

Knowledge Management: Technology of information versus Sociology of Knowledge

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Abstract

As the very nature of the ISK/DM'99 seminar seems to prove, the actual tendency of the industrials is to identify Knowledge Management to Technology of Information. Therefore, the purpose of this paper is to denounce the epistemological error consisting on confusing those very different subjects, whom we call Sociology of Knowledge (for Knowledge Management) and Technology of Information (for Information Technologies). Having understood this main point, we will propose to the reader a social and cultural methodology to implement Knowledge Management inside of a group (or a company). A discussion about Information Technologies will finally show that, if these technologies can be used as a part of the Knowledge Management concrete implementation, this has to be done carefully. Actually, we will also show that Information Technologies can impede Knowledge Management.

1. Introduction

"We do not know one millionth of one percent about anything", said Thomas Alva Edison, who probably would not have appreciate the present tendency to say that the most valuable asset companies have is the Knowledge of their employees. Now it has become a commonplace to say that successful companies of the 21st century will be the ones which will be able to deal with Knowledge, also called "intangible asset", with quickness and efficiency. The power does not remain anymore in the hands of the one who produces material goods at a minor price, but in the hands of the one who has the right Knowledge at right moment.

Thus, following the clues given by famous professors like Davenport [3], Sveiby [15] [16], or Senge [14], companies try to subsume the principle of Knowledge Management inside their walls, applying Davenport's ten principles [4], improving Sveiby's bandwidth of Trust and Communication [15], or becoming a "learning organization", has suggested by Senge [14]. Of course, the most powerful market existing nowadays (the software market) could not miss such an opportunity. That is the reason why every classical software company proposes now its Knowledge Management solution. Microsoft has its "MS Platform" containing, Windows NT, MS Office, MS BackOffice, MS Outlook, MS Exchange Server, ... Lotus has its famous

Lotus Notes, DominoDoc, Sametime, Learning Space. Opentext proposes LiveLink tool; HyperWave has its HyperWave Information Server, etc. We could make an article just listing all the Knowledge Management software existing on the market, but this is not our point.

As for me, as I am presently working in Knowledge Management area of Siemens Brazil, I was asked to propose a Knowledge Management Architecture for the R&D departments, and to implement this architecture evaluating and using existing tools, or even creating new ones. According to my graduation, that is computer science engineering, I was first full of enthusiasm, feeding my computer with what I supposed to be sharable Knowledge. As my reflection became more profound, and as I was confronted to the first real difficulties of the problem, I realized I had an erroneous conception of Knowledge Management. Actually, I did not make the difference between Information and Knowledge, between Management and Engineering. Like the majority of the industrials, I thought that a miraculous electronic tool could be installed inside the company, definitively implementing Knowledge Management. I did not make the difference between Technology of Information and Sociology of Knowledge.

Actually our experience as Knowledge Management Workers shows us that the a great majority of professionals think that Knowledge Management is Technology of Information, that is computers, Internet, document management, searching engines, data mining, artificial intelligence, intelligent agents... Therefore, our point in this article will be to show that Knowledge Management is a cultural and sociological matter, not a technical one. We will try to deconstruct this classical idea, which consists on thinking that realizing Knowledge Management inside a company is to choose between Lotus Notes and MS Platform, then install it on the company's intranet and finally wait. Our work is based both on personal experience [2] and on classical works realized by Davenport [3], Sveiby [15] [16], Senge [14], Gundry & Metes [8], Newman [10], Godbout [7], Baumard [1], and Ruggles [11].

In order to achieve our objectives, we will first try to correct the classical confusions between Information and Knowledge, between Management and Engineering, and between Knowledge Management (which we assume to be Sociology of Knowledge) and Information Engineering (which we call Technology of Information). After that, we will propose some solid bases on which we can try to develop Knowledge Management. This will lead us to expose a methodology of this activity. Finally, we will discuss the using of Information Technologies inside the Knowledge Management process, and give a conclusion to this article.

