Wikis as watercoolers?

- A study of the wiki's ability to support the processes of knowledge conversion

MA thesis – Cand.ling.merc i Engelsk, International Informationsmedarbejder
Handed in April 1st 2009, at Aarhus School of Business

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Number of characters: 132.745 (ca. 60 pages)

"You're right, boss, there may be too much idle chit-chat, but let me talk it over with my friends."

Acknowledgements

I would like to take this opportunity to thank the many people who have supported me in the process of writing this thesis.

First and foremost, I have to thank my advisor Constance Kampf for her passion and commitment to this thesis. I have enjoyed the many good discussions on knowledge creation and wiki technology, and I have learned so much in our reflections. In addition, I have enjoyed being able to broaden you horizon as well – both in terms of wikis and knowledge creation.

I would also like to thank the people at Translucent ApS for inspiring me to write this thesis. Through my job as a consultant on wiki technologies – and not least the many inspiring discussions on what a wiki is, and how it can be utilized – I have gained a priceless insight into this technology, which has provided me with a solid starting point for this thesis.

Finally, I would like to thank my family and friends for bearing with me in the times of intense writing, as well as for their love, care and support all the way to the end.

Thank you!

Table of contents

1.0 Introduction

> *"A wiki is more than just software for enabling multiple people to edit. It is a metaphor for a new era of collaboration..." (Tapscott and Williams, 2006)*

Much time and energy is spent on the search for new and cutting edge knowledge, as well as the utilization of the organization's existing knowledge in the shape of repositories and the knowledge of the individual employee. According to scholars within knowledge management (Nonaka and Takeuchi 1995; Nonaka, Toyama and Konno 2000; Grant 1996), it is the creation of new knowledge that is most valuable to organizations, and with employees spread all over the world, there is a need for tools that will allow the smooth flow of data and information, as well as the harvesting, nurturing, and creation of new knowledge.

New technologies are starting to make their way into organizations, technologies that are designed for the purpose of capturing, sustaining, and taking advantage of an organizations existing knowledge, and some are based on wiki software. Wiki technology allows employees to share their knowledge with the rest of the organization, and in addition allowing others to edit, discuss and change that knowledge in a cooperative manner. It is a new way of thinking about knowledge and collaboration, and forces employees to think of their knowledge as belonging to the greater knowledge community.

A well-known example of a wiki technology in use is the online encyclopedia Wikipedia.[1] Wikipedia is a free encyclopedia with more than ten million entries (or wiki pages), and is created and updated by its more than 75.000 active contributors, who are men and women of all ages, and who contribute voluntarily.[2] There are no editors of Wikipedia, as all editing is done by the users themselves. This means that the information available on the wiki pages is based on the knowledge of the individuals who wrote them. Most often, the information on a given wiki page will be based on the collaborative effort of a group of individuals. This 'collaboration' can be viewed on the discussion pages found behind each wiki page in Wikipedia. Here, contributors to the wiki page can discuss its contents and not least its validity, and all conversations are preserved so that others may benefit from the exchange of knowledge at a later time. According to Wenger (1998), this process of collaboration (or discussion) can be referred to as a 'negotiation of meaning.' Wenger describes this process as a duality of reification and participation, in which reification refers to the 'product' of negotiation, in this case the wiki page, and participation refers to the discussion on the discussion page. Could we then view the wiki pages as 'accepted truth' and the discussion pages as documents of the process of negotiating the 'truth'?

The title "Wikis as watercoolers" refers to this process of negotiation of meaning, in which the knowledge of a group of individuals is exchanged and combined into new knowledge (or ideas). When hearing the phrase

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[1] http://wikipedia.org
[2] http://en.wikipedia.org/wiki/Wikipedia:About

"watercooler talk", we often think of the casual and informal conversations carried out by the watercooler. The type of conversations carried could be just about any type, but what characterizes the conversations is how informal and social they are. The topics may range from pertaining to current projects, problems in the development team, etc. These informal conversations may have great value to the organizations. However, they are not preserved for others to learn from, and participants in the dialogue would not be able to refer back to it a later time, as the conversation has not been captured. The question is then if the wiki could be a place to capture this exchange of knowledge, and thus function as a watercooler? According to Nonaka and Takeuchi (1995), Nonaka, Toyama, and Konno (2000), and Liu and Liu (2008) the process of knowledge creation involves the sharing and conversion of implicit and explicit knowledge. These processes can, according to these theoreticians, not all be undertaken in a virtual environment. Nonetheless, we see examples of groups of individuals engaging in discussions and debates in chat forums, on blogs, and not least in wikis such as Wikipedia. It is therefore relevant to study whether these processes of knowledge conversion can appear in the virtual environment, in this case in a wiki, and if these theories are applicable.

The view on knowledge as something which is created in a collaborative effort and that it does not only reside within us but *among* us, has made an impact on the Danish publishing house Gyldendal and their encyclopedia. As of February 2009, Gyldendal's online encyclopedia *Den Store Danske* is publicly available, free of charge.[3] In addition, people are invited to edit, contribute and write new entries to the encyclopedia, as well as sign up as 'experts' on topics and help the editorial staff in updating and verifying the contents of the encyclopedia – much resembling the setup of Wikipedia. This step towards making the contents of the encyclopedia public is a recognition of knowledge as something which is created in the process of combining the knowledge and experience of many individuals (Nonaka, Toyama and Konno 2000; Nonaka and Takeuchi 1996; Choo 2006), and that this type of 'participatory journalism,' as characterized by Lih (2004), will ensure a high level of accurate and current knowledge (Lih 2004).

Present and future employees are using web 2.0 technologies – they are blogging, contributing to Wikipedia, sharing their pictures on Flickr, and updating their status on Facebook and Twitter, and they may want to continue using similar tools wherever they choose to work. In adapting to the employees' skills and expectations, organizations should be expected to consider how they will be a part of web 2.0, and most importantly, they need to get a better understanding of how knowledge communication processes as we know them today, have changed as we move from face-to-face to an online environment.

[3] http://www.denstoredanske.dk/

1.1 Problem statement

It is the purpose of this thesis to investigate whether the wiki can function as a space for the processes of knowledge conversions as defined by Nonaka and Takeuchi, and if so, whether these processes can be identified through discourse analysis. This has led to the following problem statement:

> *Can processes of knowledge conversion be seen in a wiki? If so, what do they look like? And can language based building tasks explain Nonaka and Takeuchi's knowledge conversion processes?*

1.2 Methodology

This section will be concerned with the methodologies of this thesis, that is, my methods of data collection, as well as my methods for analyzing these data, herein the chosen theories. The data chosen are the discussion pages, which are found behind each wiki page in Wikipedia, in which contributors to the wiki pages can discuss its content. For the analysis, James Paul Gee's (2006) notion of the seven building tasks will be used, as a tool for identifying possible knowledge conversion processes as given by Nonaka and Takeuchi (1995).

1.2.1 Nonaka and Takeuchi's processes of knowledge conversion

According to Larry Prusak (2008), knowledge is social, and thus created in a social context in which individuals interact and engage in a process of knowledge sharing, and via their interactions create new knowledge. Prusak's interpretation of a *social context* is not necessarily restricted to a face-to-face meeting, but can also be in a virtual environment. Nonaka and Takeuchi, the authors of "The Knowledge-Creating Company" (1995) share this definition of knowledge as social, and pose four modes (or social contexts) in which knowledge is created in a process of knowledge conversion; *socialization*, *externalization*, *combination* and *internalization*. The four modes each represent a stage in the knowledge creation model (SECI), which stipulates that the key to knowledge creation lies in the process of knowledge conversion.

Of particular interest to this thesis, are the processes of externalization and combination, in which implicit knowledge is made explicit and explicit knowledge is combined, respectively. According to Nonaka and Takeuchi, the process of externalization involves the externalization of implicit knowledge through dialogue and observation, and is therefore a process that takes place where individuals meet face-to-face. The process of combination is a process in which explicit knowledge is combined with explicit knowledge, most often through media such as documents, meetings and virtual communication networks. It is therefore a process in which both the physical and virtual meet is applicable. Together with Toyama and Konno, Nonaka (2000) combined the SECI model with the notion of 'ba', which is described as the shared context in which knowledge is created. The shared context may be physical, mental or virtual, and it is the latter which will be of interest to this thesis.

The two theories combined will form the basis of the analysis and identification of knowledge conversion processes in the wiki. Their definitions of the knowledge conversion processes will be the theoretical lens of the analysis, and the conclusion will thus be based on this.

1.2.2 Wikipedia - the case example

In order to analyze and observe processes of knowledge conversion in a wiki, it was necessary to collect data from a wiki that would reflect a dialogue between two or more participants, as it, according to theory, is only through dialogue that we see a process of knowledge creation take place, and thus a process of knowledge conversion (Prusak 2008; Nonaka and Takeuchi 1995; Nonaka et al 2000).

The case chosen for this thesis is Wikipedia, as it as of today is the largest public, collaborate project in which knowledge is shared and combined by a written dialogue only, and will thus provide a vast amount of examples as to how contributors to Wikipedia engage in a process of negotiation, in which they through dialogue try to reach common grounds and a shared belief of what is 'reality.'

Wikipedia consists of more than ten million wiki pages written by the more than 75.000 active contributors. Wiki pages are written collaboratively, meaning that any person can change the contents of the wiki page, as well as add or delete information. Contributors can discuss the contents of the wiki page in a subjacent discussion page in which they can discuss the validity of its contents as well as any, given edits and alterations. The data chosen for the analysis are three examples of how a group of individuals engage in a negotiation of the 'truth.' These three examples will provide me with the data needed for the analysis and possible identification of knowledge conversion processes in the wiki.

The three examples chosen for this thesis are found under the discussion pages of *Caffeine, Paracetamol*, and *Finance*. The first example, 'Caffeine,' is a discussion between five individuals on the correct way to construct the caffeine molecule. In the process of negotiation, implicit knowledge concerning the structuring of molecular diagrams is made explicit or combined with other explicit knowledge, as more knowledge is drawn into the discussion, and the outcome is not only a solution to the construction of the caffeine molecule, but also an idea on how to make other wiki pages containing molecular diagrams, easier to understand. The second example, 'Paracetamol,' is a discussion between five individuals in which they discuss the benefits or implications of using the word paracetamol as opposed to acetaminophen to describe the drug also referred to as APAP. The primary concern is the confusion that may occur if the wrong name is used, as the name paracetamol is not common in the U.S., whereas acetaminophen is. The final example is found under 'Finance,' in which two individuals discuss how to describe the term 'finance'. The three examples are all academic discussions, and have been chosen due to their 'scientific' nature, as scientific discussions lend themselves well to knowledge discussions, as they will usually contain a discussion in which the answer is either A or B, or on the 'correctness' of a given topic.

1.2.3 Analysis of data by use of James Paul Gee's seven building tasks

By use of discourse analysis, this thesis will try to identify Nonaka and Takeuchi's knowledge conversion processes in the wiki, in particular processes of *externalization* and *combination*. As the essence of the externalization process is a dialogue between two or more individuals, in which knowledge is explicated or justified by use of examples and arguments, analyzing the communication between these individuals allows a means to establish whether such a knowledge conversion process may be taking place. The process of combination is a process of combining explicit knowledge with explicit knowledge. The combining of knowledge may lead to new knowledge, and as the wiki is a probable example of a space for combination, it will be interesting to see how the participants make use of this in the process of knowledge conversion.

Concepts from discourse analysis, which guide the analysis, emerge from James Paul Gee's notion of the 'seven building tasks'. According to Gee (2005), we always and simultaneously build seven different types of realities, and that these seven realities can be identified through discourse analysis. When engaging in a dialogue with a group of people, we use our language to signal seven different things; what we consider significant or relevant, what type of activity we are engaging in, our identity, what type of relationship we wish to have with whom we are communicating, what we consider to be good, normal, correct or proper, and our area of knowledge, e.g. medicine or law, and what sign system we belong to.

Gee's approach to discourse analysis is that how we talk, walk and look is our interpretation of the world surrounding us; "...we fit our language to a situation that our language, in turn, helps to create in the first place."[4] In a situation in which we engage in a dialogue where 'truth' is being negotiated, we make use of these building tasks to tell others how we perceive 'reality.' In the discussion pages in the wiki, participants in the dialogue make use of these building tasks as they try to explain what they see as good, correct, important or irrelevant. They use the building tasks to build their arguments. Therefore, it may be possible to identify processes of knowledge conversion by use of Gee's building tasks.

1.3 Delimitation

Due to limitations in time, this thesis will not base its analysis on interviews with the participants, but on the analysis of texts only. The process of analyzing texts is a difficult task, as I as a researcher must try to remain objective in my analysis. How I interpret a text and therefore how I choose to interpret 'reality' may be entirely different from the reality of the sender of the text. An interview with the individuals involved in the discussions in the three examples, could have helped clarify the actual intentions of their statements, as well as given me an opportunity to make a more holistic analysis of the text, as any given text will be more meaningful once you know who the sender of the text is. Any discourse (or text) is a result of who we are as individuals. However, time wise it would not have been possible to engage in interviews with all the participants, and some of the discussions date back to 2004, most likely making it difficult for the participants

[4] Gee, James Paul (2005): p. 10

to even remember the discussions.

The model of knowledge conversion by Nonaka and Takeuchi contains four modes. However, as this thesis is analyzing written dialogue, and therefore explicit knowledge, only two of the four modes will be dealt with; externalization and combination. These two processes each represent a stage of the process of knowledge conversion in which implicit knowledge is made explicit and explicit knowledge is combined, respectively.

The discourse analysis of the communication between the contributors will be limited to the written communication only, as the contributors have no face-to-face contact with each other. Discourse analysis is not necessarily restrained to the written discourse only. According to Gee (2006), we can distinguish between "Discourse with a capital "D" and "discourse" with a small "d". The two represent how we act, dress, feel, believe or interact, and how we use our language, respectively. Gee's distinction of Discourse will therefore not be approached in this thesis, as the analysis is limited to a written dialogue only. Nonetheless, some of the characteristics of Discourse are possible to identify in the written dialogue (values, feelings and ways of interacting), but they will however not be dealt with, as they are a part of the analysis of the individual actors in the dialogue, and the type of relationship they have, which at this point is not relevant. For this thesis, only the part of discourse analysis pertinent to argumentation will be of interest.

1.4 Structure of thesis

The following will provide the reader with a description of the chapters of the thesis, where chapter one is the introduction. The subsequent chapters will contain the following;

Chapter two, will be addressing theories on social constructivism and constructionism as a part of the process of knowledge creation. In addition, the knowledge sharing model of Jackson and Klobas (2008) will be discussed, and then compared to Wenger's (1998) notion of the duality of participation and reification, which suggests that our participation with the world and our surroundings is reified in the world in the shape of for example documents, monuments, and instruments. The process of reification is of particular interest to this thesis, as the theory of Jackson and Klobas (2008) suggests that reifications are the physical results of a process of knowledge sharing. This means that the articles in the wiki, could be considered reifications, and that they therefore contain the result of the negotiation of meaning taking place in the discussion pages, which will be the subject of the analysis.

Chapter three is an introduction to the wiki technology, and how it differentiates itself from traditional knowledge management systems. The characteristics of the wiki will be highlighted and discussed, in the comparison with traditional systems for knowledge management, and the research of Judy Payne (2008) on wikis as a tool for improving collaboration and knowledge sharing will be presented.

In chapter four, various theories pertaining to knowledge and knowledge management will be presented. Firstly, the concept of 'knowledge' will be clarified, herein the differences between implicit and explicit knowledge as given by Liu and Liu (2008). Hereafter, Alawi and Tiwana's (2003) processes of knowledge

management will be presented as well as the potential barriers to consider, as presented by du Plessis (2008). Chapter four will also go through the processes of knowledge sharing and creation, and how these processes may function in a wiki. In the section on knowledge creation, Nonaka and Takeuchi's model of knowledge conversion (SECI) will be presented, as will Nonaka, Toyama, and Konno's (2000) notion of 'ba' – the shared context in which knowledge is created.

Chapter five will be concerned with discourse analysis, and how the discourse in the wiki can be analyzed so as to identify processes of knowledge conversion. The theory of James Paul Gee (2006) will be presented; Gee stipulates that we always and simultaneously build seven different realities, and that these realities can be identified through the 'seven building tasks'. He argues that we use these building tasks in our discourse so as to signal (1) what we consider important, (2) which activity we are engaged in, (3) what our identity is, (4) which type of relationship we have or wish to have with whom we are speaking to, (5) what we consider to be good, proper or normal, (6) what is important or relevant, (7) and what is our area of expertise or which sign system do we belong to.

In chapter six Wikipedia will be presented as the case, in particular the three examples chosen; *caffeine*, *paracetamol*, and *Finance*. But before the analysis, the history of Wikipedia will be presented, as well as some of the functionalities of the wiki pages, as well as a quick overview of the structure of Wikipedia. This will provide the reader with a better picture of how the process of knowledge sharing functions in the wiki.

Chapter seven is the conclusion. Here, I will summarize the discussions of the various theories, and compare them to the findings in the analysis. Chapter eight is a short summary of the entire thesis.

2.0 Theory of science

"Consensus is an agreement reached in a shared community" (Klausen & Harnow, 2005)

Reaching consensus means that a group of people has reached and agreement. However, Klausen and Harnow points out that a consensus is not reached simply by a 'group of people', but by a *community*. According to Wenger (1998), reaching an agreement is a process of negotiating meaning, and that the negotiation is a process which takes place in the community. Within the theory of social constructivism, the creation of knowledge is a process of combining our knowledge with the knowledge of the community, and that we through a process of negotiation, can reach a consensus on what we perceive as 'reality.'

