implementing successfully the *old* insight of the essential role of people.

1 INTRODUCTION

What do we mean by essence of Knowledge Management (KM)? In the KM literature you can find expressions like „knowledge sharing is (communities of practice are) the essence of KM“, with the meaning of "essential solution" or "essential method". But in our use it means something new, something like the DNA in biological systems:

- a) it is present in each project step or solution component and
- b) it determines them and the whole system.

From our radical constructivist point of view (Glaserfeld, 1995) this DNA of KM consists in the answer to the question "What do we mean by knowledge?" („What is knowledge?“). Everyone involved in KM answers it tacitly but seldom or never deals explicitly with it. In fact KM people tend to delegate this job to professional philosophers.

2 WHAT IS NEW?

We claim *that KM people should become aware of how they look at knowledge* (we should not delegate this job) and we have made the first step in this direction, articulated in three parts:

1. First, based on experiences with Knowledge Engineering, we claim that our established way of looking at knowledge is not appropriate for KM purposes.
2. Then we will propose an alternative view, that we call the „constructive“ view of knowledge.
3. Finally we will explain 5 practical criteria - deduced from this view - that could be used for designing or evaluating sustainable KM solutions.

The essential role of people has been recognized since the beginning of KM but the implementations of this insight are still unsatisfactory. KM systems and solutions are still very technocentric: they

concentrate on the so-called „codification approach“ and fail to implement the „personalization approach“. In our work (research, workshops, consulting) we emphasise the central role of people in KM in a different way than this has been done up to now. The newness of our contribution consists in: a) the application of Radical Constructivism to KE, b) a defect analysis of KM based on constructivist KE, art and cybernetics and c) constructivist guidelines for KM environments. From this we can obtain a better conceptual basis for a harmonic and equilibrated implementation of both the codification and personalization approaches: only this balance can make KM successful and sustainable.

3 DEFECTS ANALYSIS OF KM

KE (an Artificial Intelligence technique) is basically the art of making explicit the tacit knowledge of experts (employees, associates) by means of models which are suitable for automation. Examples of knowledge automation are the automatic assessment of tax returns, automatic diagnosis of machine faults, automatic programming, etc. The first author has about 15 years of experience in applying constructivism to making explicit the tacit knowledge of experts (Bettoni and Bernhard, 1994; Bettoni and Fuhrer, 2001) and the main lesson that he has learned is that: ⇒ succesful KE is possible but requires an understanding of knowledge which promotes the relevant human factors involved.

The second author had similar experiences in art consulting and art education. This kind of insights has been confirmed also in the domain of e-learning with the application of Constructivism to the design of learning environments (Jonassen, 1994; Jonassen and Land, 2000).

What we claim now is that the same lessons and suggestions obtained from applying Constructivism to KE, art and e-learning are valid also for KM.

Based on this claim, we are in an experientially well rooted position for understanding in this analysis what influences, what determines some major defects (obstacles, problems) of KM solutions and systems. Examples of such defects are:

- missing motivation for sharing
- difficulties in the transformation of tacit to explicit knowledge
- lack of transparency in knowledge stores and "information architectures" (taxonomies, ontologies)
- insufficient integration of KM tasks within business processes, etc.

3.1 Analysis based on KE and Art

From our experience in KE and art we are convinced that a main cause of the major KM defects is that the relevant human factors (HF) are not enough appreciated and promoted (Fig. 1, middle box „Causes“) and we see a reason for this (Fig. 1, left box „Measures“) in our established way of looking at knowledge in which we are convinced (have the illusion) that our knowledge

- corresponds to reality
- is the logic of reality
- and that we can access and extract this logic from there

When we work at the meta-level of knowledge (anything we do in KM happens at such a meta-level because KM consists of „knowledge about knowledge“), then this view becomes a big handicap. Why? Because of the influence of this measure on the human factors (Fig.1, arrow from box „measures“ to box „causes“): this view makes that human factors cannot be sufficiently appreciated and promoted.

3.2 Analysis based on Cybernetics

Regarding the influence of our conception of knowledge on the HF we have learned from Cybernetics (Maturana, 1988 and 1998; Senge, 1990; von Glasersfeld, 1995; Freeman, 2001) - that understanding knowledge as mapping (as "logic of reality") NEGATES the human factors (negates = obstructs the progress of the person in the direction of her basic human tendencies; see the humanistic school of psychology (Maslow, 1954; Bühler and Allen 1972). Why? Because when I understand my knowledge as LOGIC OF (corresponding to) REALITY, then I follow a path of objectivity in which:

1. I implicitly deny the power to choose (determinism instead of free choice)
2. I implicitly formulate a demand for obedience (awarely or unawarely). I implicitly propose my knowledge as an argument, that the other will not be able to deny. Knowledge of this kind becomes an argument to force the other, to compel the other, to do as I say!