2. Some classical confusion: Information instead of Knowledge, Engineering instead of Management

Actually, the assimilation of Knowledge Management to a technology is a trap we could hardly avoid at the switching time between the Technology era and the Knowledge era. The term Knowledge Management on itself is a double problem. First, we have to know exactly what "Knowledge" is, what "to know" means. Then we have to define an adequate methodology to manage this Knowledge (supposing

that we exactly know what we mean by "managing")

Information instead of Knowledge

In an anthropological point of view, it seems to us that we are now living in a world of Information. Everybody is looking for the right information on the Internet, using digital computers, these universal Turing machines [19] based on the Information theory. According to the hard core of AI, we, human beings, also are Turing machines, which manipulate formal information [6]. However, how could we define the concept of "information"? Ultimately this is a philosophical question where one could reasonably take different points of view. We will say that "information is something physical and measurable that is seen as existing independently of the mind who is aware of it" [7] [13]. For instance, a scattering of rocks on the surface of Mars could be seen as an example of "information", given by some non-human beings... Thus, a naive Knowledge Manager will propose to implement a computer-based document-managing tool to achieve Knowledge Management. Actually, this consists on believing that the solution of Knowledge Management lies in the realm of resources and "Knowledge physical assets" (basically documents). In fact, the most easily perceivable attribute of "Knowledge" is its physical manifestation seen in information resources. Following that point of view, the increase in performance of a firm should be achieved through sound management of these physical assets, which are formal and measurable, through sound management of information.

Is this really the purpose we want to achieve when dealing with Knowledge Management? Do we only want to organize electronic documents? A great majority of industrial would answer us that this is our purpose. Actually, they do not make the difference between Information and Knowledge, and they do not realize that the challenge is to manage Knowledge, not to organize Information. But if Information is not Knowledge we should then say at least what Knowledge is... We believe that Knowledge Management challenge lies in the realm of enterprise cultural construct (Weltanschauung). The benefit a company should extract from a Knowledge Management process would be to increase its global competency, enabling to address effectively and quickly the constraints and problems submitted by the firm environment. By the expression "To increase its competency", we mean here to create the appropriate intellectual shared behavior of the firm's participants in front of such or such situation. Therefore, Knowledge Management consists primarily on creating intellectual fluxes enabling the global emergence of the expected shared competency. Learning and communicating loops tend then to have precedence over treatment of knowledge physical assets (information).

Human's knowledge is not a physical repository of elements where one can commit the classical data-base operations "remove", "update", "add", "consult"... Knowledge is the dynamical process of exchanging. The first step to understand that point is to stop thinking human being in "hardware terms". Human being is not a computer, and Knowledge is not Information. As strange as it may sound, a book, for example, is not knowledge... A book is a piece of information. Knowledge only appears when a human-exchange concerning this information occurs. A book is nothing alone, lost in a library! I have to find the book, to read it, and then to reformulate its ideas inside of

my own cultural background to let its information become part of my Knowledge (we call it auto-communication). In addition, if I try to transmit my new knowledge about this book to somebody else, I will clearly subsume another knowledge manifestation (communication two-parties). Human exchange is Knowledge.

We can give a last classical example to make a clear difference between information and Knowledge, taken from the Vietnam War. Vietnam was the first battlefield use of computers. The Univac 1005, which the 25th infantry division installed in 1966 at Cu Chi, filled an entire van. Images of the enemy and terrain were captured with conventional cameras and television with light intensification devices, radar, and infrared devices. Sensors and high altitude reconnaissance scanned 100,000 square miles per hour providing commanders with a heretofore-unknown view of the battlefield. Meanwhile, Vietnamese soldiers were digging the crops and burying themselves in the face and "vision" of the enemy. What was dramatically missing to US Army was not information, but Knowledge in general, and an adequate form of "knowing" in particular.

Engineering instead of Management

Now that we envisaged that Information is not Knowledge, and that we want to manage Knowledge, we should have a look at the concept of management. What we need to understand now, is that management is not engineering, and that what we often call "Knowledge Management" is in reality "Information Engineering". Firstly, if you were to ask either a manager or an engineer if their job is the same, we doubt you would get them to agree they were. A brief examination of the terms management and engineering shows that to manage is to exercise executive, administrative and supervisory direction, whereas, to engineer is to lay out, construct, or contrive or plan out, usually with more or less subtle skill and craft.

A "Information Engineer" should therefore be concerned with such areas as data representation and circulation, encoding and compressing methodologies, data storing (all that concerns information matters). On the other hand, the "Knowledge Manager" should be concerned with communication flows efficiency, exchanges effectiveness between the members of a company (all that is what we describe as Knowledge matters). It is to the Knowledge Managers that the employees should go with their need "to know about the company", and to the Information Engineers that the users should go with their need "to access the system".

