

The Role of Dissonance in Knowledge Exchange: A Case Study of a Knowledge Management System Implementation

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Abstract

This study examines the non-adoption of a knowledge management system for knowledge exchange among a distributed group of non-life insurance experts. The users participated with enthusiasm in the design process where they provided functional and data specifications for the system. However, a few months after introduction, the system was hardly being used at all. The analysis of the case suggests that non-use of a system can be understood in terms of dissonance, a dominant theme observed in the social dynamics of the implementation. Dissonance was observed through disparate mental models of a system's intention and use, disparate mental models of knowledge and knowledge ownership, and relational power dissonance where the spirit of knowledge sharing imbued in the mission of the system challenges the relational power position between the affected stakeholder groups. Understanding the implications of these issues can be used to inform a requirements engineering process for these kinds of software applications.

1. Introduction

Instances of failure and non-use of information communication technology (ICT) applications such as knowledge management systems are useful to study because they provide insights into breakdowns in user experiences with technology. Breakdowns reveal social and human-computer interaction issues from which several design guidelines can be derived. It is also important to understand the dynamics of a failed implementation in order to formulate an updated view of what a successful system should be [14]. Furthermore, failures underline the value of an a priori requirements process [10][21] where design and specification, which underlie software system development, are identified and paid attention to before system development or acquisition takes place.

The implementation, non-use and eventual failure of a software system implementation can be described and

understood from the perspective of *dissonance*. This is demonstrated in this paper through an examination of a case study of a failed implementation of a knowledge management (KM) system using *dissonance* as a conceptual lens for analysis. Dissonance refers to instances of inconsistency, disagreement or discrepancy in a situation usually relating to one's beliefs, perception, attitude and action [1][7][10][12][13]. While a more restrictive theoretical formulation of dissonance [12][13] refers to psychological conflicts experienced by an individual at the cognitive level, i.e. one's set of beliefs or set of *cognitions*, dissonance also occurs at the level of mass phenomena, i.e. in the wider social context of the organization, business and information technology implementation [1][12][16][25]. In these social contexts, dissonance takes the form of conflict at the level of distributed and shared cognitions between groups of people involved. Consequently, this conceptualization of dissonance is applied in the analysis of the features of non-use as well as the circumstances surrounding the implementation of a KM system in the case study.

The interest in studying an unsuccessful implementation of a knowledge management system was to observe the various ways in which dissonance is manifested in a system implementation and use context that resulted into failure. Through these, dissonance can be established as a relevant phenomenon in system implementation from which failure or non-use can be attributed to. For an initial validation of this concept as an analytical framework, a case study is useful because it enables the observations of dissonant situations in real life settings [34]. The case study was a KM system implementation in a distributed group of non-life insurance experts in a large Dutch holding and insurance company. It was implemented with the intention of supporting and facilitating knowledge exchange among the non-life insurance experts. The resulting outcome of the implementation is an instance of an *unfaithful appropriation* of technology; although users fully accept the concept of the system, which was even further reinforced by their participation in the design process, they end up not using the system at all.

The findings of the case study suggest that dissonance is a useful concept in describing a system implementation process as well as in understanding the failure of a knowledge management system to be successfully used by its intended users. Attributing the failure as an outcome of dissonance, there are several features of implementation process where dissonance is observed to be a dominant theme. Firstly, dissonance is observed at the cognitive level. Different mental models of the world held by the different stakeholders shaped the development of disparate *metaphors of intent and use*. Secondly, dissonance is also implied in the differing views of knowledge and of the ownership of knowledge held by the different stakeholders. Finally, it is also a dominant feature at the relational level in terms of the power aspect. Power position is challenged and threatened by the implementation of the technology, and more importantly, of the notion of knowledge sharing itself.

Relating these findings to software design, this paper also tries to identify several design implications from an understanding of dissonance that beset KM system implementation. In particular, dissonance relates closely to requirements mismatch, which is a common problem with software where the implemented functionalities do not match the user-tasks that need to be supported [22]. This in return leads to user dissatisfaction and eventual non-use of a system.