This chapter will be addressing theories of social constructivism as well as constructionism as a part of the processes of knowledge creation. In particular, Jackson and Klobas' (2008) model of knowledge sharing (fig. 2.1) will be highlighted, and subsequently compared to Wenger's (1998) notion of the duality of participation and reification, which stipulates that our participation in the world is reified in our surroundings; our monuments, logos, graffiti on a wall, or documents. These processes, and thus reifications, are a part of a process of negotiation of meaning. This means that the more physical reifications such as documents are reflection of this negotiation, and can thus be subject to discourse analysis, which may then reveal these processes.

At the end of this chapter, the theory of social constructivism, visualized in Jackson and Klobas' model, will be compared to the processes in the wiki, and how they may reveal themselves.

2.1 Social constructivism and the negotiation of meaning

The basic notion of social constructivism is that we create our reality as reality creates us (Jackson and Klobas, 2008; Gergen, 2004). According to Birkler (2006), we may interpret a given object or subject based on the exact same description, but how we understand it is based on our individual preconditions. Some may view a person as a freedom fighter, whereas others will call that given person a terrorist. This means that any piece of communication is interpreted in the light of that person's historical and cultural 'horizon.' [5]

According to Prusak and Davenport (1998), Berger and Luckmann (1967) as well as Nonaka and Takeuchi (1995), a characteristic of knowledge is that "...knowledge is not absolute, but relative to cultures and contexts."[6] This view on knowledge as a result of the individuals' interactions with the world is closely linked with the theories of social constructivism as well as constructionism. The two views on the construction of knowledge share many similarities, but differ in their view on what knowledge is, and how it is to be

[5] Brier, Søren (20 05): p. 87
[6] In Jackson, P. and Klobas, J. (2008): p. 330

interpreted on the individual level.[7] The two views will be discussed in the following.

Within the theory of social constructivism, the perception of knowledge and reality is viewed as a subjective social construction, in which how we understand the world surrounding us, depends on what we already know about the world. Knowledge thus exists within us, and can be seen as an opposition to the world around us (Gergen, 2004). Engberg (2008) states that when we are subjected to new knowledge about the world, that new knowledge will be processed in the light of our existing knowledge. This means that when we engage in the process of knowledge sharing and knowledge creation, we will understand a given piece of knowledge differently, depending on how we view the world.

However, within the theory of constructionism, knowledge is viewed as a result of a social process, and is therefore not viewed in the perspective of the individual, but the social process in which it was created (Rønn, 2007).[8] Moreover, within the perspective of constructionism, knowledge is not absolute, as there is not absolute 'truth' to what is 'reality.' According to Gergen (2004), reality is a product of our social interactions, and the way we view the world surrounding us, is a product of the world we find ourselves in. Therefore, the constructivist view is that the interpretation of knowledge must begin with the individual, where the constructionist view is that we must view the social process in which this knowledge was construed, in order to understand it. However, the two are inherently connected, as how we share and create knowledge in the interaction with other individuals, is dependent on our own individual knowledge.

Jackson and Klobas (2008) have developed a knowledge sharing model (fig. 2.1) based on the core elements of Berger and Luckmann's seminal work “The social construction of reality” from 1967, which stipulates that reality exists only through our interactions with the world, and is as such a model of knowledge sharing from the perspective of social constructivism. According to Jackson and Klobas, the process of knowledge sharing, and thus knowledge creation, is a social phenomenon that is built by the group processes. The elements of their knowledge-sharing model incorporate elements of knowledge conversion, knowledge creation, and processes of negotiation.

The ‘personal knowledge’ in the model is described, in accordance with the notion of social constructivism, as the central element of the entire knowledge-sharing model. It is our personal knowledge that determines how we perceive the world, and how we engage in a process of knowledge sharing and –creation. Jackson and Klobas argue that our personal knowledge is developed through the processes of *internalization, personal knowledge creation, externalization, objectivation, legitimation*, and *reification*, and that these processes are affected by the already existing personal knowledge; it is a continuous process of development.

The processes of internalization and externalization describe how knowledge is understood and made explicit

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[7] Gergen, K. J. (2004): p. 77

[8] Gergen (2004) actually refers to it as ’social constructionism’. However, as pointed out by Rønn (2007), the social is inherent in ‘constructionism’ and calling it social constructionism is thus redundant. It will therefore be referred to as ‘constructionism’.

by an individual, respectively. The process of 'objectivation' is described as a group's shared understanding of the world, in which the shared knowledge is *objectified* in their language, behavior or artifacts. Legitimation and reification refer to a group's process of negotiation where knowledge is accepted as 'correct' and 'the norm', respectively.

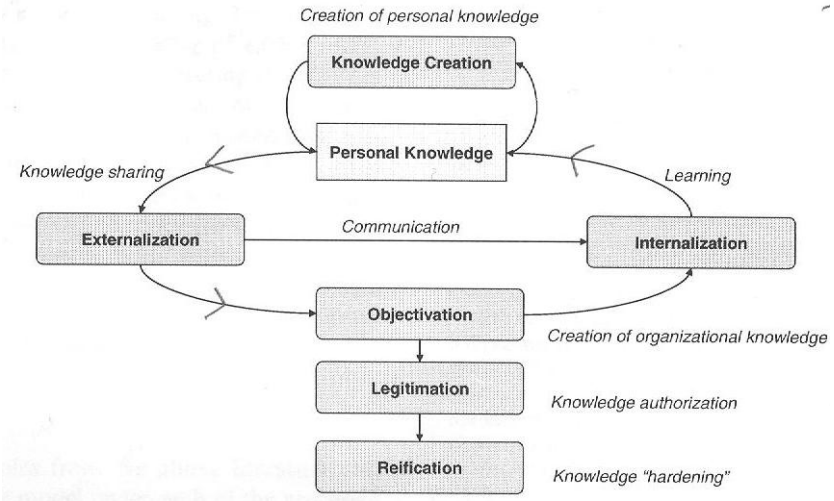

Fig 2.1: The knowledge-sharing model (Jackson and Klobas, 2008)

The process of reification has been described by Wenger (1998) as being a part of the duality of reification and participation (see fig. 2.2). The duality of participation and reification is a part of the process of negotiating meaning, which, according to Wenger, is the process "…by which we experience the world and our engagement in it as meaningful."[9] Our participation in the world and how we act and interact is projected in how the world is shaped, and is reified as documents, monuments, instruments, etc. But it is not only us who leave traces of us in the world, the world has an effect on how we engage in it as well. The processes of reification and participation cannot stand alone, which is why it is a duality: "…living is a constant process of *negotiation of meaning*"[10] (his italics). The two processes will be described in more detail in the following.

Participation is described by Wenger as how we take part in the world, and the relations we have with others. It is therefore both a process of action and connectedness. It describes our social memberships in communities of practice and combines both how we talk and walk, but also how we feel and think.

Wenger describes reification as a process in which we give form to our experiences, and that this form can be physical as well as a mental picture. The key point is that we have made abstract things into what we consider actual objects – they have been objectified. As an example of reification is some of the abstract terms we use every day as if they were active agents, e.g. 'the economy is bad.' But more physical objects are results of processes of reification as well, e.g. monuments and documents.

[9] Wenger, Etienne (1998): p. 53
[10] Ibid: p. 53

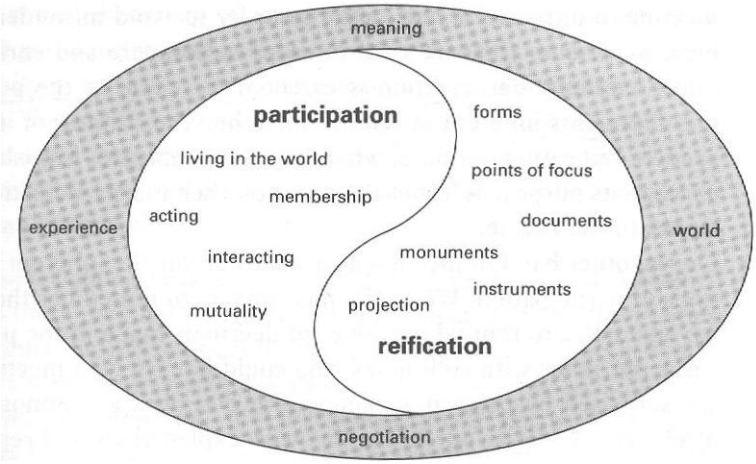

Fig. 2.2: The duality of participation and reification (Wenger, 1998)

The process of reification as a part of the negotiation of meaning is interesting to this thesis, as 'reification' can be reflected in documents, i.e. in writing, and can therefore be subject to a discourse analysis. As the documents are reflections of knowledge processes, in which meaning has been negotiated, the discourse analysis of the cases may therefore reveal similar processes in the wiki.

As was highlighted in Jackson and Klobas model of knowledge sharing, the process of reification is a process in which implicit knowledge is made explicit by reification. The process of reification is by Wenger (1998) described as a part of the process of negotiating meaning, and the reifications will thus reflect this negotiation. In the discussion pages of the wiki pages in Wikipedia, we see groups of individuals engaging in discussions and dialogues in which they negotiate what is considered the 'truth,' i.e. what can be accepted as the 'true' knowledge shown on the wiki pages. It may therefore be possible that the discussion pages in the wiki represent the participation, and that the wiki pages are the reifications of these discussions.

3.0 Wikis – an introduction

This section will describe some of the basic functionalities of a wiki, in order to gain an understanding of the circumstances under which these processes of knowledge conversion must function. In addition, the functionalities of the wiki will be compared with the functionalities of the more traditional systems used for project management. Although the two share many of the same functionalities, they are still very different.

The first section will be addressing the wiki technology in brief, and describe some of the features of the wiki which allow users to participate on projects in a collaborative manner. In the second section, the differences between wikis and traditional knowledge management systems will be addressed, in particular the difference in control of content as well as easy-of-use.

3.1 Wikis and collective intelligence

The wiki is part of the concept of web 2.0, in which user-involvement (or participation) is believed to be the keyword, as users are more actively involved on the World Wide Web (Lih 2008; O'Reilly 2005). Businesses such as eBay, YouTube and Danish Trendsales would not exist if it were not for the users and their involvement. Some of the 'products' of web 2.0 are blogs, social platforms, and forums in which users share and collect knowledge – a characteristic of the concept 'web 2.0' as given by Tim O'Reilly, one of the fathers of the concept; [11]

> *"The central principle behind the success of the giants born in the Web 1.0 era who have survived to lead the Web 2.0 era appears to be this, that they have embraced the power of the web to harness collective intelligence" (O'Reilly, 2005)*

The key to survival is therefore to embrace the development not only in technology, but also the development of the people using these technologies, as they too have evolved from being receivers of information, to being active participants in the world surrounding them.

One of the many tools used for the harnessing of collective knowledge, are systems based on wiki software. Ward Cunningham introduced the first wiki in 1995 in the shape of WikiWikiWeb. The wiki technology is today, as it was then, used for collaborating on documents, or wiki pages, in which users create, edit and comment on wiki pages in a collaborative manner. The most cited wiki is Wikipedia, the global online encyclopedia with more than ten million entries, all created and edited by its users. The vast amount of contributors, and not least contributions, makes it one of the world's largest collections of information and knowledge collected in a collaborative manner.

A wiki is a type of technology, which allows any user to create and edit a page, and not least edit the pages of others. In addition, a wiki allows 'tagging' of pages, which in essence means that users can add labels and

[11] O'Reilly, Tim (http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html)

keywords to a wiki page to make it easier to search for pages or subjects.[12] [13]

By looking at some of the functionalities of the wiki and traditional software for knowledge management (KM), both the wiki and the traditional KM tools share some of the same functionalities. However, there are some key differences separating the two, and some of these will be highlighted and discussed in the following. It is often a misconception that the two can be compared, which is why it is important to make this distinction. In addition, by comparing the two, the characteristics of the wiki will be highlighted, characteristics that influence how contributors to the wiki engage in the process of knowledge conversion.

3.2 Wikis versus knowledge management systems

A traditional knowledge management (KM) system is a system that allows for an organization to manage content such as documents, pictures audio- and video files. Although the typical KM system and the wiki share some of the basic functionalities, there are some key differences between a wiki and the more traditional KM systems, which are of relevance to the process of knowledge conversion; *control*, *flexibility*, and *ease of use* (Payne, 2008). Compared to the process of knowledge conversion, these functionalities are central, as the key to knowledge creation, and thus knowledge conversion, is the mediums ability to let its users take part in a dialogue where they will be able to engage in what will resemble a face-to-face dialogue.

In a traditional knowledge management system, the structuring, editing and creation of pages is usually done by a group of people within the IT-staff, which means that contributors are dependent on others to publish their content, and are therefore not in *control* of the content. In a wiki, the *control* of content is left with the users, who can create and edit pages whenever they like, and thus engage freely in a dialogue independent of others. In addition, there is also the issue of control of knowledge – or ownership. Once your knowledge is entered into the wiki, it belongs to everyone, as everyone is free to comment on and edit 'your' knowledge. This makes the process of knowledge conversion more free, as the knowledge, when detached from its previous owner, can now be combined with the knowledge of others and developed further. The combining of knowledge, whether implicit or explicit, is one of the central ideas of the knowledge conversion processes, as described by Nonaka and Takeuchi (1995).

Payne (2008) listed some of the major differences between traditional software and social software such as a wiki; among those are flexibility, ease of use, and control (fig. 3.1). The list of features incorporates areas such as the complexity of the technology, its flexibility and not least how user-friendly it is considered.

[12] Payne, Judy (2008): p. 7
[13] Vickery, Graham and Wunsch-Vincent, Sacha (2007): p. 37

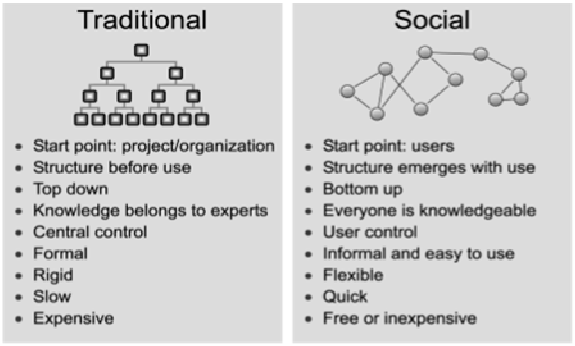

Fig. 3.1: Traditional vs. social software (Payne, 2008)

As described by Payne (2008), the wiki is characterized by its ability to be shaped by its users, its ease of use, and not least its ability to let its users engage in a dialogue, albeit a written dialogue and at a different pace than if it was face-to-face. However, like a face-to-face dialogue, the wiki allows for the help of using visual aids such as pictures or files. In addition, the wiki offers dialogue across borders and time zones, allowing an international organization to benefit from the knowledge of its employees from all over the world, as they engage in a written dialogue in which concepts are developed, and knowledge is shared. The fact that organizations have a need for tools that will support the management of international projects, and not least the knowledge creation processes entailed in this process, is what makes it important to discuss the wiki's ability to be a space for the knowledge conversion processes of externalization and combination.

It should be noted, that the two types of technologies are slowly merging, as seen with Microsoft's SharePoint Server which is being marketed as a knowledge management system, but also incorporates many of the elements often associated with web 2.0 and user-involvement; they have incorporated features such as blogs and wikis, and decentralized control of the content pages.[14] It is therefore quite possible that the differentiation between the two types will become obsolete in the near future.

[14] http://office.microsoft.com/en-gb/sharepointserver/FX100492001033.aspx

4.0 Examining notions of knowledge in different academic fields

> *"People and organizations acquire information through social networks, and a portion of this information becomes knowledge. However, the gathering of information is not equivalent to the creation of knowledge" (Calhoun and Starbuck, 2005)*

This quote from Calhoun and Starbuck brings attention to a problem within knowledge management; that information is the equivalent of knowledge, or that knowledge can be 'moved, 'stored' and in other ways processed. Moreover, that passing information (or knowledge) over to others is not the equivalent of knowledge creation, as knowledge creation is a social process involving two or more people (Nonaka et al, 2000; Nonaka and Takeuchi, 1995); Jackson and Klobas, 2008).

This chapter will be examining different notions of knowledge, herein the concept of knowledge management, sharing, and -creation. A revision and discussion of these concepts will provide the basis for the discussion of Nonaka and Takeuchi's SECI model of knowledge conversion, and how and if wikis can support these processes of conversion.

In the first part of this chapter, the differences between the terms data, information and knowledge will be highlighted. Then, differences between implicit and explicit knowledge will be discussed, as the process of knowledge conversion of Nonaka and Takeuchi (1995), involves the conversion of implicit and explicit knowledge. Finally, this first part of chapter four will discuss if wikis can 'hold' knowledge.

Hereafter, the processes of knowledge management will be elaborated on, as well as the potential barriers that may occur in these, and how and if the wiki could function as a tool for managing knowledge. In the subsequent sections, two of the processes of knowledge management – knowledge sharing and knowledge creation – will be discussed with an emphasis on the processes, and how and if wikis can support these.

4.1. Knowledge as a concept

The following sections will be addressing the distinctions between data, information and knowledge, as well as implicit and explicit knowledge. As this thesis is addressing the issue of whether or not knowledge can be converted, it is important to understand what lies in the concept of knowledge and how it differentiates itself from data and information. In addition, the difference between implicit and explicit knowledge is of particular interest, as Nonaka and Takeuchi's model of knowledge conversion, distinguishes between the conversion of implicit and explicit knowledge.

4.1.1 Data, information, and knowledge

> *"Knowledge builds on information that is extracted from data" (Boisot, 1998)*

Although the concepts of data, information and knowledge are not the same, they are however closely

connected. When discussing knowledge management and knowledge sharing, the concepts of information and knowledge are often used interchangeably; they are, however, not the same.