As we effectively want achieve Knowledge Management, we will orient our work to the understanding of communication flows inside the company, trying to detect where and why these flows are blocked, and to find ways to improve their quality and efficiency. Of course, a Knowledge Manager can choose (or not) to use Information Engineering facilities to achieve his goals. But as the fact of a taxi-driver using a car does not turn him a mechanist, it is important to understand that a Knowledge Manager is not an Information Engineer, as the majority of the industrials think. Knowledge Management is a sociological issue, whereas Information Engineering is a technological issue. That is the reason why we do oppose Sociology of Knowledge (as Knowledge Management) to Technology of Information (as Information Engineering).

We can imagine your disappointment. Is your Lotus Notes Server the solution to implement Knowledge management inside your company? We do answer that Lotus Notes is not a solution, and that MS Platform is neither a solution: these are just tools you can decide to use, or not to use. The real “solution” you need is a sociological one. It will consist on finding a methodology that will destroy all the walls that prevent Knowledge from circulating, from existing (which means basically the same) inside your company. Let’s just consider as a first clue the following famous light motives of Sveiby: "Knowledge grows when shared and when used; unused Knowledge deteriorates" [15]. We are getting closer...

In the following section, we will draw some bases of what we will soon call Knowledge Management, without having a doubt on what it actually means. Then we will propose a sociological methodology to subsume our true Knowledge management.

3. Some sociological bases for Managing Knowledge

What we will see in this part are the principle characteristics of Knowledge. We will try to acquire a meta-knowledge wisdom. We will then describe four sociological keys for understanding knowledge: knowledge is a human capability, it is tacit and informal, it cannot be segmented, and dialogue is its major manifestation.

Knowledge is a human capability

First, we do assume that Knowledge is a human property. "Computers that think are almost here", a Business Week article announced, adding that "the ultimate goal of artificial intelligence - human-like reasoning – is within reach"... Such a prediction may produce a feeling of déjà vu for managers and professionals, who have been hearing about machine-based Knowledge since the 1950's [4]. As we saw before, we should not confuse Knowledge and Information. Information can be the battlefield of computers (since the purpose of these machines is exactly to deal with information, coded in bits), but Knowledge resides in communication and personal reformulation, so it cannot be the fact of a computer. As far as we know, a computer has no personal reformulation of information, since information is formal and without meaning (typically Fodor's functionalist theory of mind [6]). Therefore, it is clear that a computer cannot possess Knowledge, cannot feel knowledge.

We do see Knowledge as a personal capability like a skill, experience or intelligence. This capability can be acquired by an individual as a result of reading, seeing, listening to, or feeling something. What is read, saw, felt is not Knowledge, it is just a media that permits the occurrence of Knowledge flows.

Knowledge is massively tacit and informal

Now that we agree on the point that Knowledge is typically a human feature, it is simple to see that Knowledge is completely tacit and informal. Again it is an illusion to think that Knowledge can be perfectly and completely transformed into an explicit version of itself. Of course, you can try to formalize Knowledge, and this is actually

the only way to share it (for example you will write what you know in order to communicate it to somebody else). However, to operate this transformation consists also on a profound distortion of Knowledge in its very nature, which we assume to be personal and human [2]. Therefore, you will probably argue that according to this point of view, it is impossible to transmit exact Knowledge. Actually, it is not exactly what we mean. We do believe that Knowledge transmission should more exactly be called Knowledge suggestion. When you try to transmit your Knowledge (for example, think about transmitting a strong feeling of love), you do actually codify it (using your own words for example), operating a deformation in the very nature of your Knowledge, then you transmit the information (not the Knowledge), and you finally let your interlocutor guess the signification of that Knowledge you wanted to give to him. And if your interlocutor is not able to produce a personal reformulation of your Knowledge, then Knowledge transmission has not actually occurred. As Descartes point out three hundreds fifty years ago [5], Knowledge is an internal fact, and the domain of mind is not the domain of what has extent, what is physical. For Sveiby [15], the most important part of company intangible assets is the personal competence of the employees, which is completely tacit and informal.

So we should remember, as a base of our building of a Knowledge Management methodology that Knowledge, as a human feature, is an informal, personal and tacit principle that cannot be exactly transmitted, but just suggested through formal communication. We can also add that not having an adequate Knowledge explicit transformation for communication will prevent Knowledge from circulating (and therefore from existing), but having a good "explicit transformation device" will never guaranty perfect Knowledge circulation and existence (do you get it?)