To structure the investigation and the presentation of results, we organize this paper as follows. We begin by providing background on related work on the topic of ICT support for knowledge management. This is followed by an elaboration on the concept of dissonance that is used to analyze the case. Section 4 and 5 introduce the case study setting and the research methods used. A background of the circumstances leading to the implementation of the system is provided in Section 6. Section 7 presents the analysis of the case and the findings. Lastly, Section 8 relates the findings and the lessons learned to software requirements. Several guidelines for requirements elicitation are identified.

2. Supporting knowledge management through information communication technology (ICT)

Organizations adopt knowledge management strategies as a means for enhancing their competitive advantage [9][24]. The importance of knowledge management usually becomes emphasized when organizations begin to realize the value of knowledge for organizational survival. The capability to stimulate and facilitate the build-up of knowledge through knowledge exchange is considered to be a desirable property of organizations. Specifically in the case of an information intensive industry such as insurance, knowledge-sharing is one aspect of knowledge

exchange that is deemed to be valuable in the enhancing the core competencies of employees. In a study of 15 Finnish insurance companies, Widén-Wulff & Suomi [33] positively correlate effective knowledge sharing to business success.

While the general concept of knowledge management is nothing new, the idea of codifying knowledge and facilitating knowledge exchange through ICT support is relatively new [17][30]. Knowledge management is already known to be in place and in practice when family corporations pass on wisdom to the next generation or when consultancy companies make use of mentorship programs for their new employees. With the increased availability of network technology such as the Web and collaborative applications like Lotus Notes, the concept of knowledge management was brought to a new level and dimension. The advanced features these technologies offer in providing facilities for storing, creating, processing, sharing and distributing knowledge have opened up opportunities for a dynamic knowledge exchange.

The growth of knowledge management efforts has been largely attributed to the diffusion of these technologies in organizations [9]. These technologies, in return, influence how organizations structure and execute their knowledge management strategies. To a certain extent, this has led to a general view that construes knowledge management with the implementation of a technical platform for knowledge management. However, the failure of most knowledge management technology implementations in bringing about the desired results indicate that knowledge management is more than just technology [6][9]. Various studies indicate the limitation of a pure technology approach to knowledge management, especially when it comes to tacit knowledge [3][6][9] and of equal importance, the human and the social dimensions of knowledge exchange [9][11][24][26][31][33] come into play.

In addition, the implementation of groupware support for knowledge exchange is known to be a complex process. The use of the technical system will be influenced by the dynamics of the social environment in which it will be used. People's perceptions, relations between people, organizational culture, power structure and relations along with a host of other social factors affect the outcome of a system implementation. More importantly, the kind of cooperative culture that exists reflected in the way people share what they know with their colleagues is influential in determining how the system will be used. For example, Orlikowski [26] observed that in a non-cooperative setting where people hold on to their knowledge and are reluctant to share it, a collaborative system such as Lotus Notes will not be an effective tool in enabling knowledge exchange.

In this study, we would like to elaborate on these human and social factors that affect KM system implementation through the following case study.

3. Notions of dissonance

Dissonance is an instance of disagreement or conflict [10]. A more restrictive definition of the term is provided by the notion of *cognitive dissonance* which is a state of inconsistency between one's beliefs and actions [7]. The notion of dissonance used in this study takes root from a more elaborate formulation of *cognitive dissonance* as a psychological theory [12]. In this theory, cognitive dissonance is described as a negative drive state that occurs whenever an individual simultaneously holds two cognitions (ideas, beliefs, opinions) which are psychologically inconsistent [1][12]. It creates a feeling of discomfort in an individual. The experience of discomfort drives a person to find means to reduce dissonance in order to attain harmony or consonance [12]. Some of the main ideas presented by this theory are [12]:

- There is a general tendency for people to seek consistency among their belief sets, and when they are made to choose between two incompatible or inconsistent beliefs or actions, dissonance exists. This feeling of inconsistency will motivate a person to try to reduce the dissonance.
- Dissonance should be eliminated in order to enable attitude change and learning. This could be done by removing the dissonant idea, adding or introducing a new idea that would create balance or by reducing the importance attached to the dissonant belief.
- The social group is at once the source of cognitive dissonance for the individual as well as the vehicle for reducing the dissonance. This can be accomplished by finding others who agree with the cognition one wishes to retain and maintain.