On this basis of *Determinism and Obedience* I cannot really respect the person in front of me (employee, associate, partner)!!! So Determinism and Obedience are the two great obstacles to organisational learning, to knowledge sharing, to communities of practice, to the improvement of

knowledge processes (in which the person is involved) in general. Which are the alternatives? How should our understanding of knowledge be?

What matters this in a business? Adaptation is important not only for KM but also for managing structural capital or for making new or modified

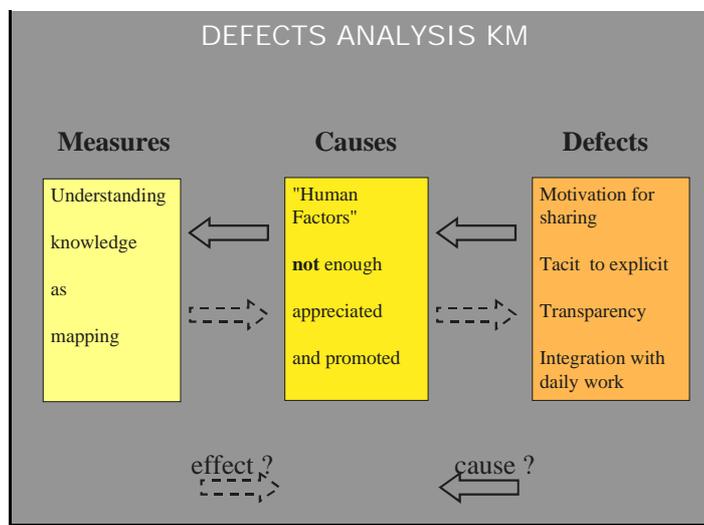


Fig.1 Defects Analysis of Knowledge Management

4 CONSTRUCTIVE VIEW

The alternative that we propose is articulated in 5 aspects of knowledge, five characteristics essential to the goals of overcoming determinism and obedience and instead awarely and explicitly promoting human factors in KM.

4.1 Value and Function

In business we are interested in the value of knowledge. And what determines the value of knowledge for a knowledge owner? It is its function (1st essential aspect). And what is then the function of knowledge?

We follow in our approach a school of knowledge research initiated by the Swiss psychologist Jean Piaget in the 30^{ies} in Geneva, the so-called "Constructivism", which suggests that (Glaserfeld, 1995):

- the function of knowledge is **adaptation**
- adaptation to what? to situations: the knowledge owner **adapts to** what he or she perceives, lives, as a certain situation (and situations are experiences of events! If a meteorite comes down now and hits me, you can experience it as perturbation in space or as divine punishment, like in the Middle-Age, or ...)

products possible (and also services, processes, networks, ...). But how does adaptation work? What drives & controls adaptation? Which is the core mechanism?

4.2 Motor and Mechanism

Following Radical Constructivism we suggest that:

- the core-mechanism of adaptation is the "**construction**" of *viable* experiences (consistent, coherent, valid).
- The construction of viable experiences is driven and controlled by factors like intentions, interests, wishes, hopes, expectations, etc. which are very specific to each knowledge owner

These *human factors* are highly individual and make that the knowledge (logic) of every single person is also highly individual: so it cannot be the logic of reality, it can much better be the *logic of experience*. Adaptation and construction create the experiential worlds in which every single person lives. What means "construction" here? We are not saying that the mind creates reality! We use "construction" in a similar sense like engineering, where it is used for activities like planning, design, building and testing. In the case of cognition we say that the brain "constructs" its knowledge in the sense that it can **know** only what it has **determined** (i.e. only what it has *done* by planning, designing, performing and testing its acts).

The first who formulated this in such a way was the Italian philosopher Giambattista Vico about 1710 (Glaserfeld, 1995). Notice that our constructions are not arbitrary! So, do not worry. Why? For 3 main reasons:

1. because we do *not create* reality; our constructions are merely experiences (artistic experiences, engineering and manufacturing experiences, financial experiences, etc.)
2. because we *rely* on them as tools for achieving something
3. and because we *test* them against the results of what we have achieved.