Knowledge cannot be segmented: it is one

Again, it is a computer-based dream to think that Knowledge can be segmented (has a hard disk or a physical RAM) in "pieces of Knowledge". Knowledge is one and it cannot be naturally segmented into "Knowledge areas". Of course, one can try to organize and segment his Knowledge in order to formalize it as information, but this will consist on a deformation of Knowledge. What I know is one: it is consequence of my education, my history, my social life, my influences, my culture, my religion, my personal convictions...

In the same perspective, we can add that Knowledge is highly contextual, and that segmenting Knowledge, trying to express it out of its context, will lead to a total distortion of its nature. Whether an individual does acquire Knowledge from a source depends on a dynamic interaction in which the important factor is the similarity between the person's context (situation, history and assumptions) and the context described. A report that suggests Knowledge to one person may not suggest anything to another one who does not share sufficient context with the author to understand what is described. [8]

Dialogue is the best Knowledge suggestion

For centuries, books have been published for the explicit purpose of letting others

"acquire Knowledge". We should call it published Knowledge suggestion. This paper focuses on dialogue, not publication. While electronic-published Knowledge suggestion is important, and indeed dominates current discussions about Knowledge Management, it is an Information Management rather than a Knowledge Management issue.

Moreover, we should not forget that Knowledge is contextual, and that it is very hard for two persons to share a context. Therefore, an instantaneous interactive way of suggestion is required to establish Knowledge circulation. Of course, the best candidate for this type of flow remains dialogue. Another clue we could add remains in the research on the origins of the word "dialogue": it is inherited from the Greek *dia* ~ *logos*, "flow of meaning". This is exactly what Knowledge Management is hopelessly needing: flows of meaning. We assume that there should be a deep hunger to rediscover our capability to talk with one another. [14]

4. A sociological methodology for Managing Knowledge

Now we do assume that we have perfectly defined our object and that we know what we are hopping from the Knowledge Management process. In addition, this article would be arrogant and useless (meanly for Siemens R&D) if we would not propose a methodology of Knowledge Management based on our first conclusions. Therefore, assuming that Knowledge Management is a sociological issue, and not a technological one, we are going to present some concrete steps to achieve Knowledge Management in a group, referring to the works of Sveiby [15] [16], Davenport [3], and Senge [14].

We will present our methodology in four steps: the "awakening and trust" step, the "globalization" step, the "flows creation" step, and the "control" step.

The "awakening and trust" step

We understood in our primer analysis that Knowledge is essentially tacit and informal. Therefore, our first step is based on the clear assumption that more than internal and tacit, Knowledge is unconscious. Why should somebody have a natural meta-Knowledge capability? My experiences, my culture, my history have led me to acquire Knowledge without even knowing that this is sharable Knowledge which should be useful for other people. We should then help the members of the group to know what they know, and to know that they know.

This first step must necessary be realized. The most classical way to do such is to map. This is the famous "Knowledge Mapping". The easiest way to map consists on putting everyone at work: every employee inside the group is going to map himself his own tangible and intangible assets of work. At a first look, many people will say that they have nothing to map, and that they have not particular competencies. Then we will simply tell them to look at their CV as if it was about a job interview. The result is generally amazing. After thirty minutes, the majority of the people has found more than fifteen different competencies and general knowledge, that are actually useful for the all group.

The second matter to resolve in that "awakening" is the trust matter. As many Knowledge Workers have recognized, and as Sveiby truly noticed, "Trust is the bandwidth of communication" [15]. We showed before that dialogue is the essential media for Knowledge suggestion. Therefore, it is clear that dialogue is much richer and much more honest with people we trust. Trust is absolutely fundamental to Knowledge Management. In previous experiences of Knowledge Management process, we noticed that many people thought that other sectors in their own company were "the enemy out there" [3]. This prejudice has to be deconstructed in order to achieve perfectly our awakening step. When one has recognized he has useful Knowledge for the group, he then has to recognize that sharing is not a danger. Actually, if my Knowledge is a valuable resource, why should I share it? Why should I put my job at risk by giving my Knowledge (and therefore becoming useless), or using another Knowledge instead of mine? More than being afraid of giving my own Knowledge, it is my natural tendency to have suspicious look on what comes from others...