The further development and studies of this psychological theory has been applied in the domain of decision-making [2][5][15][29]. Those studies make distinctions between two types of dissonance with regards to decision-making: a pre-decisional dissonance and a post-decisional dissonance [29]. Pre-decisional dissonance occurs in response to an event causing one to make a decision. For example, one is placed in a situation where one feels obliged to behave otherwise [29]. Post-decisional dissonance on the other hand can be best referred to as the feeling of regret or rationalization after one has made a wrong decision. Results from several studies on post-decisional dissonance indicate that [2][15] people who put a lot of effort in making the decision tend to rationalize their action by favoring the outcome of the decision or by attributing to a less importance to the decision they made.

While the theory and most of the studies that went into its further development deals with the concept of dissonance in the cognitive sense, that is, through individual mental processes, belief sets and perceptions, the theory can also be used to a wider and collective scope beyond the individual. The concept of dissonance can be used to describe conflicts and disagreements in a larger social context, i.e. groups of people, their shared perceptions, and the nature of the interpersonal relations among each other including how they regard the elements in their environment [1][12][16][25]. This expanded notion of dissonance is also consistent with the ideas put forward in the theory of cognitive dissonance concerning the role of social support [12]. In this case study, it will also be shown that dissonance of this form can be found in inconsistencies between structures, for example, conflicting business goals or misalignment between strategy and its operational execution [16][23][25].

In the case study, we make use of this expanded conceptualization of dissonance as a framework for analysis. Therefore, the case analysis focuses not only on individual belief sets, but also on the collective belief sets of groups, i.e. stakeholders, as well as the contextual and relational dimensions of interactions among stakeholders concerning a KM system implementation, in particular.

4. Case study site

The case study was conducted in the non-life insurance division of Active Insurance Group (AIG) where a knowledge sharing system, called *KennisNet*, was implemented. AIG is one of the largest insurance companies in the Netherlands, with approximately 12,500 employees all over the country. It specializes in the domain of financial services and all types of insurance products.

The growth and evolution of AIG as a big holding company is a result of 10 years of mergers and acquisitions. AIG bought small and specialized independent insurance companies and merged with the larger and more diversified ones. Prior to these mergers and acquisitions, the individual companies that currently make up AIG used to be competitors (with each other). Before the fusion, the single largest independent insurance company in the current AIG structure was a key and dominant player in the insurance market. In fact, the business campaign for mergers and expansions was initiated by that company.

The buy-outs and mergers still continue up to the present day, which is why the whole organization is faced with the challenge of unifying merging processes. It is a complex process given that the former individual companies each have their own product lines, processes, people and culture. The idea that the employees of each subsidiary have to realize that they now belong to one company is a major organizational concern.

5. Research methods

The research was conducted as a longitudinal case study for a period of 6 months, 7 months after the system was implemented. Data gathering was done mainly through qualitative means. Twenty-five (25) in-depth interviews were conducted among the various system stakeholders: system proponents, system designer and end-users (see Table 1).

Table 1. No. of users and interview schema

Stakeholder group	No. of users	Interviews
Knowledge Center <i>Schade</i> (KCS)	5	5
Non-life insurance experts	33	19
<i>Product Managers</i>	22	12
<i>Actuaries</i>	11	7
(<i>Insurance mathematicians</i>)		
System designer-developer	1	1
Total	39	25

While the system proponents took part in using the system, the end-user target group is mainly the non-life insurance experts composed of product managers and actuaries who are more aptly called as insurance mathematicians. These interviewees, dispersed at different offices in the Netherlands, were visited at their places of work for interviews. At the same time, the opportunity to join their workshops as observers was also made available.

The following documents from the company were referred to for content analysis: the business plan, project plan for *KennisNet*, company reports pertaining to the project, the company annual report and its supplements. The system was examined by interacting with it and system log archives pertaining to its use were also collected and analyzed.