Recent developments in brain sciences show an increasing tendency to determinism: the denial of the possibility of choice. This is the (logical) consequence (and demonstration) of the underlying assumption that knowledge is the logic of reality. But we are not like stones rolling downhill (Spinoza): the power to choose is an essential and unalienable property of human life (Freeman, 2000). It is the fundamental human factor!

4.3 Common daily words

As an example of what "construction" means, let us take something from daily life (what we daily do is namely what concerns all of us), for instance two common daily words, "look" and "see". These are two very interesting words, because they designate two coupled experiences which take place one after another and are dependent of each other. They are useful to recall us the fundamental insight that

what we see depends on *how* we look!

The same happens with 2 other words, namely "listen" and "hear": how I listen determines what I hear. Language hence embodies in such words-pairs already since thousands of years Vico's insight that everything we know (the *what*) is determined by what we do (the *how*, our way of knowing) and not by what is given (the indefinite something). In three words:

HOW determines *WHAT*.

But then we have an important consequence: that the "what" cannot be the logic of reality! Example: When I say that light is both a wave and a stream of particles then this so-called "dualism" is not in nature it is in our minds (as logic of our experiences).

5 STATES AND CHANGES

Knowledge can be distinguished in two states, tacit knowledge and explicit knowledge. Tacit knowledge, the "treasure in our heads" consists mainly of experiential knowledge and

- is generated as a result of **construction** and *not* of mapping processes
- adapts itself dynamically to all situations, belongs to his or her constructor and goes with him or her every evening home.

Tacit knowledge is generated in any individual either from available tacit knowledge ("reflecting") or from explicit knowledge ("interpreting") and constitutes "*a kind of living structure that grows and changes, yet endures*" (Freeman, 2000, p.9).

Explicit knowledge is generated by embodying the living, dynamic tacit knowledge in material carriers (artifacts). Such artifacts are for instance manuals, laws, reports (documents of any kind, incl. diagrams and drawings), procedures, organizational methods and structures, equipments. Explicit knowledge is so to speak "frozen" tacit knowledge, its shadow, and we could well call the conversion from the tacit to the explicit state either "mapping" or "representing" or "embodying".

Together the 3 transformations (interpreting, reflecting and representing) constitute the process of thinking. A crucial point is now the structure of this process. Why? Because it shows how knowledge is organized as the logic of our experience.

6 LOGIC OF EXPERIENCE

The process of thinking can be distinguished in two subprocesses, perception and elaboration. Surprisingly perception is far more important for knowledge (& goals). But traditional thinking - according to E. de Bono - is focused exclusively on elaboration and dislikes the vagueness, subjectivity and variability of perception.

In our tradition, elaboration consists basically in the use of argument and reason with the goal of "falsification": i.e. demonstrating the contradictions of a position or showing that something is false. Reality is proposed as the Universal Absolute that has to be used as reference. "I am right - you are wrong" (de Bono, 1992) condenses the essence of the "logic of elaboration" (rock logic, because like a rock it is permanent, hard, has a definite shape).

Luckily perception has another logic, the logic of pattern-building systems, but we ignore it. Why? Because we have never understood perception! Like water fits in a bowl or bottle, similarly the patterns

that perception constructs are not right or wrong, they simply "fit" in the situations and circumstances that the person lives, experiences (water logic).

And also conceptualization (categorization) works within the same "water logic": this is the main reason why perception is more important for knowledge than elaboration. For example: this room can be conceived as a "part" (of the building) or as a "whole" (in relation to the floor, roof, walls, etc.), depending on what fits in what the person lives, not depending on "Reality". We, with our conceptual operations can flexibly adapt our perception and conceptualization to "fit in the bowl". This "operational" perspective is the pioneering contribution of Silvio Ceccato (1914-1997) and his Italian Operational School (Glaserfeld, 1995).

7 THE WHEEL OF KNOWLEDGE

The name "Knowledge Management" misleads many persons involved in KM (critics, users but also developers) to think, knowledge itself (thinking, understanding, perceiving, etc.) is meant to be the straight object of management measures. This view leads then to the conclusion that KM is nonsense because "knowledge cannot be managed". Looking at the goal of KM (collective availability, access and utilization of individual knowledge) from our constructive perspective we see that not knowledge itself, but the *handling of knowledge* [knowledge processes, Fig.2] should be regarded as the object of management tasks and measures. The overall task of knowledge management then is not to organize knowledge but to *organize collective knowledge processes*. At our Institute for Methods and Structures we have developed a roadmap model for KM projects which integrates a model of knowledge processes that we call "Wheel of Knowledge" (Bettoni et al, 2001).