Choo (2006) describes information as an aggregation of data, which has been given meaning and significance by an individual or group. The meaning and significance constructed is solely dependent on the interpreter, as all individuals will be preconditioned to see a given piece of information within their frame of reference. According to Choo, information can only be become knowledge through a process of 'belief structuring' in which the information is evaluated and experienced, a process also referred to as 'justification' by Nonaka et al (2000). Fig. 4.1 is an illustration of this process; the processing of signals, data and information so that it becomes knowledge, is dependent on a *human agency* as well as a certain process of *structuring*. Signals are physically selected as data, and are then mentally processed in order to become information. For information to become knowledge, then according to Choo, this information must be subject to a process of justification, in which information is 'tested,' so to speak. The process of belief structuring is a result of an individual's use, practice and reflection on information (Choo, 2006).

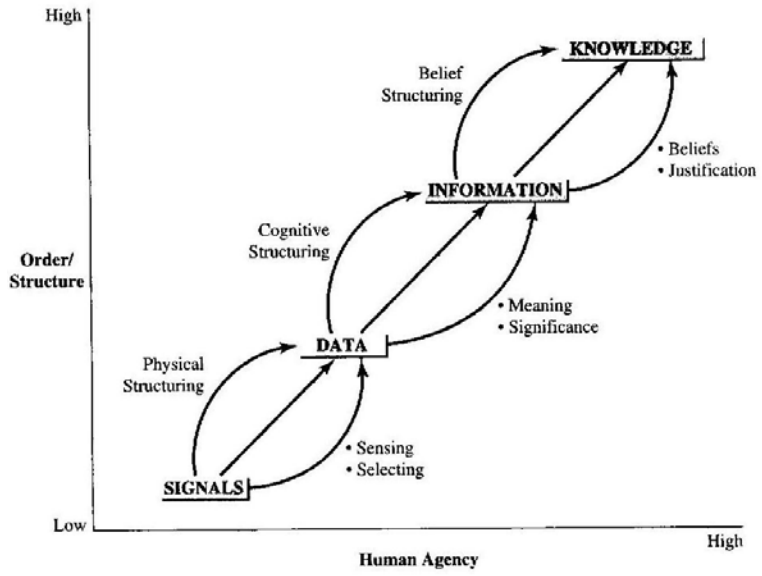

Fig. 4.1: Data, Information, and Knowledge (Choo, 2006)

Nonaka and Takeuchi (1995) describe information as "...a flow of messages" and knowledge as that which is "...created by that very flow of messages, anchored in the beliefs and commitments of its holder." This process is what Choo refers to as 'belief structuring,' in which information becomes knowledge as individuals reflect on a given piece of information, combines it with more information, and experience it in reality. Moreover, according to Payne (2006), Prusak (2008) and McDermott (1999), knowledge is defined as the individual's interpretation of its surroundings, and is as such not tangible, but created as we give meaning to our surroundings.

According to Nonaka and Takeuchi (1995) both information as well as knowledge is context-specific, and not least dependent on the use and interpretation of the individual. Therefore, in the process of knowledge

conversion in a virtual environment such as a wiki, the knowledge of one individual, may be viewed differently by another, as they each have their own individual interpretation of what is 'reality' and thereby what is 'knowledge.' This means that in the process of knowledge conversion, there will be a naturally occurring process of argumentation, as all participants in a discussion will try to argue their 'truth' as the most correct. The dialogue in this process of conversion may therefore have elements of 'persuasion' and 'argumentation' that will become apparent in the discourse analysis.

4.1.2 Implicit and explicit knowledge

"...we can know more than we can tell..." (Polanyi, 1966)[15]

Apart from distinguishing between whether knowledge is information or information is knowledge, there is also a difference between implicit and explicit knowledge. The distinction between the two is important when discussing knowledge conversion in a virtual environment, as implicit knowledge is described as the knowledge not yet articulated, whereas explicit already is. As a virtual environment, such as a wiki, is a more written than oral medium, it can be questioned whether it can capture the implicit knowledge in the process of being converted into explicit knowledge – the process of externalization as described by Nonaka and Takeuchi (1995). They argue that this process entails a face-to-face dialogue, and as such cannot be executed in a virtual environment.

As exemplified by the quote above, the concept 'implicit knowledge' has its origins in Polanyi's (1966) definition of 'tacit knowledge', which he describes as the knowledge hidden from our own consciousness, and in that regard is impossible to make explicit. Nonaka and Takeuchi popularized the concept of 'tacit knowledge' in their book 'The Knowledge-Creating Company' (1995). However, their perception of what tacit knowledge is, has been questioned by researchers such as Wilson (2002) who argues that Polanyi's definition of 'tacit' in fact means inexpressible, whereas Nonaka and Takeuchi describe it as expressible, and that what they may in fact mean is 'implicit.' Nonaka and Takeuchi base their definitions of tacit and explicit knowledge on how the knowledge can be communicated; explicit knowledge is the knowledge we can explain, write down, or in any way pass on to others, whereas tacit knowledge is our personal skills and experiences, and the part of knowledge which is more difficult to express - yet still expressible. In addition, Nonaka and Takeuchi (1995) believe that knowledge is capable of being converted from tacit to explicit and vice versa in the process of knowledge creation, and that the social interaction between two or more individuals is the key to this process. Tsoukas (2005) have questioned their notion of 'knowledge conversion,' as he argues that "…tacit knowledge cannot be 'captured', 'translated', or 'converted', but only displayed and manifested, in what we do" (p. 410). Tsoukas argues that tacit knowledge is so ingrained in what we do that it would be impossible for people to express it, let alone share it. Furthermore, he believes that the key to creating new knowledge lies not in the process of converting tacit knowledge to explicit knowledge, but in the social

[15] in Choo, Chun Wei (2006): p. 136

interaction within a group of people. However, as Wilson (2002) suggests, Nonaka and Takeuchi may in fact have meant 'implicit' knowledge, and not 'tacit,' a misunderstanding which may have been redundant if Nonaka and Takeuchi used the word 'implicit' as opposed to 'tacit.'

Throughout this thesis, Nonaka and Takeuchi's definition of tacit knowledge is referred to as implicit knowledge, as the knowledge conversion model is based on knowledge capable of being expressed, either visually, orally or in writing, and it will therefore be correct only to refer to it as 'implicit.'

4.1.3 Knowledge in wikis

As wikis are a written medium, they would seem a natural place for explicit knowledge to be expressed. But are the entries in a wiki knowledge or information? Information has so far been defined as an aggregation of data which has been given meaning and significance by an individual or group, whereas knowledge is defined as something which is created in the social interaction between two or more individuals.

Based on these definitions, the entries we find in the wiki pages of Wikipedia would be characterized as 'information.' Wikipedia defines the contents of the articles in Wikipedia as 'information,' which, according to the definition, is true. However, have they perhaps failed to recognize that the processes of negotiation, which we see in the discussion pages, in which knowledge is seemingly combined and negotiated as 'truth,' could be processes of knowledge conversion, and thus a process of knowledge creation? The analysis suggests that there is a process of knowledge conversion in which the wiki pages represent the accepted knowledge, and the discussion pages represent the process of negotiation.

The following sections will be concerned with the processes of knowledge management as presented by Alawi and Tiwana (2003), as well as the potential barriers of successful knowledge management initiatives, as described by du Plessis (2008).

4.2 Knowledge Management

> *"The aim of effective knowledge management is to enable everyone to gain from the intellect, imagination, potential and enthusiasm of people working in and with organizations (McKenzie and van Winkelen, 2004)"*[16]

The quote by McKenzie and Winkelen highlights one of the core issues of knowledge management; is knowledge management about managing people or knowledge? The term 'knowledge management' has been used by many researchers, theoreticians, and others alike, over the past couple of decades; even though it has been discussed and debated in terms of its applicability and not least relevance – because can you *manage* knowledge?

Traditionally, knowledge management is seen as a way of controlling knowledge – in which knowledge is

[16] in Payne, Judy (2008): p.5

viewed as something which can be moved, stored and retrieved whenever the situation calls for it. However, according to du Plessis (2008) and Tsoukas and Vladimirou (2001), knowledge management is not a question of how to capture, store and distribute pieces of knowledge, but rather about how to create situations and conditions that further knowledge sharing and thus knowledge creation. With the progress in technology and the internationalization of organizations, the processes of knowledge management, and the tools used for these, have to not only support them, but also support the increasing need for tools that will allow employees from all over the world to collaborate on projects in a virtual environment. This means that the knowledge management of today has the opportunity to focus on creating *virtual* situations and conditions that will further knowledge sharing and knowledge creation. When comparing this to wiki technology, then according to Lih (2004) and MacFadyen (2006), the wiki technology permits the free flow of information and an environment in which all participants have equal access to all information and equal opportunity of participating in the creation of new knowledge. The purpose of good knowledge management is thus to create conditions under which knowledge can be created and shared, and provide for conditions that will allow international collaboration and knowledge sharing via virtual environment.

In order to gain a more thorough understanding of the concept of knowledge management, and how to associate Nonaka and Takeuchi's processes of knowledge conversion with these, the following section will address the processes of knowledge management, as presented by Alawi and Tiwana (2003).

4.2.1 Alawi and Tiwana: Knowledge management processes

> *"Knowledge in and of itself does not produce organizational value. Its application for taking effective action does." (Alawi and Tiwana, 2003)*

For knowledge to become a valuable asset in an organization, it must be activated through processes such as knowledge sharing, -creation, -storage and retrieval as well as –application, as argued by Alawi and Tiwana (2003). They highlight four types of knowledge management processes, and suggest appropriate technologies to be used in these processes. It is to be noted, that Alawi and Tiwana's perception of 'knowledge' very much resembles the definition of 'information' as they in their description of knowledge management refer to knowledge as something which can be transferred, stored and retrieved, as if knowledge is an object which can be physically moved. They do however, distinguish between two types of knowledge: that which cannot be expressed (implicit), and the codified and explicit knowledge, and they argue that these two types can be 'transferred.'[17] Nonetheless, their descriptions of the processes in knowledge management are still of interest, and will be presented in the following:

- **Knowledge creation** – the development of 'new' knowledge through employee training, and by supporting the collaboration between employees and departments through e-learning systems and systems for collaboration.

[17] Alawi, M. and Tiwana, A. (2003): p. 105ff

- **Knowledge storage and retrieval** - the process of storing and retrieving the knowledge of an organization whether internal or external, in which internal refers to what has previously been defined as implicit and external as the explicit knowledge.
- **Knowledge transfer** – the process of transferring knowledge between (1) individuals, (2) individuals and repositories, and (3) between repositories. They pose two models of transfer; the network model and the stock model. The stock model uses information technology to transfer explicit knowledge between individuals and repositories, whereas the network model uses technology for establishing electronic channels between individuals (such as email, instant messaging, video conferencing, etc.) for the purpose of transferring implicit knowledge.
- **Knowledge application** – is the knowledge management process, which they describe as most important. The process of knowledge application refers to how knowledge is used for decision-making and problem solving in organizations. However, as has been previously defined, how we as individuals absorb knowledge, is dependent on our preconditions, i.e. our perception of the world and what is 'reality.' Alawi and Tiwana suggest two types of IT systems: rule-based expert systems and case-based reasoning systems, used for the reuse of already established knowledge and 'rules of thumb,' in order to limit the time spent on similar projects or cases.

In the following, the four processes of Alawi and Tiwana will be compared to Nonaka and Takeuchi's four modes of knowledge conversion;

The process of **'knowledge creation'** is the knowledge management process of Alawi and Tiwana that most resembles the SECI model of knowledge conversion. Alawi and Tiwana regard collaboration as the key to creating new knowledge, and that it is created by combining the knowledge of individuals, who, in a process of negotiation, are exposed to "…each other's thoughts, opinions, and beliefs, while also obtaining and providing feedback from others for clarification and comprehension" (p. 107). This type of exposure allows for the externalization and combination of knowledge through dialogue. They further argue that IT systems should aim at supporting the individuals learning processes, and improve group interactions by connecting employees. These processes much resemble what we see in wikis such as Wikipedia, something that will become more apparent in the analysis.

The process of **'knowledge storage and retrieval'** is, according to Alawi and Tiwana, a process of storing and retrieving both implicit and explicit knowledge. They never refer to the implicit knowledge as 'implicit' but do however describe it as knowledge which "…cannot be codified and imbedded in systems," and that it resides

"…within the individuals or groups of individuals in an organization" (p. 119). But if the knowledge can be 'retrieved', they must mean 'implicit'. It is therefore the assumption of this thesis, that what they actually mean is 'implicit' knowledge. They argue that the sharing of implicit knowledge is best done by a group of individuals who meet face-to-face, and suggest that the use of IT tools is merely for the facilitation of "…connections between the individuals who possess the necessary knowledge" (p. 119). This means that with their perception of implicit knowledge, they do not regard IT tools as suitable for the management of implicit knowledge, but merely suggest the use of technology for the transferring of explicit knowledge – a perception shared by Nonaka and Takeuchi (1995) and Nonaka et al (2000). The process of storing and retrieving knowledge somewhat resembles the process of externalization and internalization of the SECI model, as you could argue that the process of making implicit knowledge explicit is done with the intention of storing it. Moreover, the process of internalization could be argued as a process of retrieving knowledge with the purpose of putting it to use.

Their definition of the process of '**knowledge transfer**,' and how explicit knowledge is 'moved' between individuals and between individuals and repositories, is somewhat of a contradiction of the definition of knowledge management, as given by du Plessis and Tsoukas and Vladimirou above, as knowledge cannot be moved, whereas data and information can. Nonetheless, their description of this knowledge management process, somewhat resembles the process of *combination*, the third mode in Nonaka and Takeuchi's SECI model, in which explicit knowledge is combined by use of IT systems. Alawi and Tiwana suggest three types of knowledge transfer: (1) between individuals, (2) between individuals and knowledge repositories, and (3) between knowledge repositories. The process of combination, as described by Nonaka and Takeuchi, is described as a process between individuals, and not between knowledge repositories or individuals and repositories. For the purpose of this thesis and not least the analysis, the notion of knowledge transfer will be viewed as a part of the knowledge management processes; however, only as a process between individuals. If the knowledge is transferred between knowledge repositories, then according to the theories of Nonaka and Takeuchi (1995), Nonakae et al (2000), and Choo (2006), it is no longer knowledge but information, as there is no 'social context.'

Their final process, '**knowledge application**,' much resembles the fourth mode in the SECI model, the process of *internalization*, in which knowledge is converted from explicit to implicit in a process of 'learning-by-doing.' Nonaka and Takeuchi describe this process as helping an individual "…experience the experiences of others indirectly" (p. 61) and is a process of applying explicit knowledge to new situations. As this process necessitates a situation in which an individual effectuates this knowledge, it will not be relevant to the analysis of this thesis, as it cannot be observed. It is however an interesting part of the knowledge management processes, as the purpose of knowledge creation, is to create new knowledge, which can be applied to new situations.

However, no tool for knowledge management can be successful unless a number of factors are considered. When working with people, there will always be a number of issues, which somehow influence the outcome

of an organization's knowledge management efforts. The following section will be addressing some of these as given by du Plessis (2008).

4.2.2 du Plessis: Barriers to successful knowledge management

As the role of knowledge management is to create conditions under which knowledge can be created and shared, it automatically involves the role of creating conditions under which a group of *individuals* can engage in knowledge sharing. As human beings we are *individuals* in the sense that we will all react differently to the process of knowledge sharing and knowledge creation, as we communicate in each our own way, and each sustain our own perceptions of the world. This means that there may be barriers pertaining to the use of technology, as well as motivation to engage in these processes.

Du Plessis (2008) suggests a list of potential barriers to successful knowledge management. Four of those are listed in the following, as they would represent barriers relevant to the knowledge conversion processes and the creation of knowledge in wikis;[18]

- Shared understanding of knowledge management
- Do people know how to use knowledge management systems?
- The role of technology
- User acceptance

I have chosen to focus on these four, as they represent barriers pertaining to the technology of the concept of knowledge management, and the possibility of knowledge conversion processes in the wiki.

Shared understanding of knowledge management – according to du Plessis, a shared understanding of the concept 'knowledge management' is a prerequisite for utilizing any type of knowledge management technology. If the employees do not understand the value of good knowledge management, they will never understand the purpose and meaning of the technologies they are presented with. It is therefore imperative that organizations bring awareness to the potentials of utilizing a tool such as a wiki, so that the employee will understand the benefits it will bring to their work and the company at large. However, as emphasized by Christensen (2004), using technology in knowledge management, is about finding the needs of the organization *before* using it, and not about creating needs that will apply to a given knowledge management tool.

Employees and technology – apart from being aware of the processes of knowledge management, and being able to effectuate these processes, then according to du Plessis, the employees must also be confident with systems for knowledge management. For some employees, it may be a barrier to learn new ways of doing things, for example when learning to work with wiki technology. As illustrated in fig 3.1, a wiki differentiates itself from traditional knowledge management systems in significant areas such as *control* and *ease of use*. As

[18] du Plessis, M. (2008): p. 286ff

an example, the wiki technology does not make use of the hierarchical way of producing and storing knowledge in folders and subfolders, as seen in most regular IT systems, and it will take some getting used to, to use the seemingly unstructured wiki, in which knowledge and documents are stored not in folders, but via keywords, or tags, and all documents (or wiki pages) are found via e.g. search functions. However, once users are comfortable with this, the creation and editing of wiki pages is very simple.

The role of technology – du Plessis lists four main barriers of using technology; the costs of knowledge management systems is one of the major barriers, something which bars many organizations from pursuing knowledge management by use of technology. Furthermore, when having invested in an IT tool, the organization needs to make sure that the technology is always up to date with business processes, and not least maintain the system, something which requires additional effort of the organization. Finally, the skills, motivation and behaviors of the employees can be barrier, as they learn to work with a new tool.