6. Background to the KM system implementation: a dissonance reduction process

From the perspective of dissonance the context of implementing a knowledge management system can be regarded a process of experiencing and reducing dissonance. The initial manifestation of dissonance in the case study is the strategy chosen by the company that ultimately led into the implementation of a knowledge management system. Knowledge management was the strategy chosen by the top management of AIG as a means of bringing together all the employees from the different sub-companies – to evoke in them a sense of community and belonging to ‘one AIG’. This strategy was pursued through the creation of different knowledge centers for each division. These centers were charged

with the function of discharging the knowledge management strategy of the organization. One such center, the knowledge center for non-life insurance, locally referred to as the Knowledge Center *Schade* (KCS).

KCS is the competence center the non-life insurance division. It is a small group of five people: the manager, two actuaries, a project leader for the *KennisNet* project and an internal consultant from the mother company. The non-life insurance division, which is supervised by the KCS, specializes in the non-life insurance products and services of the company. It is made up of five business units representing five different formerly independent insurance companies. Each company also represents a particular brand of insurance product. In total, the KCS manages a loose network of 33 professionals from this division consisting of product managers and actuaries.

Product managers (22) are responsible for developing and managing non-life insurance products. This is done by conducting market research, competitor analysis, knowledge of and information monitoring about changes in legislation, new related product development, and keeping track of all product development efforts within the whole company. There are three categories of non-life insurance products: mobility (private cars, motorbikes, caravans, trucks, lorries, etc.), recreation (boats, yachts, travel, etc.), and home insurance (valuables, legal services, glass, fire damage, third party liability, etc.).

Actuaries (13) are mainly responsible for the calculation and financial analysis of insurance premiums, benefits, reserves and other number-crunching activities required in coming up with a new insurance product or policy, as well as in re-packaging an existing product or policy. The current setup, however, is that these insurance professionals continue to report formally to the business units they belong to, which retain their structure and operations autonomously from the mother company even after the merger.

Altogether, the KM responsibility of KCS to these professionals is to develop professional competence by facilitating the creation, development and maintenance of non-life insurance ‘knowledge’. In addition, there is also a more strategic, background goal aimed at community building of which knowledge management is a strategy chosen by the top management to achieve this. The dissonance in this context lies in the conflict between the desired state as expressed by the goals and physical decentralized distribution of the employees who remain loyal to their original companies. This is expressed in the cognition of the KCS Manager who explains,

“I feel responsible for building a team out of all non-life insurance specialists in AIG. They all work as product developers and actuaries. Two to three years ago, they all felt themselves more like competitors than colleagues. Step by step, things are improving.

They work in different places but I believe they now feel together”.

To reduce the dissonance, which is in effect a means to realize the KM responsibility of the KCS to the non-life insurance group, it embarked on a long-term KM strategy consisting of:

- A personalization approach through regular face-to-face workshops and meetings
- Implementation of a virtual, IT-based knowledge exchange support system

The regular face-to-face workshops were aimed at facilitating the ‘getting-to-know-one-another’ and to bring the experts together to share experiences and expertise. Apart from these workshops, monthly KM meetings are also held among the representatives of each sub-company, more commonly referred to as business units.

The virtual IT-based knowledge sharing system is aimed at supporting the exchange of knowledge among the experts. It is meant to be the central place in which knowledge can be stored and accessed given that the experts are distributed in different locations. *KennisNet* is the realization of this second part of KCS’ KM strategy.

6.1. Gaining social support in system development through a participatory process

According to the notion of cognitive dissonance, the existence of dissonance leads one to seek others who already agree with the cognition that one wants to establish or maintain [12]. In this case study, the idea of implementing a system for knowledge exchange was initiated by the KCS Manager in 1999. He proposed the idea to the rest of the KCS department who met this idea with enthusiasm. One of the KCS members recall:

“In the beginning it was all very vague. We had this idea and we wanted to implement it.”

However, the project faced a serious constraint—a budget. KCS did not have corporate funding for the acquisition or development of a new system. The project was a local initiative. As a result, they were constrained to make use of existing resources, like Lotus Notes, which was already being used in AIG. Lotus Notes was thought to be an optimal platform for launching a knowledge sharing system given that it was already available to everyone in the organization. Lotus Notes was currently being used as the de-facto email platform and several shared databases were developed using this system.