8 MESSAGES

In summary: in order to advance the person in the direction of his or her tendencies in the context of KM initiatives we propose to understand knowledge as construction:

- *Main function*: Adaptation to situations as they are lived
- *Core mechanism*: construction of viable experiences
- *Interpretation*: a construction process where we choose how to look at something and this determines what we see

- *Representation*: not the same but the inversion of interpretation
- *Logic of experience*: the pattern-building processes of perception and conceptualization operated by the knowledge owner are more important than elaboration
- *KM main task*: organisation of collective knowledge processes with knowledge transparency at the center.

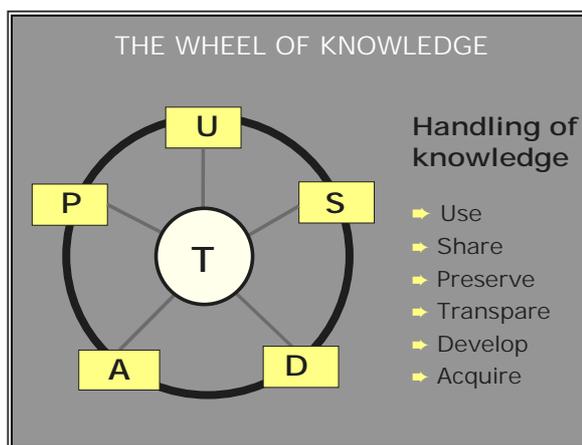


Figure 2: The Wheel of Knowledge

The application of this approach to KM projects must influence all levels of the projects: for this reason we have derived from our view of knowledge a set of 5 principles to be used as practical criteria for evaluating KM measures at any stage in the roadmap of a KM project.

9 PRINCIPLES OF CKM

We propose five basic, fundamental (essential) principles of Constructive Knowledge Management (CKM). Why five? Because we want to use the hand as a symbol of CKM. And there are five fingers on a human hand. The number five best reminds of our goal to advance and improve KM unless it will become a tool as powerful for changing business life as the human hand. Thus we use here the number five not as a "meaningless metaphor" but indeed as a very useful mnemonic tool.

1. **CONSTRUCTIVE**: We can look at a banana and an apple as being the same thing (food) and we can look at an apple and a billard ball as being different things. *What* we see (food, apple, ball) depends on *how* we look at: this is what *constructive* means. The act of "looking at" is represented by the index finger, because that is the

finger we use to point to what we have given a meaning (source of different or similar visual stimuli).

2. **INSEPARABLE:** The act of looking at is determined by intentions, interests, wishes, hopes, expectations, etc. These *human factors* are highly individual and make that every person is inseparably bound to his or her knowledge (logic). This is represented by the second finger because this finger is the longest of the hand and this principle the most important of all five.

3. **BALANCE:** In order to avoid the separation of an employee from his or her knowledge a balance between intrinsic economic constraints and human-social requirements must be maintained. This is the energy of CKM activities and is represented by the third finger. We do not notice this finger much - but it there all the time. So the balance must also be there.

4. **NEGOTIATION (PACT):** A further contribution to avoiding the separation of an employee from his or her knowledge can be obtained if firms negotiate with their employees a new pact, one could say a "knowledge contract" summarized in the sentence: "You let your individual knowledge flow, we appreciate, promote, protect it and let the company's knowledge flow". This is the little finger of the hand, to remind us that even a limited, reduced pact (negotiation) is important. Eventually, negotiation by negotiation, the pact can contribute to bigger and bigger effects.

5. **COMMUNITY:** Without community there can be no effective knowledge management. Community provides steady networking between the two states of knowledge (tacit and explicit) and continuous cooperation between individual knowledge workers. Community is the thumb of the hand, because without the thumb the hand is useless.

10 CONCLUSION

Our contribution to a "new knowledge era" can be summarized in four points:

1. the DNA (or essence) of KM is our tacit conception of knowledge;
2. the established way of looking at knowledge is not appropriate for KM because of its implicit Determinism and Demands for Obedience;

3. the alternative that we propose is the radical constructivist conception of knowledge, because it promotes the human factors, particularly the fundamental respect of the persons we interact with;
4. finally, from this conception we can deduce 5 practical criteria that are useful for designing or evaluating sustainable KM solutions and measures (at any stage in the roadmap of a new generation KM project).

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