So what kind of strategy should we use to create a trust climate inside the group? We think that before even starting our mapping process, we have to design and apply a sort of advertisement campaign for Knowledge sharing. Like a true electoral campaign, we will use some slogans like "Nobody knows more than everybody", "Knowledge grows when shared and when used, unused Knowledge deteriorates" [15], "Trust is the bandwidth of communication" [15]. Senge proposes as his second discipline to focus on mental models [14]. His mental models are one's experience, concepts, culture, etc. They will determine how one sees the world and interprets facts. These mental models could be compared to Kuhn's paradigms [9]: when caught in a mental model, you will simply ignore some facts. According to Senge, recognizing that these mental models exist is an essential step for managing knowledge: when I know that I see through my mental models, I am then able to recognize the existence of other mental models. In the process of dialogue (which Senge opposes to discussion), every one should be in "inquiry position". In that turn of mind, everybody just listen without judging or arguing. Everybody is open, everybody wants to learn. This is a sort of exaggeration of the trust process. After inquiry, and only after, Senge proposes to start an advocacy process, where everybody will then try to defend his points of view.

The creation of a trust atmosphere inside of a group is a work that has no end. Again, the point here is to rediscover the faculty to talk one with the other.

The "globalization" step

Now that we have succeeded in obtaining a group that knows it has Knowledge, a group that is convinced that sharing will be useful for everybody without ever being dangerous, we can start our "globalization step".

Again, this globalization step is cultural and sociological, much more than technological. As Savage noted [17], we need to change our archaic conception of organization inside a group. Here, we want of course to deal with hierarchy difficulties. We should then consider the group as a network of agents, having all the

same importance in the Knowledge process. We call it having a global vision of the group. This is Senge's work main point. The group is a dynamic complex chaotic system (in the Stewart sense [18]). This system functions clearly in cause-effect mode. The point is that causes and effects are not closely related in time and space, what causes tremendous problems in analyzing this system. Actually, everybody is part of this system, and the actions of the most insignificant agent (in the hierarchical paradigm) have consequences in the all system. Using the butterfly effect metaphor, the smallest change can produce "catastrophic effects" (in the sense of chaotic systems analysis).

In order to control this kind of social chaotic system, we propose that every agent has a global vision of himself inside of the system. This is exactly the globalization step. One has to stop thinking that he is not responsible since his chief is responsible for him. There are no chiefs; there are just agents.

So how to achieve concretely our "globalization" step. It is not going to be easy, since we will have to deal with general company policies and politics; we will have to confront the famous "power inertia". We propose here a knowledge workflow establishment principle. Every intellectual process inside of the company will be described with causal graphics. These graphics will not give us information like who is the chief, who has power, but like which agent is involved, which is his task, what are the resources he needs, etc. Of course, each agent will see in real time the evolution of these causal graphics, having a global vision of the process of intellectual and physical production inside the group.

Coupling our awakening and trust principles with our globalization step, we understand that our human Knowledge Management process is quite completed. Knowledge agents know now that they know, and that other agents also know. They have a global vision of what is happening inside of the group, which Knowledge is required, when it is required, who is involved... What does it finally miss? As we emphasized before, we do need dialogue! This is our "flows creation" step, which we are going to present now.

The "flows creation" step

We worked with the previous steps at the realization of a global vision of the potential Knowledge existing inside the company, and of what is daily needed to achieve common objectives (and we should not forget that everybody is involved in everything). Therefore, assuming that trust is essential, Knowledge Management will actually occur only when people communicate what they know, and what they need to know through the "communication flow channels" we need to create. What are those communication flow channels? Again, we are tempted to confuse Knowledge Management with Information Engineering, and immediately talk about GroupWare, emails, and other electronic stuff. Is it really what we need? Do we want to invest in Knowledge Management or in Information Technologies?