However, there were objections to the use of Lotus Notes as the development environment for *KennisNet*. There is dissonance in this aspect. According to one member of the KCS:

“At the beginning, we were constrained to use Lotus Notes. At that time, we had a software engineer in our group. He was quite negative about it. He said if we

are to use Lotus Notes, we better stop it. It does not have lots of possibilities. It [KennisNet] cannot be web-based because it is not supported [by Lotus Notes]. But we thought, it is better to have something than nothing”.

In this resulting design decision, dissonance is resolved by favoring the desired outcome, i.e. having a technical product, and by relegating lesser importance to the software development environment. Despite being considered to be limited by the software developers, Lotus Notes still became the development platform and interface for the knowledge exchange system. This is because the key stakeholders valued more the accomplishment of a finished product than having a technically optimal development platform.

When the first version of the system was delivered, it had minimal functionality. It consisted simply of a database shell where information can be entered and a question and answer module. It was put into use for a limited period of time, and for a limited group of users, mainly to input information.

The KCS was not satisfied with the system and this triggered lots of discussion within the group. The desire to improve *KennisNet* led the KCS to include the non-life insurance experts in the re-design process. This ensuing action is consistent with the notion of gaining social support in order to remove dissonance or to establish and maintain the cognition one has.

The second design iteration aimed at improving *KennisNet* began in spring 2001. It embodied features of a participatory design process where the design team was composed of the group of non-life insurance experts. Several representatives from the different business units were invited to represent their units and to take part in the system re-design process together with the KCS and the system developer-designer from the IT department. Apart from formulating their requirements, the representative group of experts also developed the specification for organizing the contents of the knowledge base in *KennisNet*. They formulated a domain-based classification scheme through which non-life insurance knowledge can be structured and described.

6.2. Features of system use

The system was officially implemented in October 2001, with the intention that it would be used voluntarily. In the beginning, there was visible interest in the system, especially from those who participated in the design process. However, this was not sustained. The level of system usage after its implementation can be described in terms of the following features:

- Only 67 new entries were added after a period of 7 months, translating to approximately 10 entries per month;

- 31% of all the contributions to the knowledge bank came from one person – the project leader of *KennisNet*.
- Less than half (46%) of the user base (N=39) have made an entry in the system.
- There are over 800 user activity logs related to reading and searching for information within *KennisNet*.

Several efforts were taken to improve system usage. How to improve the use of the system was included in the agenda of KM meetings between business units. KCS facilitated these meetings. In addition, the project leader repeatedly requested the experts to publish information and whatever report they have written in the past months in order to build-up the knowledge content of the system. Yet, these efforts were not effective in stimulating system use.

7. Analysis and findings

In this section, the case study is further explored with respect the actual use of the system from which implementation failure is made apparent. In the following analysis, a prevailing theme of *unresolved* dissonance is observed in the social dynamics of the implementation. Dissonance at the level of distributed and shared cognition and structure is observed in three forms: (i) disparity between mental models of intent and use, (ii) dissonance in the views of knowledge ownership, and (iii) power dissonance.

7.1. Disparity in mental models of system intent and use

This disparity is a form of dissonance at the level of distributed cognition, that is, the cognition or mental models held by the different stakeholder groups. A mental model [18] is a conceptual and operational representation developed and used when interacting with the world and with complex systems. Each stakeholder, the KCS and the non-life insurance experts, had different mental models regarding the system. These are represented through different metaphors of the system image that they evoke when they perceive the system (see Table 2).

As early as the planning for implementation, these mental models are already made apparent. The system proponent KCS, for example, proceeded with the implementation of the system based on a mental model of an *intention* for a knowledge-sharing platform (see Table 2). As the system proponent, the KCS perceives the system with a *mental model of intent*. In other words, they perceive *KennisNet* as a tool that will help them achieve their goal of forming a community of non-life insurance experts. Out of this, they formed the expectation that the system will be used for sharing knowledge, that the

experts would make use of it to create and publish information to share with their colleagues. This is expressed in terms of how KCS formulated the goal for the system:

"With the new system, we mainly aim at supporting exchange of knowledge, discussions among the users. This is the main idea behind KennisNet. We wanted to place all knowledge on the Net in order to provoke and stimulate discussion. The objectives can be formulated as storing, sharing, and discussing of information. We think that this will also lead to producing new knowledge also. Through applying innovations such as cooperative knowledge building via the system we hope to improve profits in product development and to support personnel development."
 – Project Leader, *KennisNet*

Table 2. Mental models and metaphors of system intent and use

Stakeholder Group	Role	Mental Model	Metaphor of System
KCS	System - proponent and user	Mental model based on <i>Intent</i>	Community-building system; Knowledge sharing platform
Non-Life Insurance Experts	User	Mental model based on <i>Utilization</i>	Information resource; Search engine

On the other hand, the end-users – the non-life insurance experts, were operating under the mental model of *utilization* (see Table 2). They have formulated their mental model of the system from *utilization* perspective, i.e. how can the system be of use to them. Their view of the system is in the form of an information resource metaphor in the vivid form of a search engine or an expert system.

"I have a completely different notion of a KennisNet. I regard KennisNet more in the automation sense, like a blackbox system where you input data and it gives you some information in return. You could, for example, input data such as age, gender, etc and then it would give a recommendation for a range of insurance products that suits this person. However, the KennisNet that we have is different. What we have is a system for the exchange of information, for providing information about competition, for asking questions and answering them. This is not KennisNet, to my opinion, based on the examples and demos I have seen in Germany of such systems." – Phil, Product Manager.

This utilization mental model is likewise implied in terms of user activity logs saved by the system regarding

the nature of interaction that took place at the system interface. The logs recorded a ratio of 85% user activities related to reading and searching, compared to 15% relating to writing or creating files. This shows that users preferred only one side of knowledge exchange, mainly to get information.

While there was an effort to seemingly bridge the disparity through the participatory design workshops, this was, however, not sufficient. Users were asked to participate in the design process that proceeds from a mental model of intention, but not of their own mental model. In this way, the system can be evaluated in two contrasting ways. In terms of the goals set by the KCS as a system for enabling sharing and exchange of knowledge, the system is satisfactory because it indeed contained functionality for communicating with colleagues and inquiring about knowledge. However, on the part of the users, the system was not satisfactory when it came to fulfilling their needs. While these two groups share a similar understanding of what the *KennisNet* is intended for i.e. knowledge exchange, this is however not consistent with the way users have constructed their image of system use. This action bears upon system design in terms of the following usage breakdowns:

- System is lacking in critical content

Users are frustrated with the system because it does not have enough content. It is an unfulfilled requirement.

“Well, you see, there are times I have searched for information in the KennisNet and it is not available. The thing is, the information in that system needs to be maintained and kept up-to-date.” – Frans, Product Manager.

“To illustrate my feelings about KennisNet, let me give an example. Recently I got a question from the Call Center about registration of the caravan of our customer. The matter was that the caravan was not registered. I immediately started to search for the information... And I did not even think to look at the KennisNet – I used other resources”- Jerome, Product Manager.

Yet, content is something that needs to be built up with the system. One product manager comments:

“With KennisNet, it is up to us to keep the information up-to-date. But you can get so busy in a day that you don’t even have time to look at the system.”

- System use is extra work

Product managers and actuaries alike complain that to use *KennisNet*, they would need time away from the regular conduct of their work to use the system. This is because the system has a low task focus. It does not effectively support task performance.

7.2. Dissonance in the views of knowledge and knowledge ownership

The other form of dissonance is observed in the differing views of knowledge and of knowledge ownership by each stakeholder group. This observation is closely related to the notion of power which will be discussed in the next section. However, this finding will be discussed separately as it is a unique phenomenon observed in the case worthy of pointing out.