User acceptance – the primary barrier, according to du Plessis, is the acceptance of the employees, both in terms of the type of technology chosen, but also in terms of the motivation to share. According to Christensen (2007), if the employees do not see the benefits of using a knowledge management system, they will not feel motivated to share, and thus the purpose of the knowledge management system is no longer there.

The four barriers to successful knowledge management, listed above, represent some of the potential barriers to knowledge creation and thus knowledge conversion in wikis. Of particular interest is the possible barrier that the technology may cause. The technology chosen for the task of managing an organization's knowledge must be able to support the needs of the organization. The following section will address knowledge management and wikis, and how this technology and concept may work together.

4.2.3 Managing knowledge in wikis

As has been established, knowledge management is not about managing knowledge, but about creating situations and conditions that will further knowledge sharing, and consequently a process of knowledge conversion. If the wiki should function as a tool for knowledge management, then, according to Alawi and Tiwana, it should support the processes of knowledge- creation, storage and retrieval, transfer and application, as they encompass the processes of knowledge management, and therefore hold the key to processes of knowledge conversion.

In the light of the theory of Alawi and Tiwana (2003), and their definition of the knowledge management processes, it seems that wiki technology can support the processes of 'knowledge creation', 'knowledge storage and retrieval', and 'knowledge transfer'. According to Alawi and Tiwana, a knowledge management technology should be able to support and improve group interactions and collaboration. In addition, it should facilitate connections between users, and be able to transfer, store and hold knowledge. The wiki is meant as a place for the storing and creation of knowledge, and could as such uphold some of the knowledge

management processes. In addition, the wiki is also meant as a tool for connecting individuals, as much of today's wiki technology gives users the ability to add profiles, enabling others to find them if needed for e.g. a project. Of the potential barriers in using wikis as a tool for knowledge management, the technology itself may be a barrier. However, when users are confident with the technology, only the individuals themselves may prohibit the potential flow of knowledge sharing and creation, as wikis give users control of the content.

But before knowledge can be created, it needs to be shared by the individuals. The concept of knowledge sharing will be discussed in section 4.3, and in addition, the difference between sharing in large- and small-group settings will be highlighted, as this may have an impact on the sharing of implicit or explicit knowledge.

4.3 Knowledge Sharing

> *"Det er egentlig forkert at tale om at viden deles. Viden deles nemlig ikke bare ud – viden byttes i et økonomisk, organisatorisk eller socialt bytteforhold."(Christensen, 2004)*[19]

The quote from Christensen (2004) exemplifies the key issue of knowledge sharing, namely that the sharing of knowledge is a collaborative effort in which knowledge is *exchanged* between individuals. As the process of knowledge sharing is inherently part of the process of knowledge creation, which will be described in section 4.4, this section will not go into depths with the process of knowledge sharing. However, some of the characteristics of knowledge sharing will be highlighted by describing some of the potential barriers of knowledge sharing, as presented by Szulanski, Cappetta, and Jensen (2004). Szulanski et al emphasize four barriers: the type of knowledge transferred the source of the knowledge, the receiver of knowledge, and the context in which it is shared. Subsequently, implications of sharing in large- and small-group settings will be discussed. According to Liu and Liu (2008), there is a difference between the sharing of knowledge in small-group settings and the sharing of knowledge in large-group settings, as the nature of the knowledge (implicit or explicit) has an effect on how it is shared and with whom. As the case example is an example of a wiki open to a large community, it will be interesting to see if the type of knowledge sharing seen in the wiki pages, is consistent with the research of Liu and Liu (2008). Lastly, the wiki will be compared to the processes and barriers of knowledge sharing, and discussed as a medium for knowledge sharing, and the technological features of the knowledge sharing process in Wikipedia will be presented in brief as well.

4.3.1 Barriers to knowledge sharing

According to Szulanski, Cappetta and Jensen (2004), the successful process of sharing knowledge is dependent on a series of factors such as motivation to share, the relationship between sender and receiver, trustworthiness of the sender, and the nature of the knowledge (see table 4.1). [20] Their list of barriers can be divided into four areas: knowledge transferred, source of knowledge, receiver of knowledge, and context (Sonne, 2007), and will be presented in brief in the following.

According to Szulanski et al, if the 'knowledge transferred' cannot be determined in terms of it accuracy or how it will work in a different context, it may cause causal ambiguity. In addition, knowledge which has been proven as useful, e.g. 'best practices,' is supposedly easier to transfer than knowledge which has no record of usefulness.

In regards to the source of the knowledge, the source of the knowledge may not feel motivated to share, even though the knowledge may be valid. Moreover, the source may not be perceived as a trustworthy source, and knowledge stemming from this source may be rejected.

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[19] in English (my translation): "It is actually wrong to say that knowledge is shared. Knowledge is not simply shared – knowledge is exchanged in economic, organizational, or social terms of trade."

[20] Szulanski, Gabriel, Cappetta, Rosella and Jensen, Robert J (2004): p. 600ff

The recipient can in large part also be a source of implication, as the recipient may not be motivated to accept knowledge – in most cases due to a sheer lack of will to participate and engage in something 'new', as the status quo feels more comfortable. Furthermore, a recipient's inability to process new knowledge may result in him or her not being able to see new knowledge, and thus potential new ideas. And even if the recipient is capable of absorbing the new knowledge, he or she may not be able to retain the knowledge until it can be integrated with existing knowledge.

Finally, Szulanski et al argue that the relationship between the source and the recipient, as well as the organizational context (or culture) may impair the knowledge transfer. The relationship between source and recipient is of particular interest, as the process of knowledge sharing requires a shared context in order to be shared. Nonaka et al (2000) describe the shared context, as the 'space' in which knowledge sharing takes place, and that it does not necessarily refer to a physical place, but can also be mental, or virtual. It is therefore necessary for the sender and receiver to maintain a good relationship. The notion of a 'shared context' will be further discussed in section 4.4.2

Knowledge transferred	Causal ambiguity Unproven knowledge
Source of knowledge	Source lacks motivation Source not perceived as trustworthy
Receiver of knowledge	Recipient lacks motivation Recipient lacks absorptive capacity Recipient lacks retentive capacity
Context	Arduous relationship between the source and the recipient Barren context

Table 4.1: Barriers to the successful transfer of knowledge (similar in Sonne, 2007)

4.3.2 Liu and Liu: Knowledge sharing in large- and small-group settings

According to research conducted by Liu and Liu (2008), the difference between the sharing of knowledge in a large-group setting or a small-group setting is important because the type of knowledge shared, implicit or explicit, will be different depending on the circumstances. Furthermore, they stipulate that we must differentiate between sources from outside and inside the organization, as this will have an impact on whether the knowledge shared is implicit or explicit. Their research was conducted in an R&D environment in which the knowledge sharing- and knowledge acquisition-behaviors of the R&D professionals was examined. Their distinction between implicit and explicit knowledge is much like Nonaka and Takeuchi's, as they define

explicit knowledge as the "…knowledge that is codified as signs and symbols, or (…) formulated information that is conveyed by formal systems" (p. 424). Their definition of implicit knowledge is that this type of knowledge "...is very personal and should be constructed socially" (p. 424) and that the transmitting of implicit knowledge is dependent on the interaction between knowledge sender and receiver.

Their definition of large- and small-group settings is based on the type of communication channels chosen. They define a small-group setting as "...the private sharing of useful knowledge with co-workers belonging to the same group," and large-group settings as "...the transmission of useful knowledge to a large number of people via the company's internal and external education, training, and publications" (p. 425). It is not specified whether the 'private sharing' in a small-group setting entails face-to-face communication, or if it can be conducted electronically as well. Nonetheless, if something is shared in 'private' it implies that the persons involved have a personal relationship in which they have established a sense of trust and commitment. In addition, as implicit knowledge has previously been defined as something that is less tangible and best communicated in the social meet between two or more individuals, it will be assumed that the 'private' sharing in the research of Liu and Liu entails face-to-face communication.

According to the research of Liu and Liu, the researchers in the R&D department were more inclined to exchange implicit knowledge in small-group settings, as opposed to large-group settings, most likely due to the nature of the knowledge, and the communicability of implicit knowledge. Explicit knowledge, on the other hand, was shared in both large- and small-group settings, irrespective of whether the knowledge was acquired from outside or within the organization (see fig. 4.2).

Even though the source of the knowledge is relevant to the discussion of knowledge sharing, it will not be dealt with in detail, as the primary concern of this thesis, is the dynamic between implicit and explicit knowledge in the process of knowledge conversion.

Also, it seems that the sharing of explicit knowledge via the wiki is easier than the sharing of implicit knowledge - depending on the size of the wiki in a given organization. For the wiki to support the sharing of implicit knowledge, it must support a high level of social interaction, and the question is whether or not the wiki can support that. As explicit knowledge is defined as the type of knowledge which can be written down, it seems suitable for wikis as wikis primarily make use of the written language.

	Internal	External
Implicit	small	small/large
Explicit	small/large	small/large

Table 4.2: Knowledge sharing in large- and small group settings (Liu and Liu, 2008)

According to their research, the R&D professionals, whose work is dependent on their ability to combine knowledge in new ways, do in general have a much greater need for implicit knowledge than explicit knowledge, reason being that they do not need the knowledge which they already have access to, but have a

greater interest in the knowledge not yet discovered – the type of knowledge which is created only in the interaction between individuals. However, according to Nonaka and Takeuchi (1995), new knowledge is not necessarily created in the process of combining implicit knowledge only – as stipulated by the process of socialization – but also in the process of converting implicit to explicit, and when combining explicit knowledge. Liu and Liu do not recognize the process of knowledge conversion in their distinction between small- and large-group settings. They do however recognize the two knowledge conversion processes of externalization and internalization as given by Nonaka and Takeuchi; "…the knowledge sharing process includes the externalization of knowledge by the knowledge transmitter and internalization of knowledge by the receiver" (p. 425). However, they have chosen to base their research on the sharing of implicit and explicit knowledge respectively, and thereby do not, at least in their research, recognize an actual process of conversion in which implicit becomes explicit and explicit is converted into implicit. Their distinction is more similar to that of Jackson and Klobas in which Internalization and Externalization refers to an individual's processing of knowledge, whether sending or receiving it.

However, if we view their definition of sharing implicit knowledge as the process of 'externalization' and the sharing of explicit knowledge as the process of 'combination,' then according to their research, the process of externalization is best done in small-group settings, whereas the process of combination, could take place in both small- and large-group settings. This means that if the process of externalization would take place in the wiki, the size of the group should be fairly small, whereas the sharing of explicit knowledge, the process of combination, could take place in both small- and large group settings.

4.3.3 Sharing knowledge in the wiki

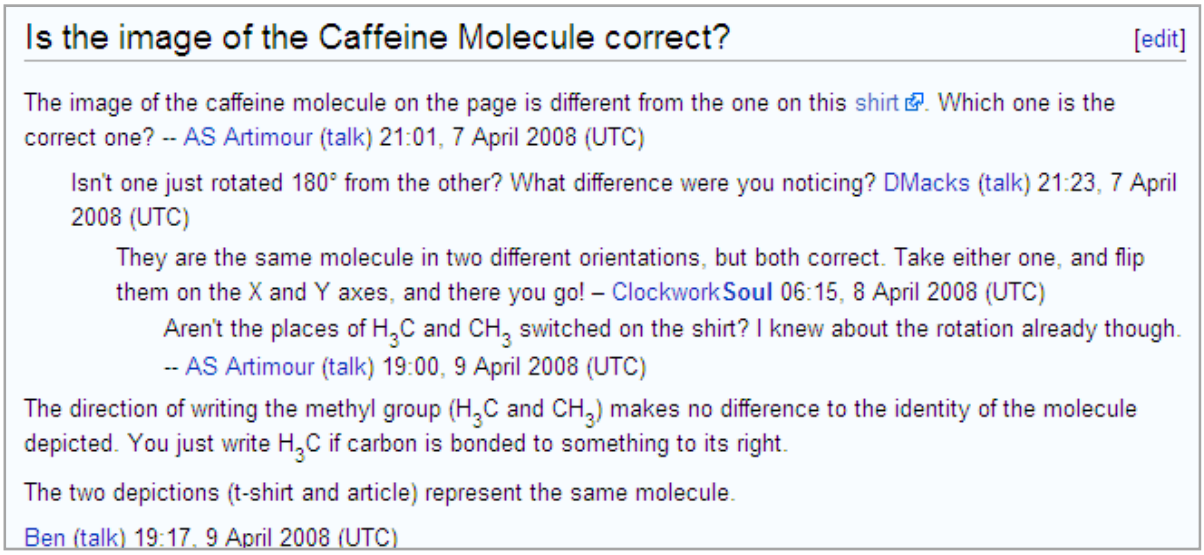
> *"Case studies have shown, in modern organizations, although information and communication technologies enable people to connect more effectively, the performance of teams and their knowledge sharing are linked with individual and team-based incentives" (Von Krogh, 2005)*

It is important to recognize, that despite managements interest in knowledge sharing, and despite the capabilities of technology, the sharing of knowledge is still dependent on the individuals motivation to share. In addition, as stated by Szulanski et al (2004), the trust between the individuals and the knowledge being shared, is a barrier as well. In her research on knowledge sharing and wikis, Payne (2008) also found that the trust between users was a concern. Moreover, some users did not feel that they had anything valuable to contribute with, and therefore refrained from participating. In addition, some of her research on knowledge sharing and wikis, indicated that management was somewhat reluctant to take part in the knowledge sharing, a barrier that has an effect on the entire organization. If management fails to communicate the purpose of knowledge sharing, and refrain from setting an example, the employees of the organization will feel reluctant to share (du Plessis, 2008).

As suggested by du Plessis (2008), the technology itself may cause a barrier, and the participants in Payne's research also found knowledge sharing difficult due to the technology, most likely due to the fact that users may not feel comfortable with this type of IT tools.

Nonetheless, her research also indicated that the wiki was a place for new staff to quickly learn the routines of the organization, as well as get updated on previous and current projects. The wiki also provided employees, who were about to the leave the organization, with a place to share their knowledge – while they were still there.

As illustrated in fig. 4.2, the actual process of sharing knowledge in a wiki is through a written dialogue between a group of individuals. Fig. 4.2 illustrate how four individuals engage in a discussion of the correct way to construct the *Caffeine* molecule, and whether or not the one illustrated on the wiki page is the correct one. If others would like to join in on the conversation, and share their knowledge, they simply click the 'edit' link at the top right hand corner. The example will be analyzed in section 6.3.1, and serves now only as an example of a process of knowledge sharing in a wiki.



Is the image of the Caffeine Molecule correct? [edit]

The image of the caffeine molecule on the page is different from the one on this shirt. Which one is the correct one? -- AS Artimour (talk) 21:01, 7 April 2008 (UTC)

> Isn't one just rotated 180° from the other? What difference were you noticing? DMacks (talk) 21:23, 7 April 2008 (UTC)
>
> > They are the same molecule in two different orientations, but both correct. Take either one, and flip them on the X and Y axes, and there you go! – ClockworkSoul 06:15, 8 April 2008 (UTC)
> >
> > > Aren't the places of H_3C and CH_3 switched on the shirt? I knew about the rotation already though. -- AS Artimour (talk) 19:00, 9 April 2008 (UTC)

The direction of writing the methyl group (H_3C and CH_3) makes no difference to the identity of the molecule depicted. You just write H_3C if carbon is bonded to something to its right.

The two depictions (t-shirt and article) represent the same molecule.

Ben (talk) 19:17, 9 April 2008 (UTC)

Fig. 4.2: Example of knowledge sharing in the wiki (Wikipedia, March 28th 2009)

In the following section, theories on knowledge creation will be presented, in particular Nonaka and Takeuchi's model of knowledge conversion (SECI), as well as Nonaka et al's (2000) notion of 'ba' as the shared context in which knowledge is created. These two theories will then be compared to the wiki, and it will be discussed whether the wiki could support the knowledge conversion processes of the SECI model, as well as whether the wiki could be a place for a shared context.

4.4 Knowledge Creation

Knowledge sharing and knowledge creation are two processes within knowledge management that are closely linked. When knowledge is shared between two individuals there is usually a process of knowledge creation taking place as well. The process of knowledge creation is according to Nonaka and Takeuchi (1995) a process of knowledge conversion, as the key to knowledge creation lies in the conversion of implicit and explicit knowledge. Their model of knowledge conversion processes (SECI) will be described and discussed in the following section, followed by a discussion of the notion of 'ba' (Nonaka, Toyama and Konno, 2000), which is described as the shared context where knowledge is created. The shared context can be physical, mental, and virtual. The notion of 'ba' will also be compared to wikis.

4.4.1 Nonaka and Takeuchi's model of knowledge conversion (SECI)

Nonaka and Takeuchi, the two authors of the renowned "The knowledge-creating company" (1995), pose two types of dynamics that drive the knowledge-creating process in an organization; the conversion of implicit into explicit knowledge (the epistemological dimension), and moving knowledge from the individual level to the organizational level (the ontological dimension).[21] The concepts of implicit and explicit knowledge have previously been defined, however their notion of how implicit can be converted into explicit knowledge and explicit to implicit knowledge have not yet been discussed in detail.

According to Nonaka and Takeuchi (1995) as well as Nonaka et al (2000), the process of knowledge creation entails a process of knowledge conversion, in which implicit and explicit knowledge are converted in four different modes; socialization (implicit → implicit), externalization (implicit → explicit), combination (explicit → explicit), and internalization (explicit → implicit) which gives us the SECI model (see fig. 4.3). Moreover, the whole process of converting knowledge is a process *between* individuals, and as such cannot be undertaken by one individual alone. Each mode represents a different situation, in which the physical conditions, as well as the type of knowledge being converted, has an effect on the outcome of the process. The physical conditions refer to whether the process of knowledge conversion is effectuated in the virtual space, such as a system for collaboration and knowledge management, or in the physical meet between two or more individuals.