Let's think simply about an office. Should it be a number of cubicles connected with long winding corridors, or a green open space, with coffee machines? These two

kinds of offices will be quite different in the type of Knowledge that will be transferred and created in them. [15] This very simple example shows what are the true communication flows preoccupations. We do affirm that Knowledge Management does not necessarily need Information Technologies. Another example that I can give the following one (from Senge [14]):

"I found myself pondering these questions anew as a result of participating in "Summit on Reinventing Government," hosted by United States Vice President Al Gore in June 1993. The meeting was held at the Congress Hall in Philadelphia, where the original U.S. Constitutional Convention was held, and where the U.S. Congress met for ten years, before the government moved to Washington, D.C., in 1800. Being part of the conversation that day was a stirring experience. The Congress Hall is a room designed for conversation. The acoustics are exceptional. One hundred and fifty people can carry on a conversation as if they were seated in a living room. Designed in an era before there were skylights, the room is nonetheless full of light. Windows surround the meeting area at an elevation where they can illuminate but not distract. Participants are very aware of the larger natural world outside the building, yet still focused on the conversation at hand. The chairs are set in a semicircle so everyone can see everyone else. Clearly, the designers of that room understood that conversation and self-governance are inextricably intertwined. If we lose our ability to talk with one another, we lose our ability to govern ourselves."

So before investing an enormous amount of money in an Information-Treatment-system, the company should think of simple ways to improve communication inside of its services. Buying flowers, tables, organizing coffee breaks is exactly what we call Knowledge Management! It simply improves the communication flows inside the company! In addition, you can simply and quickly verify that a coffee machine is much cheaper than Lotus Notes Server is. The point is to create the opportunities to communicate, even for the shyest personalities of the company. In the inquiry attitude, everyone has the right to speak, and the "great chief" of a sector has probably lots of ideas to learn from the most humble technician, if they decide to take tea together sometimes.

The "control" step

To conclude our methodology, we cannot forget to talk about some kind of control process. As we noted before, a company is a complex system of agents. Like every chaotic system, this network of agents needs to be carefully controlled. We should not forget that a small action of any agent can have catastrophic results in the future. Therefore, if every agent is equal when giving ideas, it is also equal in front of the control process.

Of course, the control process never ends. It consists primarily in continuously analyzing what are the Knowledge Management needs inside of the group, how they can change, what improvement can be done for the communication flows... Secondly, it consists on verifying that the communication flows facilities do not degenerate neither deteriorate the work efficiency. To talk is good, to act also. Of course, this is not simple. Talking about football can be part of the Knowledge suggestion process,

not necessarily, because it is linked to a project, but because it can create a relation between two people who should work together...

Actually, most of the persons spend one third of their life in their office. An office should not be a prison and, ideally, there should not be difference between one's house and one's office. My office should be my second home. Of course, this is a little bit complicated, and mentalities have to change a lot. The point of this "control step" is not to create a "Knowledge Police Department", and our second assessment (the one which says that Knowledge Management can degenerate) should simply not exist. As a part of the all agents system, each agent should simply act with conscience and self-governance

5. Using Information Technologies inside the Knowledge Management social processes

Man is a tool using animal...Without tools he is nothing, with tools he is all. -Thomas Carlyle (Essayist & historian, 1795-1881)

Now we will try to analyze how technological tools are often used to support the automation or augmentation of organizational Knowledge Management, having understood that Information Technology is not Knowledge Management. To do that, we will see that in particular cases Information Technologies tools can effectively be used as physical infrastructure of our sociological Knowledge Management process. Nevertheless, we will not forget to emphasize the fact that Information Technologies can also be an anti-Knowledge-Management service.

Which benefits can we make in using Information Technologies for Managing Knowledge?

To analyze the potential benefits of using Information Technologies tools we will actually describe what are the main opponents to the communication flows establishment. According to Ruggles [11], there are three main barriers to sharing Knowledge: temporal, spatial, and social (often hierarchical) distance. The farther apart two people (or groups) are on any of these dimensions, the more difficult it is for them to pass along true knowledge, since distance degrades the ability to relay the context with the content of the idea or message. Tools can be used to help decrease these obstacles. Every tool will have different capabilities for reducing one or more of these barriers, and each situation will have certain barriers, which need to be broken down more than others. Tools worth considering are those, which address the barriers most in need of reduction.

Temporal Distance

Time can be a barrier in two ways: historical and current. Historical time barriers have to do with organizational memory. Face-to-face Knowledge exchange, although rich, has little lasting value to the organization unless captured and made available to others when needed, whether ten minutes later or ten months later.

Current time problems usually come from the difficulty in coordinating two schedules to coincide long enough for Knowledge exchange to take place. It seems that people spend more time talking to each others voicemails than they do talking with each other. This is appropriate if the ideas being exchanged can be reduced to voicemail/email-sized chunks, but if true Knowledge exchange is needed, these time issues must be overcome. Tools which allow an ongoing dialogue among or between individuals over time can help. Internet-based forums (newsgroups) and the class of software called GroupWare enable people to communicate with each other in a virtual space, over time, capturing the interactions. Because GroupWare applications hold not only current comments, documents, etc., but also the evolutionary threads of the conversations and interactions, they can address both historical and current time problems.