Concerning the differing notions of knowledge, the non-life insurance experts view their knowledge as a source of power. Their expertise is their power leverage. This notion of knowledge and power is a well-recognized frame of reference in understanding knowledge management and system implementation issues [8][23][26]. In this case, this view of knowledge as power is consistent with the way users have motivated their behavior toward the system and formed their mental model of system use in which they regard the system as an information resource. The system is seen as a means for enhancing knowledge and therefore, of power. However, dissonance exists with regards to the knowledge sharing aspect of the system. *KennisNet* was designed such that in order to build knowledge content, it is necessary that the experts input information in the system. On the other hand, such action is most likely not going to succeed because it can be seen as a means of relinquishing power when experts divulge to others what they know. The feelings of competition and lack of trust which emanate from this fear of losing power are expressed by Tim, an actuary:

“For example, our business unit has many travel insurance products and we are the first one to start a travel cancellation insurance product. At the time when we started with this cancellation insurance, we did a lot of research and compiled a lot of historical information, such as cancellation histories. That kind of information, we share easily and directly with other business units that we are working with. But that kind of info, I will not put on KennisNet. KennisNet should instead guide anybody interested to me ... like please contact me for more information.”

On the other hand, at the top organizational level, knowledge is considered to be a central property of the holding company. This concept of a central ownership is the guiding principle from which the KCS executes its tasks. In fact, their mandate is drawn from this mental model. They acted based on the mental model of ‘one company’ with regards to the ownership of knowledge. The *KennisNet* project is, thus, an extension of this mental model and a physical representation of centralized knowledge ownership. However, this runs counter to the cognitions of the users, who remained in their own mental

models of ‘localized ownership’ of knowledge. To them, the knowledge remains to be a property of the sub-company. This is made explicit in the frequent reference in the interviews to the feelings of competition that still exist between each sub-company. This is also why permission from the managers in the subsidiary is needed before publishing information in the system:

“Another issue is what to publish – the content of the inputs. Last week I made a small report about price differences and volatility. I want to put it on KennisNet and I am going to discuss it with my colleagues in KCS. I want to discuss it because I want to be sure that the document is ok to place in KennisNet.” – Leo, Actuary-KCS.

7.3. Relational power dissonance

The other notion of power is the relational aspect of power, which is related to what determines it, aside from knowledge. According to Pfeffer [27] the power of social actors is determined by two factors: the importance of what they do in the organization and their skill in doing it. In these terms, the group of non-life insurance experts had more power than the KCS by the virtue of their knowledge and expertise. This is further reinforced by the fact that their area of expertise corresponds to one of the primary processes of the organization, namely insurance product development.

While the mandate of KCS comes from top management, their work is not part of the mainstream business of the company. In this sense, they are powerless when it comes to influencing the actions of the experts to share information because position-wise and skill-wise, the experts have more power. This is also related to the way the experts see their affiliations and loyalty in a hierarchical manner: first as a member of the business unit they work for, which is their first priority, and later as part of the knowledge circle KCS had formed. This way, KCS pursued the implementation not from a position of power.

With a different goal from theirs, the group of experts leveraged their knowledge power in exercising their autonomy and freedom in not using the system. The *KennisNet* project leader, who, on the other hand, does not have any specialized knowledge about non-life insurance, his requests to input information to *KennisNet* were not heeded to, in very subtle terms.

8. Discussion and implications for design

The results of the case study suggest how dissonance can be used in describing KM system implementation process and in explaining its eventual failure in the form non-use. In the first instance, system implementation can be described as an outcome of a dissonance reduction

effort. On the other hand, the interplay of dissonant situations at the social level beyond the individual serves as pretext to system non-use and failure. In the case study, instances of dissonance were observed which serve as barriers in the implementation of tool support for enabling and facilitating knowledge exchange. Dissonances are instances of conflict and inconsistencies usually in terms of views of the world and of social relations that can be observed at various levels of representations. In this case, it is found to mostly reside in people’s cognitions, through the mental models they create when they view the system and its operating domain, namely knowledge and knowledge exchange. It can also exist in the social structures and relations in a situation, i.e. power.

Dissonance is an important phenomenon to reckon with when designing and implementing ICT tool support for knowledge management. It is also useful not only at the IT support level but also at the strategic level, i.e. when contemplating the execution of a KM policy as a business and organizational strategy on its own. An understanding of dissonance can have several design implications and is useful in structuring a requirements elicitation process [19][21][25][32] as well as organizing continuing IT support and maintenance.