In the following, the four modes of the SECI model will be described in more detail, so as to better understand the entire process of knowledge conversion.

[21] Nonaka, Ikujiro and Takeuchi, Hirotaka (1995): p. 59

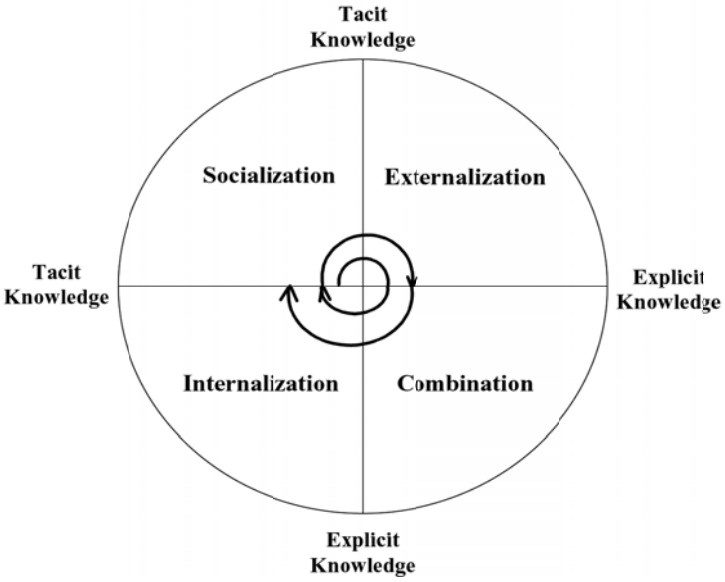


Fig 4.3: Four modes of knowledge conversion (Nonaka and Takeuchi, 1995)[22]

Socialization is the process of transferring implicit knowledge from one person or group to another. By the sharing of experiences and mere observation of working routines, a recipient will acquire implicit knowledge. The socialization process is most often an act of observation or simply working together with someone with more experience than oneself, as seen with interns and apprentices. As the socialization process entails the physical and visual contact of the source and receiver of the implicit knowledge, the virtual space in a wiki makes the sharing of implicit knowledge very difficult – if not impossible. In the virtual space, receivers are unable to observe and thereby learn, as well as have a face-to-face dialogue with the source in which they can get instant feedback on questions and comments.

The process of *externalization* is the process in which implicit knowledge is articulated and thereby converted into explicit concepts. By this they mean that knowledge is conceptualized and expressed in the form of models, concepts, examples, or analogies, and most often written down. This process, as with the others, takes place in a social setting, in which a group of people convert knowledge in a collective act. Whether the social setting needs to be physical – as in face-to-face – or if this process can be executed in a virtual environment, is not described precisely, but they argue that this process is "…triggered by dialogue and collective reflection" (p. 64). By moving this process to a virtual environment such as a wiki, the participants in the process would be forced to think about their implicit knowledge in terms of concepts and ideas in order to make them explicit, thereby enabling a process of externalization.

The third of their four processes is the process of *combination* in which explicit knowledge is synthesized. This may not seem as an actual knowledge conversion process as knowledge does not take on a different shape, so to speak. However, as the word 'combination' indicates, knowledge is *combined*, and in that sense takes

[22] This one is similar to the illustration in the book, but due to the condition of the book, this illustration is used instead. Retrieved from the following website on March 12th 2009: http://www.emeraldinsight.com/fig/2300070401001.png

on a different shape. They describe the process of combination as a process in which individuals share and combine knowledge, and through collaboration create new knowledge. Nonaka and Takeuchi state typical media such as documents, meetings, telephone conversations, or computerized communication networks. The process of combination is most likely the process in which a virtual environment would be applicable. Not only will most knowledge be written, but it can also easily be combined by the process of extracting, adding and discussing its content by use of the many technological tools such as for example wikis.

The final process of knowledge conversion is the process of *internalization* in which explicit knowledge is made implicit through the process of 'learning-by-doing'. In order for this process to be successful, they state that the explicit knowledge must be verbalized into documents or oral stories, as this helps individuals to better internalize their experiences.

In order for the process to continue after internalization and thereby achieving the 'spiral effect' indicated in fig. 4.3, Nonaka and Takeuchi state that the implicit knowledge gathered from the process of internalization must be communicated to the rest of the organization. Therefore, it is the responsibility of the organization to provide the proper environment in which such knowledge sharing and knowledge-creating activities can take place.

An example of a process of knowledge creation is the U.S. Army's use of After Action Reviews (AAR) (Prusak, 2008:1). It is a process of retaining lessons learned, and of developing new and better ways of handling situations or operations. All soldiers are subject to a debriefing (externalization), in which they formalize their experiences. The purpose of this process is to combine (combination) this knowledge with previous AAR's in order to improve their methods (internalization).

Nonaka and Takeuchi's SECI model was developed in 1995, and is as such a model based on the early web 1.0 era in which the World Wide Web was seen as a source of information, and one in which the flow of information was one-way. This means that their model does not take into consideration the new technologies of today and the move from the web as a push-medium to what Lih (2008) refers to as a medium of participation. So even though Nonaka et al (2000) continues to work with this model, their perception of what a virtual environment is, is still pre web 2.0 and pre wiki. Therefore, they do not consider the virtual environment, such as a wiki, a place for the knowledge conversion process of externalization.

However, despite the outdated view on virtual tools for knowledge sharing and collaboration, the process of knowledge conversion is still interesting, in particular the processes of externalization and combination. As the wiki is a written medium in which knowledge is being collected and shared, it may be possible to identify processes of externalization and combination, as these processes represent an explication of implicit knowledge (written or oral) and a synthesizing of already explicit knowledge, respectively. However, according to Nonaka et al (2000) and Nonaka and Takeuchi (1995), the process of 'externalization' can only take place in an environment in which participants engage in a face-to-face dialogue, and that it is only in the process of combining explicit knowledge that a virtual environment will be suitable. The question is then, if

the wiki is merely a place for explicit knowledge to be combined, as we see it with regular knowledge management systems, or if it could also be a place for capturing implicit knowledge in the process of being converted to explicit knowledge.

In the following section, the theory of *Ba* as presented by Nonaka, Toyama and Konno (2000) will be presented. Their theory of *ba* is an extension of Nonaka and Takeuchi's theory of knowledge conversion.

4.4.2 'Ba' as a space for knowledge conversion

"Ba is a place where information is interpreted to become knowledge." (Nonaka et al, 2000)

According to Nonaka, Toyama, and Konno (2000), knowledge is created in a context, and this context can be referred to as 'ba,' a Japanese word which roughly translates into 'space.' The 'ba' is the shared context in which knowledge is created, and is shaped by the participants and how they participate. The 'space' does not necessarily refer to a physical space, but may also be virtual or mental (Nonaka et al, 2000).

The key to understanding 'ba' is that knowledge is created in *interactions*. As was discussed in section 2.0 on social constructivism and the negotiation of meaning, knowledge is not something, which reside within individuals, but exists in the interactions amongst individuals or between the individuals and their environments (see fig. 4.4). As ba is a product of the interactions between individuals, it cannot be captured and observed as it is always changing.

When combining the SECI model with Nonaka et al's perception of 'ba,' four new modes of knowledge conversion are formed; originating ba, dialoguing ba, systemizing ba, and exercising ba. As this thesis has chosen to focus on the processes of externalization and combination, only the two 'ba' which relate to these processes, will be described briefly in the following, namely *dialoguing* ba and *systemizing* ba.

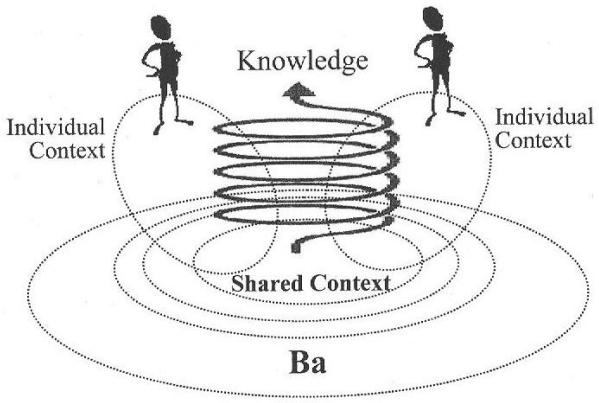


Fig. 4.4: *Ba* as shared context in motion (Nonaka et al, 2000)

The dialoguing ba is described as the face-to-face interaction between a group of individuals, in which they engage in a dialogue where their mental models and skills are shared and made explicit. The systemizing ba is described as the virtual and collective interactions between individuals, and most often a process undertaken

by use of IT tools such as online networks and data banks.

Their focus on ba is not to be viewed as a new version of the SECI model, but more a recognition of the fact that knowledge creation does not take place within individuals, but in the shared context between them, a context consisting of both the physical, virtual as well as mental space, and which functions as a point of reference for their interactions.

In the following, the wiki will be compared to the processes of knowledge conversion, as just described by Nonaka and Takeuchi (1995) as Nonaka et al (2000).

4.4.3 Knowledge conversion processes in the wiki

> *"...as ba can be a mental or virtual space as well as physical place, it does not have to be bound to a certain time and space." (Nonaka et al, 2000)*

As the 'shared context' of ba, is described as both a physical as a virtual space, the wiki could be considered a 'ba,' or at least a place for 'ba' to exist. If we consider the wiki as a place for the dialoguing ba – the shared context in which a process of externalization could take place – the wiki would have to support a process in which the participants would be able to engage in a dialogue (preferably face-to-face) and externalize their implicit knowledge. According to Nonaka et al, for the dialoguing ba, it is important that the participants are the right 'mix,' that is, that they have the right mix of knowledge, as this will enable a successful process of knowledge creation in the dialoguing ba. As a wiki is open to the contributions of all, it could be assumed, that the 'right' people will automatically direct their attention to a 'ba' with which they have at least a mentally shared context. As we will see in the analysis of the case, the number of participants in the discussions rarely exceeds five to six people, even though Wikipedia attracts more than 600 million visitors a year,[23] and as such 600 million potential contributions to the 'ba.' In this context, it is important to clarify, that according to Nonaka et al, you cannot be a spectator to a ba, as the ba is created by the participants, which means that only actual contributors to the wiki, will be a part of a 'ba,' and that it, unlike communities of practice, is not a community which is defined by its history and culture (Wenger, 1998), but a living place which emerge and disappear as participants evolve and engage in new interactions.

The systemizing ba is described as a virtual environment in which participants can engage in a collective process of knowledge sharing and exchange of explicit knowledge. The key to this ba is the clear and concise communication between participants, as the virtual communication makes it more difficult to communicate, and the knowledge is subject to a larger audience. The wiki allows for participants to engage in a written dialogue, and there are many options for the sharing of explicit knowledge. Therefore, it seems only natural that the wiki could be a space for the systemizing ba. In addition, the potential size of the wiki, allows for the process of sharing to incorporate a large number of individuals. Ba is not constrained to a certain time or space, but exists only in the interactions between individuals. The wiki could be a place for ba to exist, as it

[23] http://siteanalytics.compete.com/wikipedia.org/?metric=uv

provides for a space in which a group of individuals can engage in a dialogue, irrespective of time, and all conversations and discussions will be saved as a still picture of their ba, and thereby preserved for others to learn from.

As previously defined by Nonaka and Takeuchi (1995), the process of sharing and creating knowledge is a process of justification in which the concepts, ideas and knowledge discussed is subdued to a continuous conscious or unconscious process of justification by all individuals in the discussion. Traditional epistemology defines knowledge as 'justified true belief' (Audi, 1998), and the process of justification is by Choo (2006) defined as the "…human process of justifying personal belief toward the truth." He further argues that this process requires "…that a person must have adequate indication or evidence that a proposition is true."

As a consequence, the language (or discourse) of the individuals participating in a discussion will be oriented towards this process, and seek to meet this process of justification. Nonaka et al (2000) claim that we, in the process of negotiating 'truth', make use of examples, metaphors, analogies, models or other means of persuasion, in order to make our arguments seem stronger. Consistent with Nonaka et al (2000) and Choo (2006), James Paul Gee (2005) argues that we always and simultaneously use our language to build seven different realities, or truths, by use of seven different building tasks. Gee's notion of the seven building tasks, and how they may be relevant in the analysis of knowledge conversion processes in the wiki, will be discussed in the following chapter.

5.0 Discourse analysis

> *"Language has a magical property: when we speak or write, we design what we have to say to fit the situation in which we are communicating" (Gee, 2005)*

The analysis of discourse is the analysis of not only the words expressed, but also the situation in which the communication is taking place; it is the analysis of any spoken or written text[24] or any other type of communication otherwise expressed in ways such as signals, clothing, posture, and facial expressions.

This thesis will be analyzing the written dialogue between contributors to a wiki, and will as such not be discussing the influence of gestures, clothes and other more physical objects of influence. However, the context in which text is written is not irrelevant:

> *"...discourse analysis is always a movement from context to language and from language to context. We gain information about a context in which a piece of language has been used and use this information to form hypotheses about what that piece of language means and is doing."*[25]

The context does not necessarily refer to the physical conditions in which the actual communication takes place, but may also, and perhaps even more importantly, refer to the participants in the conversation, their relationship, cultural background, the world surrounding them, their level of knowledge, and much more.

Kreckel (1981) has identified three types of knowledge: private, common and shared interpersonal knowledge. Private knowledge is that which is only known to the source of the knowledge, and is as such not interesting to this thesis. Common knowledge is the type of knowledge which you would expect all participants in a given conversation to have on a given subject, i.e. knowledge as generic such as abortion, religion, and similar. According to Kreckel (1981), common knowledge is acquired separately, as opposed to 'shared interpersonal knowledge', which is acquired in the mutual interaction between groups of individuals, and refers to the knowledge of the group members. The shared interpersonal knowledge is of particular interest to this thesis, as this knowledge in a group leads to strong group cohesion (Cutting, 2000). The shared interpersonal knowledge can be described as the type of knowledge that would exist in a community of practice, in which the participants acquire knowledge of one another through shared experiences and joint activities. For the case example of this thesis, the shared interpersonal knowledge is only partially applicable, as the participants in the discussion, most likely do not know each other, and therefore do not possess any personal knowledge of the people with whom they are communicating. However, according to Burke (1969), individuals may feel a sense of belonging and a shared context, even though they do not know each other, simply because they share the same context. A group of individuals, with no prior knowledge of one another,

---

[24] According to Fairclough (1997), 'text' can refer to both written and verbal texts. However, most analysis is based on written text, as well as transcriptions of verbal text, in which many of the verbal features such as pauses, intonations, etc. will be lost. In this thesis, 'text' will only refer to the written language.

[25] Gee (2005): p. 14

who engage in a process of knowledge sharing, would then feel a sense of belonging to this process, and in that process, direct their discourse towards this. In this respect, it is possible to consider the shared interpersonal knowledge a possibility in the wiki. Moreover, according to Engberg (2008), there is a distinction between the level of knowledge of the individuals in a given conversation or discussion, also referred to as symmetrical or asymmetrical communication, in which symmetrical communication refers to the communication between peers, that is people with the same level of knowledge of the topic at hand, and asymmetrical communication refers to the communication between people with different levels of knowledge. This will also reflect itself in the discourse of the participants in a discussion, as their discourse will be affected by their area of knowledge.

Other ways of shaping our communication is by use of mood, modality, and forms of address, as listed by Barker and Galasinski (2001), also referred to as the interpersonal functions.[26] We use mood in our language (written or spoken) to signal which type of relationship we wish to have with the ones with whom we are communicating; modality concerns how we use language to signal what our attitude is towards whichever statement or utterance we are giving, and forms of address refers to how we position ourselves towards our listener(s).

Gee (2005) has tried to conceptualize mood, modality and forms of address by the use of seven 'building tasks,' which, according to Gee, are seven ways of constructing reality, and how we perceive the world. The seven building tasks will be elaborated on and discussed in the following section.

5.1 James Paul Gee: The seven building tasks

Discourse analyst James Paul Gee (2006) offers a theory about the nature of language-in-use, and his approach to discourse analysis "...seeks to balance talk about the mind, talk about social interaction and activities, and talk about society and institutions" (p. 6) Gee suggests the notion of the seven building tasks, which he also refers to as seven ways of 'constructing reality.' The seven building tasks are the ways we construct language so as to signal *significance*, *activities*, *identities*, *relationships*, *politics*, *connections*, and *sign systems and knowledge.* In the following, the seven building tasks will be discussed and elaborated on.

Significance is defined by Gee as follows: "We use language to make things significant (to give them meaning or value) in certain ways, to build significance." By building *significance*, Gee is referring to the act of making some things seem more valuable than others, or to signify that e.g. a given object or place has a certain function or meaning. An example of how to build significance could be the following hypothetical exchange of words between two colleagues:

> Colleague A: "What is the average age of our senior consultants?"
>
> Colleague B: "Somewhere around 35. Why?"

[26] Barker and Galasinski (2001): p. 75ff

Colleague A: Jennifer, the new senior consultant, is 26."

What is not said in this conversation, but implied by the way they structure their conversation, is that it is highly unusual – and thus significant – that Jennifer has already reached the status of 'senior consultant.'

Activities is defined as follows: "We use language to get recognized as engaging in a certain sort of activity, that is, to build an activity here-and-now." According to Gee, we can also use language to indicate that we are engaging in certain types of activities, e.g. certain expressions belong to certain activities;

"Your honor may I please approach the bench?"

This sentence would be out of place if used outside of a courtroom.

Identities is defined as follows: "We use language to get recognized as taking on a certain identity or role, that is, to build an identity here-and-now." If we return to the sentence used as an example for building activities ("Your honor may I please approach the bench?"), the sentence is also used for building the identities of lawyer and judge.