Physical Distance

Modern enterprise is rarely local. Between coordinating global operations and interacting with suppliers, customers, and partners wherever they may reside, most people must be able to carry on transactions and interactions from afar. Unfortunately, face-to-face interactions are the highest bandwidth forms of Knowledge exchange. Therefore, mediating the gains of global reach is the intellectual heat loss, which accompanies interaction while physically separated. Technology can help bridge these gaps to some extent, sometimes just by allowing virtual replication of existing practices. For example, war rooms or talk rooms can be used as incubators for spontaneous innovation. War rooms are established with a specific project or objective in mind, while talk rooms are general areas where people can gather to chat and exchange ideas. Because, at the end of the day, Knowledge transfer must take place between people, war and talk rooms offer an opportunity for such transfer by creating the space and the opportunity.

In order to break down the barrier of distance, such rooms are also being established virtually. By allowing individuals to create virtual spaces, GroupWare and similar Internet-based tools allow individuals to carry on conversations over time and distance, work on documents cooperatively, create virtual libraries and Information-Bases, and coordinate activities from remote locations.

Social Distance

Social distance includes factors such as hierarchical, functional, and cultural differences, which constrain shared understanding. We assume that these tend to be the most difficult barriers to overcome. They are based upon the deep mental models [14] which people have built their sense of self around, and which form peoples expectation of meaning. Tools which can help avoid or bridge such gaps are usually built around facilitating social translation.

Mechanisms for bridging social gaps revolve around supporting cognitive authority over mandated authority. Tools which allow for anonymity (some meeting facilitation technologies, for instance) do so by nullifying the persona and emphasizing the content of the contribution. This can be effective over short periods of time to insure

democratic contribution and equal consideration of ideas. However, total anonymity also nullifies cognitive authority over time. If I do not know who contributed brilliantly in the past, how do I know who to go to in the future for more of the same?

Typically, the problem of social distance shows that Information Technology is not Knowledge Management, and that all the problems linked to Knowledge Management are not tool-solvable. Actually, more than not computing-solvable, the very fact of using Information Technologies can increase the strength of the difficulties it wanted to overpass. That is what we will discuss in the following part.

What are the dangers of using Information Technologies for Managing Knowledge?

Now we are going to see that Information Technology can become a strong barrier to Knowledge Management process establishment when not exactly used as no more than a tool.

The computer who dreamt he was a man

The first and most critical drawback we want to discuss is based on the classical epistemological error, which consists on assuming that a computer can be a machine that thinks. This fantasy has already cost a lot to many companies, but time has passed since the middle 80's... Nevertheless, we should never forget that a computer is machine that helps thinking, not a machine that thinks. It would be the same type of error to pretend that a pen and a paper think. They do not think, they help human being thinking. These are simply tools, and if not correctly used, they will produce unwanted effects.

Therefore, instead of pursuing the dream of creating a software, which would automate the taking of decision, we should just think that computers are here to permit a most quick and efficient transfer of information, in order to help human beings taking more quickly and efficiently the right decisions.

Saturation of information

What happens currently with Information-Technology-based systems is that they are so efficient and quick that they become completely unusable for a normal human being. Come-on, let's be honest, who do actually read entirely the fifty emails he receives everyday? Don't we have to make a quick selection between what we will read and what we will directly throw to garbage (the same selection we make with our classical mailbox...)?

So what happens with these super-efficient services? People cannot easily make the difference between crucial information and banalities. Who can be sure that he has never thrown without reading it material that should have been crucial for him? Moreover, after the twentieth email one reads, one cannot be so attentive to the contents... This is typically the information saturation problem. Another example we could give concerning information saturation problem is an experience that you live everyday. Just tip "Knowledge Management" on Alta-vista search engine: "*Alta-vista*

found 34366 Web pages"... Good luck.

Information critical distortion

It is clear that computer-based transmission of information should often be called computer-based deformation of information. Keeping the context loss issue for the next point, we could just talk about the famous "compression of information". The more information is compressed, the more it is deformed, that is very clear. Actually, now to enter a classical "chat room", or to participate to mailing lists, you definitively need a formation to understand all the initials and other abbreviation used: "DYJHIW FAQ OF UR R 2 LONG? FYI, IYKWIM I DON'T!" (Don't you just hate it when frequently asked questions of your are too long? For your information, if you know what I mean, I don't!)