8.1 Design implications for requirements elicitation

Requirements elicitation is a crucial part of a software development process. It forms part of a larger requirements engineering process which usually precludes software development [19][21][28][32]. Requirements elicitation is concerned with identification of what the users’ needs and demands are for a software system. It establishes the desired functionality and quality a software system must have. Requirements elicitation is mainly a process of learning, discovering and surfacing the needs of stakeholders [21]. In this activity, the software designer together with the customer discover, review, articulate and understand the user’s needs as well as the constraints on the software and development activity [32].

An understanding of dissonance is useful input for organizing and conducting a requirements elicitation activity especially when it comes to the following techniques:

1. Stakeholder analysis

Stakeholder analysis is one of the techniques used in gathering requirements. An understanding of the different manifestations of dissonance is helpful in identifying which stakeholders need to be approached and have to be included in the process. One possible design guideline that can be drawn from this understanding is to identify which stakeholders will experience the most dissonance

and therefore are amenable to attitude change with respect to using the system. However, this can go both ways depending on the degree of importance attached to a dissonant idea, i.e. the system is not useful. Therefore, the direction of information provision should be in the direction of those who hold a dissonant cognition regarding the system. At the same time, the information provision should be directed towards making the preferred cognition more important than the dissonant one.

Understanding the mental models in which each stakeholder operates is also important to anticipate the possible areas where inconsistencies will arise and where negotiation and viewpoint reconciliations will be needed. One possible heuristic that can be derived from this is that it may perhaps be more useful to implement a system among a group of people who have a shared mental model or to those who have amenable mental models and are not in conflict with each other. One other way is to emphasize the importance of the dominant mental model or reduce the importance of the conflicting one.

One specific stakeholder technique for stakeholder analysis that can be utilized is viewpoint analysis [20][21]. These are practical approaches towards integrating multiple perspectives in a requirements process.

2. End-user participation in decision-making

It is generally known that end-user participation in the design process is important in ensuring system success [23]. From the perspective of dissonance this is also important because it provides a venue for gaining social support in establishing and maintaining a positive cognition for the system to be developed. Likewise, an intense contribution or participation in the decision-making with regards to specifying system requirements is also desirable because it could lead into increased end-user support for the future system as a result of a dissonance reduction effort. At the same time, an intense participation is also beneficial for requirements elicitation as it allows for the discovery and articulation of useful requirements.

3. Requirements prioritization and negotiation

Requirements prioritization entail that some requirements are more important or urgent than others. As requirements come from stakeholders, the requirements of those whose mental models have the power leverage need to be further analyzed.

4. Task support: anticipating future system interaction

The case study has demonstrated that system use proceeds from the people's mental models of the system in relation to their tasks. In this particular case, it was shown that product managers for example, have tried to

make use of the system to search for information, which is a key feature of their tasks. With the system not being able to support this efficiently is an instance of requirements mismatch: the functionalities of a system do not effectively support the performance of user-tasks [22]. It is therefore useful to focus not only on the knowledge sharing aspect of work but, more importantly, the specific tasks that need to be supported have to be paid attention to in design.

The findings of dissonance analysis also reveal information about the nature of the domain of knowledge exchange itself. While it is generally recognized that sharing and exchanging knowledge is important, its actual execution in the work setting is not optimal because such activity do not really make up one's tasks. This way, KM systems are voluntary-use systems. The design challenge therefore is to find means of how to couple official and usual tasks with knowledge exchange.

5. Contextual factors

Contextual factors, such as power relations are important considerations in implementing a system and in trying to foresee its impacts to the social environment. Recognizing that power dissonance is a factor to reckon with, the findings imply that emphasis needs to be given to the mental models of those on which the success of the system is critically dependent, most especially to those who have the power to reject it.

8.2 Limitations and ideas for future research

It is acknowledged that the findings are not readily generalizable to a larger context because the conceptual application of the model is based only on one case study. However, the depth provided by a qualitative evaluation of the case study provide insights for future research into the application and testing of the concept of dissonance in other case studies of cooperative systems implementation. In particular, a comparative case study of similar and contrasting cases to determine patterns of dissonance as well as dissonance reduction mechanisms would allow for more conclusive theoretical generalizations.

9. References

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