Relationship is defined as follows: "We use language to signal what sort of relationship we have, want to have, or are trying to have with our listener(s), reader(s), or other people, groups, or institutions about whom we are communicating." The relationship may be formal, friendly, collaborative, sincere or hostile, and thus how we engage in a conversation determines how the conversation will evolve, and what we will get out of it.

Politics (the distribution of social goods) is defined as follows: "We use language to convey a perspective on the nature of the distribution of social goods, that is, to build a perspective on social goods." The fifth building task is politics, and is also referred to as *the distribution of social goods*. This building task allows us to communicate what is 'normal', 'wrong', 'appropriate', 'valuable', etc. and gives the other participant in the conversation an idea of how we view the situation or subject.

Connections is defined as follows: "Things are not always inherently connected or relevant to each other. I have to make such connections." What he means by this is that some things may not seem important or relevant, unless a connection is made which makes it seem that way. As an example, a manager's thorough revision of a given procedure may not seem relevant or important, unless he connects it to last week's accident.

Sign systems and knowledge is defined as follows: "We can use language (...) to build privilege or prestige for one sign system or knowledge claim over another." There are more languages in the world, than the languages of nations; for example the language of doctors, lawyers, biologist, etc. How we use whichever specialized discourse we may be a part of, tells something about whom we are, and what our level of knowledge is on the subject. For example, a biologist in a conversation with another biologist may use very specialized terms in their conversation. But if in a conversation with a person who does not belong to that discourse, the biologist may refrain from these difficult terms and use more simple words.

Only four of the seven building tasks will be utilized in the analysis of the data from Wikipedia: significance, politics, connections and signs systems and knowledge. These building tasks represent the tasks we make use of in a process of negotiation, whereas the building tasks relationship, activities, and identity are used for the process of 'identification' (Burke, 1969). According to Burke (1969), we have an inherent need to identify who we are, so as to feel that we belong somewhere; it is a process fundamental to being human and communicating, and we try to identify common interests, values, perceptions, or experiences to feel a sense of belonging. The building tasks *relationships, activities,* and *identities* are therefore the building tasks we use to fulfill our need to 'belong'. Although the process of 'identification' is interesting to the discussion of Wikipedia as a community, it will not be used in the analysis of the data, as the primary interest of this thesis, is to identify processes of knowledge conversion. For this purpose, the four previously mentioned building tasks are more appropriate, as they represent the tasks we use as argumentative tools, and would make use of in a process of negotiating meaning.

In the following chapter, the analysis of the three case examples will be presented, followed by a summary of the findings, as well as the conclusion.

6.0 Case: Wikipedia as an example of a knowledge management tool

Wikipedia was chosen as the case for this thesis, as it as of today is the largest public example of a collaboration project in which knowledge is shared and created through mutual collaboration – across time and borders. The structure of the wiki and Wikipedia is interesting to the process of knowledge creation, as the purpose of a wiki is to share and collect knowledge in a collaborative manner. The process of sharing and collecting knowledge takes place in the wiki pages, as well as in the discussion pages behind each wiki page. The discussion pages are of particular interest, as the contents of the discussions seem to resemble the processes of knowledge conversion as given by Nonaka and Takeuchi (1995). It will therefore be interesting to study and analyze if there are any processes of knowledge conversion in the wiki and if so, if they can be identified through discourse analysis.

But before the analysis, the history of Wikipedia will presented in brief, in order to gain an understanding of the ideology behind it, as well as look into the actual structure and features of the wiki pages, as this will provide for a better understanding of what contributors must physically do in order to participate.

6.1 History of Wikipedia

Wikipedia was launched in January 2001 as an offshoot of Nupedia, a free encyclopedia edited only by PhD's, as it was believed that only a PhD level would make the entries in this encyclopedia *encyclopedic*.[27] The project was soon abandoned due to a lack of funding, and not least participation, as the editing structure was too complex and time consuming. As the editors of Nupedia did not want to let the knowledge already gathered to be lost, they decided to put the contents of the encyclopedia on the internet in a wiki format, and launched it under the name Wikipedia.[28] Contrary to Nupedia, Wikipedia is a social experiment in collaboration, as Wikipedia allows anyone to participate, and has no gate-keeping function. The contents of Wikipedia are continuously improved, and users are always encouraged to improve articles. Articles are classified as either 'good articles' or 'featured articles' when their contents are considered to be of good encyclopedic quality and remains a neutral point of view. Featured articles are considered the best articles in Wikipedia, as determined by Wikipedia's editors, who are also the users and contributors. There is no editor in chief in Wikipedia, so the decision of what makes a good article, is decided be the entire knowledge community.

As just mentioned, Wikipedia strive to maintain a neutral point of view (NPOV) in their articles. The neutral point of view attempts to present ideas and facts in such a fashion that both supporters and opponents can agree on it;[29]

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[27] About Wikipedia: http://en.wikipedia.org/wiki/Wikipedia:About
[28] Lih (2008): p. 3
[29] http://en.wikipedia.org/wiki/Wikipedia:Neutral_point_of_view

> *"In reality, the process of reaching consensus may be long and drawn-out, with articles fluid or changeable for a long time while they find their "neutral approach" that all sides can agree on." (Lih, 2008)*

The discussion of NPOV is central to the discussion of social constructivism and knowledge creation, as the process of reaching a NPOV, is a process of negotiating meaning. The NPOV is the cornerstone of Wikipedia, and all articles must represent, without bias and as fairly as possible, all significant views, published by reliable sources.

> *"The policy requires that where multiple or conflicting perspectives exist within a topic each should be presented fairly. None of the views should be given undue weight or asserted as being judged as truth…"*[30]

However, as we are not interested in determining whether wikis can be a medium for encyclopedic content, it will not be discussed any further. Nonetheless, it is relevant to the three case examples, as the discussions often revolve around what is considered 'correct' or 'true', and will therefore contain a fair amount of argumentation pertaining to this.

Before we turn to the analysis of the data from the three chosen discussion pages, this next section will give a brief introduction to the functionalities of Wikipedia, and the circumstances under which knowledge is shared and created.

6.2 The structure of Wikipedia

The main page of Wikipedia[31] introduces readers and contributors to a list of topics and options. In figure 6.1 we see an example of a how the main page could look like. The contents of the four boxes at the center of the main page changes each day, and brings readers new 'featured articles' and news.

At the top of each page, users are encouraged to log in if they have an account, and if not, to create one. By having an account and logging in, your contributions to the wiki pages in Wikipedia are more easily traced, and users are thus accredited with their alterations – good or bad. In addition, having an account also means that you can create a 'User page,' which in many cases functions as the users profile page in which he or she can write about their area of expertise, as well as discuss alterations made in various wiki pages.

[30] Ibid: "Explanation of the neutral point of view"
[31] In this case the English version. However, Wikipedia currently contains wiki pages in more than 250 languages.

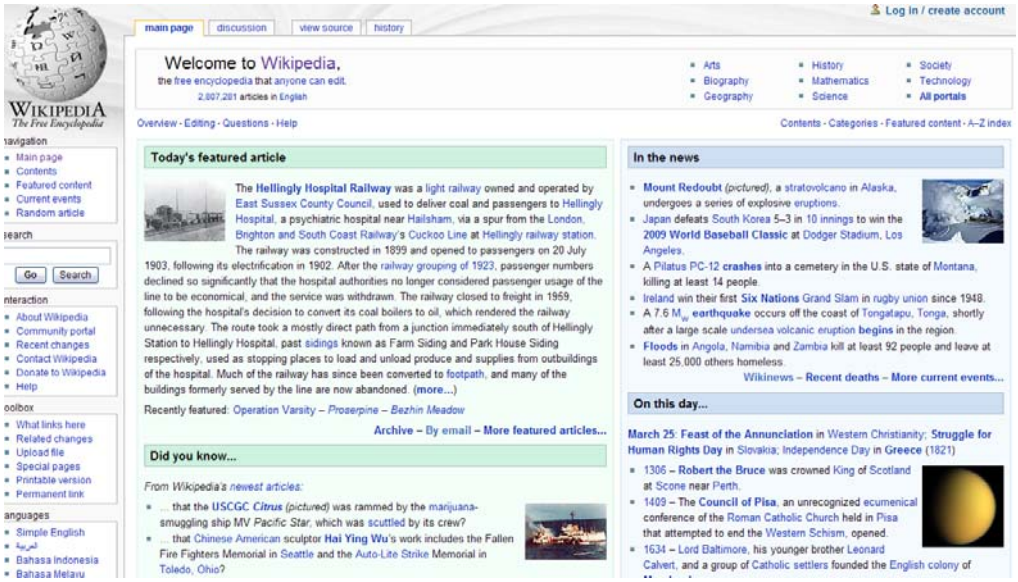


Fig. 6.1: Main page of Wikipedia (Wikipedia, March 23rd 2009)

Figure 6.2 is the 'User page' of Lvi82, and contains the same options as seen on all other wiki pages. In true 'wiki mentality' even the user page of Lvi82 can be edited, although Wikipedia do advice people not to edit user pages, unless they are in fact the user in question. Once you are logged in, the top section of your frame has the following options:

- **My talk –** is a section in which other users can engage in a discussion with the user in question
- **My preferences –** gives users a number of options for editing their profile, as well as their viewing options in the wiki
- **My watchlist –** this allows users to keep track of the pages which they have chosen to 'follow,' and will thus be notified of any changes made to these pages, with both the date and time, as well as the identity of the person who made the change (in some cases only the ip address is shown, e.g. when users do not log in)
- **My contributions –** is a full list of all edits and additions made by the given user

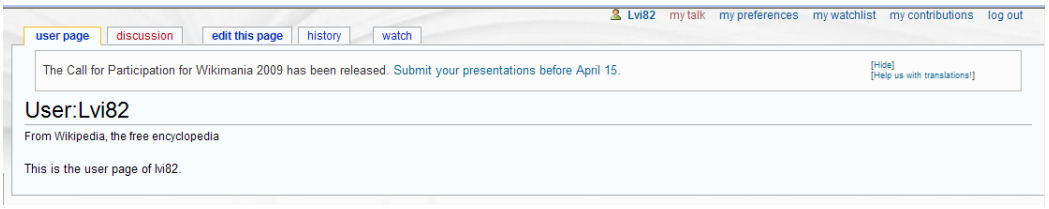


Fig. 6.2: User page of Lvi82 Wikipedia, March 25th 2009)

To always encourage users to engage in the process of knowledge creation and knowledge sharing, every page in the wiki contains the following four options: 'article', 'discussion', 'edit this page', and 'history'. In figure 6.3 we see an example of these options (can also be seen in figure 6.2).

Fig. 6.3: Collaboration tools in Wikipedia (Wikipedia, March 25th 2009)

The tab 'article' directs you to the main page of the wiki entry. The tab 'discussion' directs you to the discussion page found behind each wiki page, in which the contents of the wiki page can be discussed – this is also where the data for the analysis were found. If you wish to edit the wiki page, the third tab in the menu will send you to an edit page, in which users can make alterations and add content to the wiki page. History pages, like the one illustrated in figure 6.4, allow contributors to view the history of all changes made to a given wiki page. It contains information on what changes were made, when they were made, and by whom.

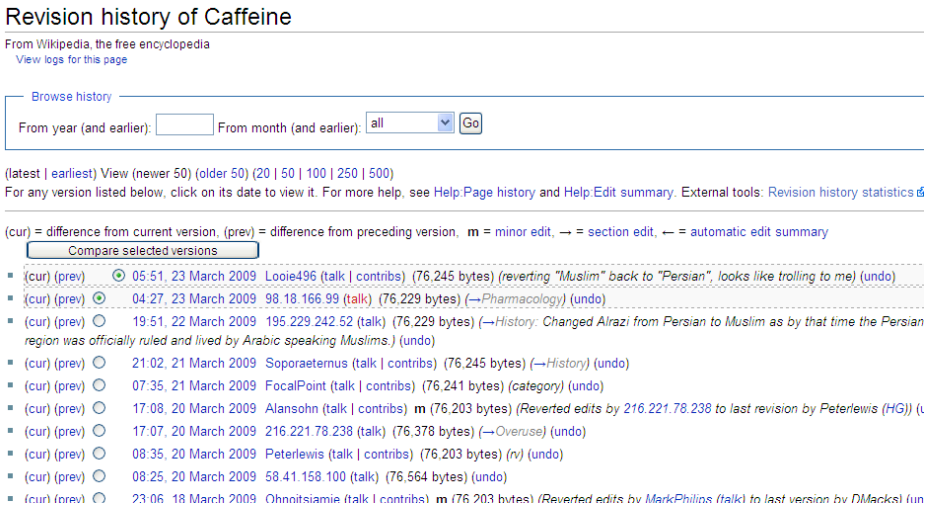


Fig. 6.4: History page of the wiki page for *Caffeine* (Wikipedia, March 23rd 2009)

Wikipedia, and the wiki pages, seem to support the processes of knowledge sharing as well as creation. The setup is fairly simple, as people who wish to contribute to the wiki pages, simply have to click 'edit', or go to the discussion page to discuss any considerations he or she may have regarding the contents of the wiki page.

The discussion pages are the ones of primary interest to this thesis. This next section will go in to the analysis with the three chosen examples, and will be followed by a summary and discussion of the analysis.

6.3 Analysis of knowledge conversion processes through Gee's building tasks

The purpose of this thesis is to establish whether the wiki could be a place for the processes of knowledge conversion as described by Nonaka and Takeuchi (1995). The focus has remained on the processes of externalization and combination, as they include the conversion of explicit knowledge, which per se involves the written (or oral) explication or combination of knowledge, a process that could be found in a written medium such as the wiki.

In order to establish whether there are any processes of knowledge conversion in the wiki pages of

Wikipedia, I will be analyzing dialogues between groups of individuals who engage in processes of argumentation, in which they try to negotiate 'truth'.

One could argue that the wiki pages in Wikipedia contain the current accepted knowledge (the truth), whereas the discussion pages 'underneath' represent the process of negotiating the truth. In a wiki, this process of negotiation is very explicit, as it has been captured in the discussion pages as well as the 'history' of the wiki entry. As these negotiations are explicit, they can be subject to a discourse analysis. In the following, the three examples chosen for the analysis will be analyzed according to Gee's building tasks.

The seven building tasks have already been presented in chapter five, but the following will be a short recap of the characteristics; Gee (2006) claims that we use seven different building tasks to (1) make some things seem more significant than others by giving them meaning and value, (2) get recognized as engaging in some type of activity, (3) take on a certain identity, (4) signal which type of relationship we have or want to have with whom we are communicating with, (5) signal what we find good, normal, correct or proper, (6) make some things seem more relevant or connected to other things, and (7) to signal what form of knowledge or sign system we are a part of, e.g. medicine or law. As established in section 5.1 only four of the seven building tasks are of relevance to this analysis: *significance, politics, sign systems and knowledge,* and *connections*, as these represent the building tasks which we would make use of in a process of argumentation.

I will not be analyzing all sentences in the three case examples, but merely illustrate processes of knowledge conversion by a few examples from each of the three cases. The three examples chosen can be found under the discussion pages of the following three wiki pages: *Caffeine*, *Paracetamol*, and *Finance*, and are presented and analyzed in the following.

6.3.1 Example 1: Caffeine

Under "Is the image of the Caffeine Molecule correct?" we find two discussions, which hereafter are referred to as the April and October discussions, and are shown in figure 6.6 and 6.7. The two discussions are concerned with the image of the caffeine molecule (see fig. 6.5) depicted in the wiki page of *Caffeine*. In April, a group of individuals engage in a discussion of the correct way to structure molecules, in this case the caffeine molecule.

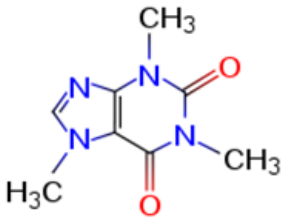


Fig. 6.5: Caffeine molecule from the wiki page *Caffeine* (Wikipedia, March 23rd 2009)

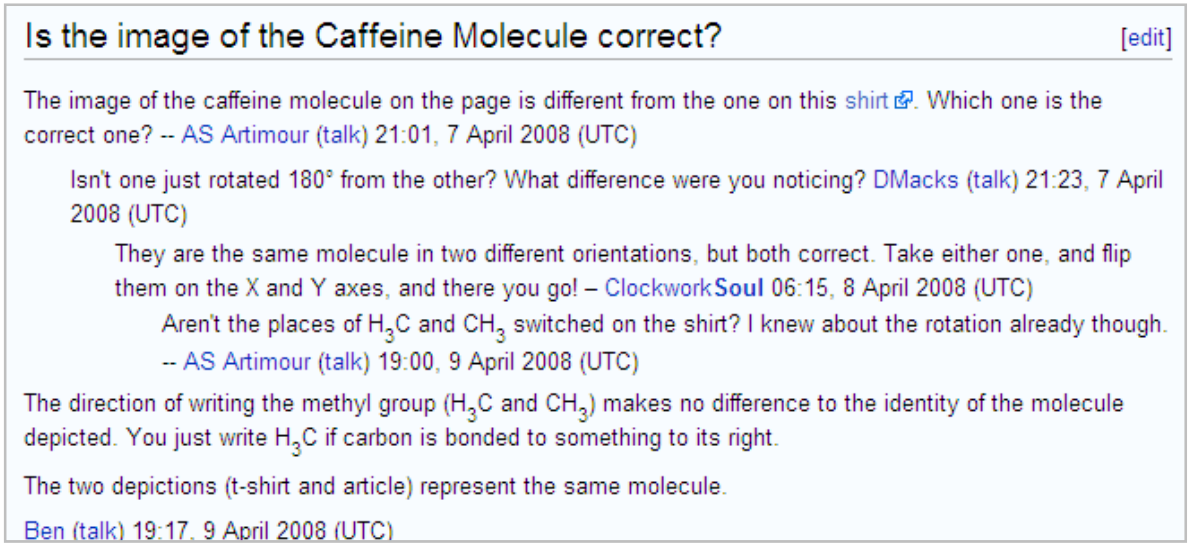
The participants in the discussion offer various solutions to how best to understand the rules of structuring, and there is a clear distinction between who are the knowledgeable, and who are the less knowledgeable. As the discussion moves into October, it becomes a discussion of whether other articles containing images with molecular structures, should include a link to pages on the correct way to structure molecules.