The context loss

Context loss is one of the most dramatic drawbacks of Information Technology services using. As we saw before, knowledge transference essentially occurs in the suggestion mode. You perfectly feel it when you are learning a new language. Someone asks you something: using the context, your own knowledge about the culture, a little intuition, and the two words you have the impression of having recognized in the sentence, you will perfectly respond to the question (with the five other words that you know). In addition, what is the most amazing, it is that your interlocutor will also understand your answer. Now try the same experience using emails, and tell us your conclusions. I can tell you mines, since I have been living in Brazil for six months: I prefer clearly see the person to talk, and what I hate the most is the telephone (my hands are very useful...) You actually noted that context loss is closely linked with critical deformation.

Moreover, as we have already noticed, knowledge is one and cannot be segmented. To acquire knowledge from a source depends meanly on the similarity between the person's and the context described [8]. The main problem caused by this loss of context is the impossibility to reformulate correctly the information (and therefore, no knowledge transmission can occur). The worst occurrence of context loss' drawback is the classical total misunderstanding of what should be understood. (Just think about the meaning of this sentence: "He has done a very nice work!")

Impersonality of the media

Finally, a computer is not a person, it is cold and not very friendly (no MS-context misunderstanding here!) Being more serious, it does not seem to us to be the most interesting way to communicate. The impersonality of the media will strongly deteriorate the efficiency of the communication, and then prevent knowledge flows from being operative. As an example think of what is your choice when you have to make a delicate transaction on your banking account... What do you honestly do: do you use the automatic banking device, or do you go and talk with your banker?

This argument joins clearly the information distortion and context loss that we

discussed before, emphasizing more the human side of the problem. As we saw before, the personality of the one trying to give the knowledge and of the one trying to receive it, are fundamental elements in the communication flows. I will certainly not formulate a request in the same way to my old 20-year friend and to the young trainee that arrived two weeks ago! Now, if I use a mailing list, I will gain time, but I will surely lose efficiency and impact.

Finally, most of the classical and fundamental rhetorical devices are completely unusable in a computer-supported conversation. This can be responsible for the entire destroying of the efficiency of communication.

6. Conclusion

What was the purpose of this paper? We wanted to show that Knowledge Management is a sociological issue, not a technological one. That is the reason why we decided to oppose Sociology of Knowledge to Technology of Information. We actually showed that information is not Knowledge (which is a dynamic process of human exchange, coupled with social suggestions), and that engineering is not managing. We saw that the best Knowledge sharing process is dialogue, and then we proposed a methodology to achieve Knowledge Management inside a company.

We presented four steps in the gradual realization of Knowledge Management. The first one was awakening and trust where every agent of the Knowledge network becomes aware of his own knowledge capabilities, and learn that other agents also have good ideas. In a mutual-trust climate, the agents will then stop thinking their organization as hierarchical. In that globalization step, each agent will learn how he is personally involved inside the global chaotic system of knowledge agents. He will then learn that each agent action has consequences for the all system. His own conscience of the complexity of that system will help him to control the system's dynamic with the collaboration of each agent. After that, the work of the Knowledge Managers will be to analyze the knowledge flows and try to improve them, in the "flows creation" step. We do here insist on the fact that this step is not necessarily computer-oriented. We should not forget that a coffee machine is less expensive and often more efficient than a computer, in the domain of Knowledge Management. The step of "flows creation" is then succeeded by the "control" step, which is the natural continuation of the flows improving, according to the necessity of the group. We should not forget here that Knowledge Management is not a task that you can definitively end.

Concerning Information Technologies services, and more specifically computer-oriented ones, we do not radically say that they are useless in a Knowledge Management process implementation. The point is that each firm needs a particular evaluation to see which improvements can be done for knowledge flows. Following that evaluation, the Knowledge Managers can decide to use Information Technologies or not. Nevertheless, we should not forget that Information Technologies do not necessarily help managing Knowledge. On the opposite, they can be an obstacle to the establishment of Knowledge Management.

As a final conclusion, we would say that when Knowledge Management is really achieved inside of the group, each member of the group should pass more time working for the others than working for himself.

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