The two discussions are an example of how a group of five individuals meet in an online environment in

which they engage in a negotiation of meaning, as they try to reach a consensus on what is accepted knowledge, and therefore what can be depicted on the wiki page.

The April discussion

As just mentioned, the April discussion is a discussion of the correct way to write the caffeine molecule. The question is raised by AS Artimour, who would like to know whether the molecule depicted on the main page (fig. 6.5) of the wiki entry *Caffeine* is correct, as he has found another image of a caffeine molecule. The question is debated and answered by three other individuals, and they reach the conclusion that both depictions are one and the same, and that how you write it is indifferent. The discussion runs from April 7th until April 9th. The blue colored words and numbers in the text represent links in the original discussion page in the wiki, and can refer readers to sources outside or inside Wikipedia, user pages, and the discussion (or 'talk') pages found on all user pages, where you can continue a discussion with a given user (see Appendix 1 for larger image).



Is the image of the Caffeine Molecule correct? [edit]

The image of the caffeine molecule on the page is different from the one on this shirt. Which one is the correct one? -- AS Artimour (talk) 21:01, 7 April 2008 (UTC)

> Isn't one just rotated 180° from the other? What difference were you noticing? DMacks (talk) 21:23, 7 April 2008 (UTC)
>
> > They are the same molecule in two different orientations, but both correct. Take either one, and flip them on the X and Y axes, and there you go! – ClockworkSoul 06:15, 8 April 2008 (UTC)
> >
> > > Aren't the places of H_3C and CH_3 switched on the shirt? I knew about the rotation already though. -- AS Artimour (talk) 19:00, 9 April 2008 (UTC)

The direction of writing the methyl group (H_3C and CH_3) makes no difference to the identity of the molecule depicted. You just write H_3C if carbon is bonded to something to its right.

The two depictions (t-shirt and article) represent the same molecule.

Ben (talk) 19:17, 9 April 2008 (UTC)

Fig. 6.6: April discussion of "Is the image of the Caffeine Molecule correct?" March 17th 2009

The April discussion has been analyzed with the purpose of identifying the building tasks significance, politics, connections, and sign systems and knowledge, and how the individuals in the discussion make use of these as they try to negotiate meaning. The results of the analysis show that as the topic of the discussion is concerned with 'correctness', the four individuals make use of the building tasks *significance* and *politics*, more than *connections* and *sign systems and knowledge*. In the process of discussing what is the correct way of constructing the caffeine molecule, explicit knowledge is combined.

As the building tasks chosen for the analysis are closely related, many of the examples used in the following will appear more than once, as they each represent more than one building task, when viewed in a context. Comments used as examples in the analysis are marked with author, time, and date. The results of the analysis are presented in the following.

Significance

The conclusion of this first discussion is that how you write the molecule is indifferent. In the process of negotiating this, the participants in the discussion are making the sameness of the different solutions more significant than the differences in them. An example of this process can be found in the following dialogue between AS Artimour and DMacks:

> **AS Artimour (21:07, 7 April):** "The image of the caffeine molecule on the page is different from the one on this shirt. Which one is the correct one?"
>
> **DMacks (21:23, 7 April):** "Isn't one just rotated 180 from the other?"

DMacks makes AS Artimour's question seem less significant, by his use of 'just', which makes AS Artimour's differentiation of the two seem less significant.

Then ClockworkSoul enters the conversation, and makes the sameness of the molecules more significant by stating that they are one and the same:

> **ClockworkSoul (06:15, 8 April):** "They are the same molecule in two different orientations, but both correct. Take either one, and flip them on the X and Y axes, and there you go!"

Ben, the final participant in this discussion, offers a final explanation to how the two molecules are the same:

> **Ben (19:17, 9 April):** "The direction of writing the methyl group (H_3C and CH_3) makes no difference to the identity of the molecule depicted"

The contributions of DMacks, ClockworkSoul and Ben, respectively, contribute to making the sameness of the two molecules more significant than their differences. In the process of making the sameness significant, they are also making the knowledge of the rules about molecule construction explicit, where they preciously were implicit. However, if implicit knowledge is viewed as personal experiences, it can be questioned whether this is an actual process of externalization, as the rules of writing molecules are only implicit to this conversation, and not necessarily to others. In that case, this is just a process of combination, as individuals bring in explicit knowledge to the conversation, and combine them to produce new explicit, which can be read by others. In addition. The process of combination is also effectuated by the use of links to alternative sources such as the image on the t-shirt.

Politics

As previously mentioned, politics is the part of discourse in which participants in a conversation signal their opinion on what they see as good, correct, proper, normal, valuable, etc. So how you construct language has

an implication for the distribution of social goods. In this context there is a clear distinction between what is the 'correct' or 'incorrect' way of constructing the caffeine molecule. As the entire discussion is concerned with what is considered 'correct', the entire dialogue is a process of building *politics*. For example, ClockworkSoul argues that the two molecules are the same, and he supports his argument by saying the following:

> **ClockworkSoul (06:15, 8 April):** "Take either one and flip them on the X and Y axes, and there you go!"

Implicit in his answer is the knowledge that it makes no difference to the function of the molecule, if the components of the caffeine molecule are reversed. In reference to the discussion of knowledge communication and Nonaka and Takeuchi's process of knowledge conversion, it is interesting to see that in the process of explaining what is the correct way to construct molecules, the implicit knowledge of a molecular structure as being 'flexible' is made explicit, if not externalized, then at least explicated.

However, AS Artimour is still not convinced that the depiction of the caffeine molecule is correct, and proceeds with the following argument:

> **AS Artimour (19:00, 9 April):** "Aren't the places of the H_3C and CH_3 switched on the shirt?"

In response to AS Artimour's continued doubt, Ben offers the following explanation, which is also the final comment in the April discussion:

> **Ben (19:17, 9 April):** "The direction of writing the methyl group makes no difference to the identity of the molecule depicted. You just write H_3C if carbon is bonded to something to its right."

As already mentioned, the entire discussion is concerned with 'correctness', why only a few examples were chosen from the text. The examples illustrate how a discussion of what is right or wrong, is a part of the process of knowledge sharing, as they in their process of negotiating meaning, externalize (or explicate) the implicit knowledge of molecular structuring, and combine it with other explicit knowledge as well as external sources of knowledge, in order to clarify the rules of molecular structuring.

<u>Connections (or relevance)</u>

What is meant about *connections* as a part of the discourse analysis is that we use language to make some things seem more relevant than others (or irrelevant) or connected to other things. This building task is closely connected to significance and politics, in that it is concerned with making arguments clear and convincing. AS Artimour's question of whether or not the image of the caffeine molecule is incorrect, is made less relevant, as Ben makes the writing of the 'methyl group' irrelevant:

> **Ben (19:17, 9 April):** "The direction of writing the methyl group makes no difference to

> the identity of the molecule depicted. You just write H_3C if carbon is bonded to something to its right."

This building task is not that explicit in the April discussion. However, in the process of negotiating meaning, building connections will often be a part, as connecting things with other areas, can make them seem more apparent, or in this case, not relevant. In this example with Ben, he does not make use of external references, but by saying that "you just write…," he does make the implicit argument that this knowledge is something 'you' would already know, and thereby assumes that it is already explicit knowledge, where in fact it seems implicit.

Sign systems and knowledge

We use language to make certain forms of knowledge relevant or privileged (or not) in given situations. By privileging or disprivileging certain forms of knowledge, we are justifying our claim. *Sign systems and knowledge* is not a direct indicator of a knowledge conversion process taking place. However, in the process of arguing for or explaining a given piece of knowledge, we privilege or disprivilege this piece of knowledge by use of our language, and thus signal in what area we are knowledgeable, and thereby how valuable our statements are. In this respect, Gee's seventh building task can be used as a tool for identifying processes of knowledge conversion. Two examples of two of the participants showing their area of knowledge are, among others, Ben's description of how the caffeine molecule is constructed:

> **Ben (19:17, 9 April):** "You just write H3C if carbon is bonded to something to its right."

The words 'just' and 'something' is an oversimplification of the molecule construction, and makes it sound as if Ben expects it to be common knowledge, and therefore becomes an example of the difference between layman and in this case a scientist. A second example is ClockworkSoul's description of the molecule:

> **ClockworkSoul (06:15, 8 April):** "Take either one, and flip them on the X and Y axes, and there you go!"

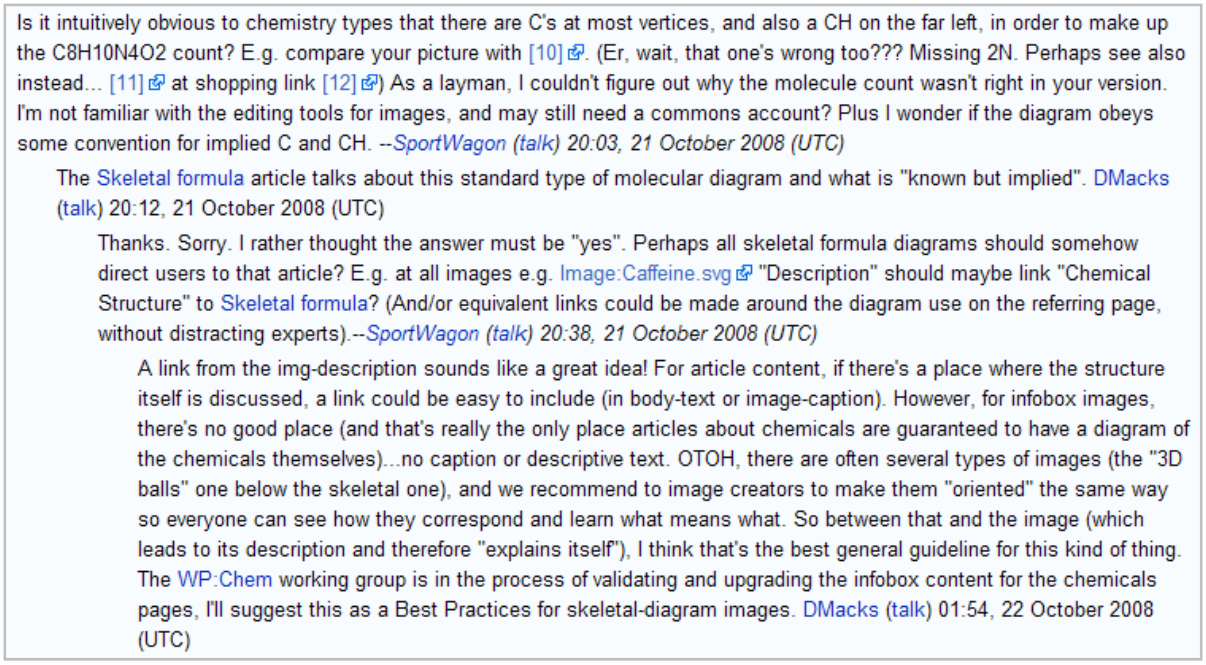
Here, words such as 'flip' and the very non-scientific "...and there you go!" shows that he too is part of the science discourse, and that he too finds it to be common knowledge. In addition, the knowledge implied is that rotating the molecule makes no difference to its function. The April discussion is an interesting example of how you can show which sign system you belong to, as they have clearly done so without use of many scientific phrases and words – apart from the formal terms used for the various components.

By use of the four building tasks *politics*, *connections*, *significance*, and *sign systems and knowledge* the participants of this discussion were able to argue their way to the conclusion that there are more ways to write the caffeine molecule, and during this process of negotiation of meaning, knowledge on the construction of the caffeine molecule and molecules in general was made explicit or combined with other explicit knowledge. As all building tasks are closely related, it is difficult to say that one building task is more dominant than the other. However, for this particular example, in which the discussion is concerned with

what is correct, the building task *politics* seems to be the more dominant.

The October discussion

The October discussion (fig. 6.7) is in fact more a conversation than a discussion, and is concerned with how to best understand the way the caffeine molecule is constructed. It is initially raised as a continued concern for the accurateness of the caffeine molecule depicted on the main page, but is quickly turned into a discussion of whether or not all wiki entries containing similar images, should incorporate a link to a wiki entry on molecular constructions, so as to make the rules of construction more comprehensible. In this second discussion on the caffeine molecule, there are only two participants, namely SportWagon and Dmacks. The discussion takes place from October 21st until October 22nd. In the discussion page, the October discussion is situated directly underneath the April discussion, allowing others to see the full dialogue. Blue colored words and numbers also refer to links in this example (see Appendix 2 for larger image).



Is it intuitively obvious to chemistry types that there are C's at most vertices, and also a CH on the far left, in order to make up the C8H10N4O2 count? E.g. compare your picture with [10]. (Er, wait, that one's wrong too??? Missing 2N. Perhaps see also instead... [11] at shopping link [12]) As a layman, I couldn't figure out why the molecule count wasn't right in your version. I'm not familiar with the editing tools for images, and may still need a commons account? Plus I wonder if the diagram obeys some convention for implied C and CH. --*SportWagon (talk) 20:03, 21 October 2008 (UTC)*

> The Skeletal formula article talks about this standard type of molecular diagram and what is "known but implied". DMacks (talk) 20:12, 21 October 2008 (UTC)
>
> > Thanks. Sorry. I rather thought the answer must be "yes". Perhaps all skeletal formula diagrams should somehow direct users to that article? E.g. at all images e.g. Image:Caffeine.svg "Description" should maybe link "Chemical Structure" to Skeletal formula? (And/or equivalent links could be made around the diagram use on the referring page, without distracting experts).--*SportWagon (talk) 20:38, 21 October 2008 (UTC)*
> >
> > > A link from the img-description sounds like a great idea! For article content, if there's a place where the structure itself is discussed, a link could be easy to include (in body-text or image-caption). However, for infobox images, there's no good place (and that's really the only place articles about chemicals are guaranteed to have a diagram of the chemicals themselves)...no caption or descriptive text. OTOH, there are often several types of images (the "3D balls" one below the skeletal one), and we recommend to image creators to make them "oriented" the same way so everyone can see how they correspond and learn what means what. So between that and the image (which leads to its description and therefore "explains itself"), I think that's the best general guideline for this kind of thing. The WP:Chem working group is in the process of validating and upgrading the infobox content for the chemicals pages, I'll suggest this as a Best Practices for skeletal-diagram images. DMacks (talk) 01:54, 22 October 2008 (UTC)

Fig. 6.7: October discussion of "Is the image of the caffeine molecule correct?" (Wikipedia, March 28th, 2009)

As this is a continued discussion of the structuring of the caffeine molecule, the discussion is still concerned with 'correctness.' However, the discussion has also turned into a discussion of 'audience,' which is why the analysis only shows clear examples of the building tasks *significance, politics* and *connections*. In the process of knowledge sharing, implicit knowledge of the structuring of molecules is made explicit.

As the building tasks chosen for the analysis are closely related, many of the examples used in the following will appear more than once, as they each represent more than one building task, when viewed in a context. Comments used as examples in the analysis are marked with author, time, and date.

Significance

In the October discussion, the concern is that a layman would not understand the implicit rules of writing molecules. Reason being that if you do not possess the implicit knowledge, which a scientist would, you would not be able to understand the molecular construction of the caffeine molecule. The significance of clarifying "…what is known but implied" (DMacks, 20:12, 21 October) is emphasized by addressing the issue of audience and how some may be more knowledgeable than others about structuring skeletal formulas;

> **SportWagon (20:03, 21 October):** "Is it intuitively obvious to chemistry types that there are C's at most vertices?"

Through dialogue they reach the conclusion that a link to the article, which describes skeletal formulas, would be a good idea. This process of knowledge sharing in which implicit knowledge is made explicit would not have happened, had SportWagon not emphasized, or made significant, the knowledge gap between layman and scientists. However, as discussed under the April discussion, whether simply explicating knowledge, which in this case is even referred to as implicit knowledge, is in fact a process of externalization can be discussed. Nonetheless, it is a very clear example of implicit knowledge being 'explicated' and perhaps externalized.

Politics

As there is an outspoken problem with the caffeine molecule and the missing description of its structure, the two participants in the discussion agree on (build politics) the idea that other articles with molecular structures should contain a link to the 'Skeletal formula'-article mentioned:

> **SportWagon (20:38, 21 October):** "Perhaps all skeletal formula diagrams should somehow direct users to that article?"
>
> **DMacks (01:54, 22 October):** "A link from the img-description sounds like a great idea!"

As this is not a discussion of what is the correct answer, but more a discussion of what would be the best solution for explaining the structuring of molecules, the building task *politics* is not as evident as the other building tasks. Nonetheless, from their discussion AS Artimour and SportWagon have come to the agreement that articles containing similar molecular structures should also link to the article on 'Skeletal formula,' and this makes it an example of how a process of knowledge sharing has created new knowledge which will benefit others – whether through combination or externalization.

Connections (or relevance)

SportWagon is making the fact that there is a gap between layman and scientist relevant in the two examples below. They are taken from the same comment, but are not consecutive:

> **SportWagon (20:03, 21 November:** "Is it intuitively obvious to chemistry types that

there are C's at most vertices, and also a CH on the far left, in order to make up the C8H10N4O2?"

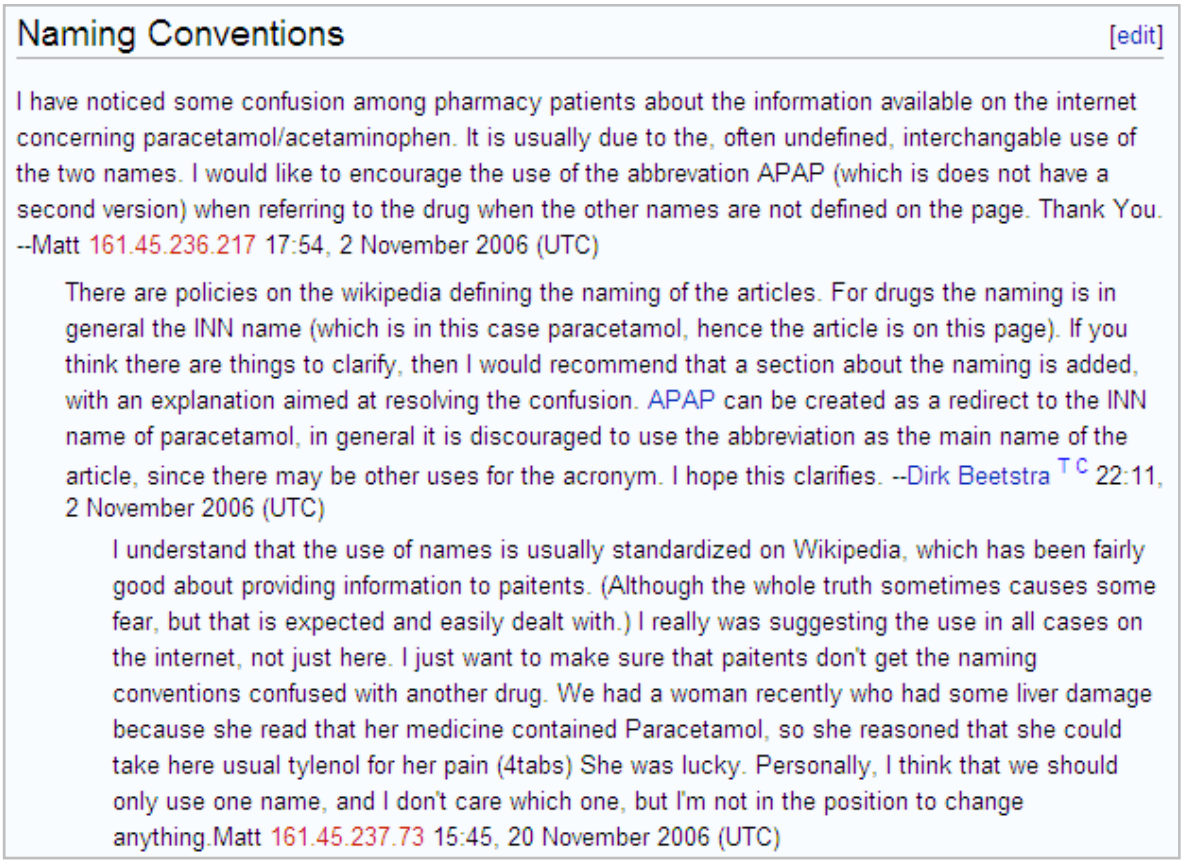
"As a layman, I couldn't figure out why the molecule count wasn't right in your version."

With the labels 'chemistry types' and 'layman', SportWagon has made the knowledge gap between the two types of knowledge more apparent. By emphasizing this gap, and making it relevant, attention is brought to the fact that there needs to be a more 'explicit' explanation to the caffeine molecule depicted in the wiki page. The building task *connections* becomes important as the topic of this discussion is 'audience', and thus it becomes important to clarify that there is a distinction between laymen and scientists.

The October discussion is an example of how two individuals, with no prior knowledge of one another, are able to reach consensus through a process of knowledge sharing. Had SportWagon not made the connection between 'layman' and 'chemistry types', and made the knowledge gap between the two significant, they would not have ended with a solution in which this article links to another article on skeletal formulas. In addition, the suggestion (or new knowledge) has been passed on to others, as DMacks intends to suggest it as a "Best Practice for skeletal diagrams" (01:54, 22 October) for the Wikipedia Chemistry group – a group of individuals working on chemistry related articles. The knowledge spiral of Nonaka and Takeuchi is thus in effect, as knowledge is passed on to others, so that they may learn from it as well.

6.3.2 Example 2: Paracetamol

Under “Naming Conventions” we find a discussion on the correctness of naming the article 'Paracetamol' as opposed to ‘Acetaminophen’, which is more common in the U.S. The primary argument for using paracetamol and not acetaminophen is that Wikipedia usually use International Nonproprietary Names (INN) for drugs, and in this case it is paracetamol. The opposing argument is that these articles are written for the masses, and that the article name should contain either names or the abbreviation APAP so as not to lead to confusion. The discussion is thus clearly a discussion of who are the 'masses' and what is the universal solution to the problem of naming the article. The discussion takes place in November 2006 and January 2007. In order to have the full discussion as an image, it is divided into two parts and is shown in fig. 6.8 and 6.9 (see Appendix 3 and 4 for larger images in color). Even though the discussion has a natural division in terms of time of occurrence, it will be analyzed as a whole, as the contents of the entire discussion should be viewed as an entirety. The discussion is also a good example of how a discussion can be preserved, and continued at a later point in time. Blue- and red colored words in the images represent links in the discussion page.

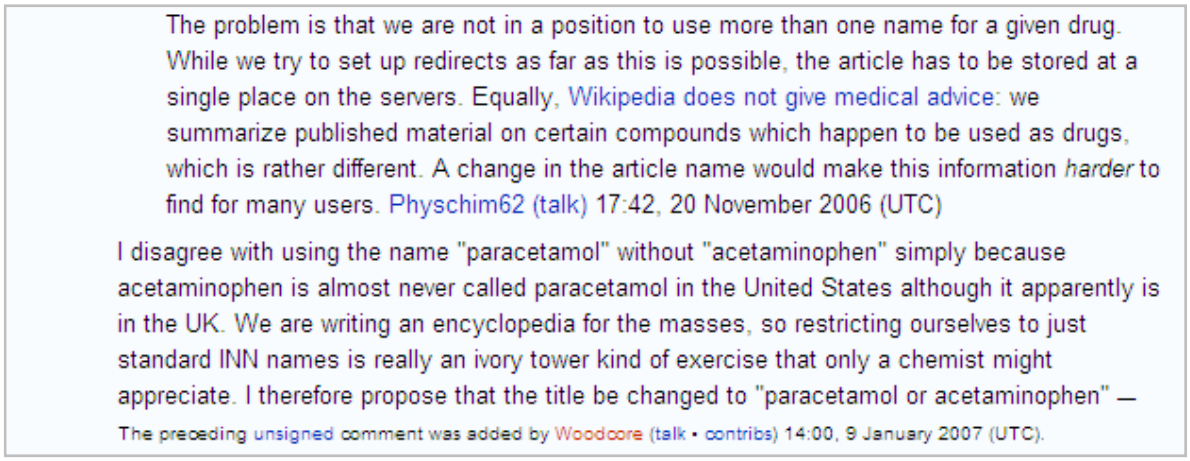


Naming Conventions [edit]

I have noticed some confusion among pharmacy patients about the information available on the internet concerning paracetamol/acetaminophen. It is usually due to the, often undefined, interchangable use of the two names. I would like to encourage the use of the abbrevation APAP (which is does not have a second version) when referring to the drug when the other names are not defined on the page. Thank You. --Matt 161.45.236.217 17:54, 2 November 2006 (UTC)

> There are policies on the wikipedia defining the naming of the articles. For drugs the naming is in general the INN name (which is in this case paracetamol, hence the article is on this page). If you think there are things to clarify, then I would recommend that a section about the naming is added, with an explanation aimed at resolving the confusion. APAP can be created as a redirect to the INN name of paracetamol, in general it is discouraged to use the abbreviation as the main name of the article, since there may be other uses for the acronym. I hope this clarifies. --Dirk Beetstra T C 22:11, 2 November 2006 (UTC)
>
> > I understand that the use of names is usually standardized on Wikipedia, which has been fairly good about providing information to paitents. (Although the whole truth sometimes causes some fear, but that is expected and easily dealt with.) I really was suggesting the use in all cases on the internet, not just here. I just want to make sure that paitents don't get the naming conventions confused with another drug. We had a woman recently who had some liver damage because she read that her medicine contained Paracetamol, so she reasoned that she could take here usual tylenol for her pain (4tabs) She was lucky. Personally, I think that we should only use one name, and I don't care which one, but I'm not in the position to change anything.Matt 161.45.237.73 15:45, 20 November 2006 (UTC)

Fig. 6.8: Part 1 – discussion of “Naming Conventions” (Wikipedia, March 28th 2009)


The problem is that we are not in a position to use more than one name for a given drug. While we try to set up redirects as far as this is possible, the article has to be stored at a single place on the servers. Equally, Wikipedia does not give medical advice: we summarize published material on certain compounds which happen to be used as drugs, which is rather different. A change in the article name would make this information *harder* to find for many users. Physchim62 (talk) 17:42, 20 November 2006 (UTC)

I disagree with using the name "paracetamol" without "acetaminophen" simply because acetaminophen is almost never called paracetamol in the United States although it apparently is in the UK. We are writing an encyclopedia for the masses, so restricting ourselves to just standard INN names is really an ivory tower kind of exercise that only a chemist might appreciate. I therefore propose that the title be changed to "paracetamol or acetaminophen" —

The preceding unsigned comment was added by Woodcore (talk • contribs) 14:00, 9 January 2007 (UTC).

Fig. 6.9: Part 2 – discussion of "Naming Conventions" (Wikipedia, March 28th 2009)

The discussion under Paracetamol concerning 'naming conventions', is an 'either/or' discussion, as the participants in the discussion discuss whether to use one name over the other. As a result, the findings of the analysis show that *significance* and *connections* are used in the process of negotiating meaning. They use these building tasks to make their arguments more relevant or significant than the arguments of the others. It is a discussion of names, but it is also a discussion of 'audience', as it is pointed out by the participants in the discussion, that one of the names is more common in the U.S. whereas the other is more common in the U.K.

In this analysis, some examples will be used to identify more building tasks, and may therefore occur more than once. Examples from the text will be followed by the time and date of the comment, in addition to the name of the author. The results of the analysis are presented in the following.

Significance

In this discussion, it is important for the opposing arguments to highlight the *significance* of choosing one solution over another. The participants in the discussion thus make use of different analogies and examples in their argumentation, and use language to make their suggestions seem more significant than the others. Matt, the first person to address the issue of names, gives an example of how he personally experienced a problem with using paracetamol as opposed to acetaminophen;

> **Matt (15:45, 20 November):** "We had a woman recently who had some liver damage because she read that her medicine contained Paracetamol, so she reasoned that she could take here usual tylenol for her pain (4tabs) She was lucky."

By use of an example, Matt is signifying the problem of the naming conventions. He is making the danger of using the wrong name significant, and in the process of that, he is making the implicit knowledge (and experience) of a woman, who suffered from liver damage, explicit. 'Examples' are one of the methods used in externalizing implicit knowledge, as described by Nonaka and Takeuchi (1995).

Politics

As this discussion is also a discussion of what is right and wrong, or correct and incorrect, there are many examples of how the participants make use of *politics* in their language. One good example of this is how Woodcore makes a clear distinction between what he considers to be right and wrong, and not least why:

> **Woodcore (14:00, 9 January):** "I disagree with using the name "paracetamol" without "acetaminophen" simply because acetaminophen is almost never called paracetamol in the United States although it apparently is in the UK."

Woodcore's distinction between right and wrong thus has to do with who the audience of this article is. It can further be deduced from this statement that he believes that the majority of the readers are American, and that the most correct term would then be acetaminophen. During this process of distinguishing between right and wrong, Woodcore manages to make it explicit that the use of paracetamol is not common in the U.S., as they prefer using acetaminophen. However, whether this is an actual process of externalization can be questioned. The knowledge may not be implicit in the sense that it is not a knowledge he holds inside him, and which has never been articulated before, but to this process of knowledge sharing it is implicit. It may also simply be a process of combination, in which explicit knowledge of the use of medicinal names are merely emphasized, and combined with the knowledge of the others in the group, thereby making it a process of combination.

Connections

In the process of justifying their statements, it is often seen that participants in a discussion will make use of connections, in which connecting them with other things, emphasizes their arguments. In this discussion, the significance of the danger of naming the article paracetamol as opposed to APAP or acetaminophen, is made relevant (or connected) by exemplifying what may happen:

> **Matt (15:45, 20 November):** "We had a woman recently who had some liver damage because she read that her medicine contained Paracetamol..."

Once again, Matt's personal experience (or implicit knowledge) of what may happen when there are more than one name for a product, is made explicit, and in the process used as an example to support his argument, in this case that there is a connection between using wrong names and a potential danger.

At one point in the discussion, it is suggested that there could be two articles on the topic, but with each their name. In arguing against this solution, Physchim62 makes the connection between naming the articles, and the technical issues concerned with that. In the process of making that connection, he makes it apparent that it is not possible to have one article with two names:

> **Physchim62 (17:42, 20 November):** "…we are not in a position to use more than one name for a given drug. While we try to set up redirects as far as this is possible, the article has to be stored at a single place on the servers."

The information provided here by Physchim62 could be an example of implicit knowledge made explicit. However, as just discussed, the process of combination may be more of an obvious choice, as the explication of the technical issues connected with the naming of articles is not necessarily implicit knowledge, but more explicit knowledge which is merely 'explicated.'

Nonetheless, these were two examples of how the building task *connections* can be used in the process of negotiating meaning, and as a tool for supporting arguments. In the process of connecting things, implicit knowledge can be converted into explicit; in this case it was a personal experience, and technical knowledge regarding the structure behind Wikipedia.

Sign systems and knowledge

'Naming conventions' is an example of how the building task *sign systems and knowledge* is used as tool of justification. Matt, the participant who raised the issue indicates that he may be working within the medical sector. The example from November 20th in which he mentions the instance with the woman with liver damage, he says:

> **Matt (15:45, 20 November):** "We had a woman with liver damage…"

As he chooses to say "we had" it can be deduced from this, and most likely also interpreted by the other participants, that Matt is knowledgeable within the field of medicine (i.e. he is working within the industry), and is therefore a reliable source, and someone whose opinion should be valued on topics concerned with medicine.

In this second case example, the discussion was concerned with whether to choose one name or the other; it was an either/or discussion so to speak. In this regard, the analysis also showed that all four building tasks were used in the process of negotiation. In this discussion, it was important to the participants to emphasize the potential dangers of choosing the wrong name, and they did so by using the building tasks *politics*, *connections*, and *sign systems and knowledge*.

6.3.3 Example 3: Finance

Under 'Lead section' (see fig. 6.10) in the discussion page for 'Finance', we find a discussion on how to define the term 'finance.' In this final example, there are two participants in the discussion, and the discussion takes its departure in the sentence ”The simplest form of financial activity is debt” which has been removed from the ‘lead section’ in the finance article by the participant ‘mydogatgodshat’. The discussion hereafter revolves around what the term finance actually encompasses. As it is the lead section of the wiki page 'Finance' the participants in the discussion are discussing how to best introduce the reader to this topic.

The discussion takes place between the 14th and 15th of December, 2004 and is actually a part of a larger discussion with more participants. However, for the purpose of exemplifying, this small section has been selected for the analysis. Blue- and red colored words represent links in the discussion page (please see appendix 5 for a larger image of the discussion in color).

I have removed "The simplest form of financial activity is debt." because it is obviously untrue. There are many forms of financial activity that are simpler than mortgages, bonds, and loans, for example, a cash purchase to name just one. I also doubt the value of the new material. If seems that the article is turning into a meandering description of select finance topics instead of being a concise introduction to finance in general terms. mydogategodshat 18:12, 14 Dec 2004 (UTC)

> By your definition, what doesn't count as finance? Barter? -- Walt Pohl 05:03, 15 Dec 2004 (UTC)
>
> > I am not defining finance. The removed statement is about "financial activities" which is much broader than finance. Even if we changed the statement to read "In finance, the simplest form of activity is debt.", I still have doubts about it. I think that it can be argued that areas of working capital management are simpler than debt financing. Try floating a bond issue and by time you've paid hundreds of thousands of dollars in legal, accounting, and brokerage fees you will be longing for the simplicity of cash flow budgeting. At any rate, its probably unnecessary to claim that one area of finance is the simplest. mydogategodshat 05:44, 15 Dec 2004 (UTC)

If we decide to start adding select finance topics to this article, we have to decide which ones. Probably the most general finance topic is the time value of money, discounting, NPV, ect. These concepts are used in all of finance. mydogategodshat 02:49, 15 Dec 2004 (UTC)

> Maybe, but this is still a rather academic view of finance. Plenty of individuals or businesses make financial decisions without using anything like NPV (even though they should). -- Walt Pohl 05:03, 15 Dec 2004 (UTC)
>
> > You seem to have an anti-academic predisposition. I see no problem with including these core finance topics. Your statement that plenty of individual or businesses make financial decisions without using these core finance techniques is quite true. But you have to ask, Is it finance. I would argue that making a financial decision is not the same as finance. Buying a chocolate bar is a financial decision: It is not finance. Using your "anti-academic" definition, how do you differentiate finance from management accounting or managerial economics. mydogategodshat 06:37, 15 Dec 2004 (UTC)

Fig. 6.10: Discussion of the term finance in “Lead section” (Wikipedia, March 28th 2009)

As the discussion is concerned with 'correctness' and what is considered true or false, there are many examples of how the two participants make use of the building tasks *politics* and *connections*. In addition, there are many examples of how explicit knowledge is combined in the process of defining the term ‘finance.’ The combining of knowledge serves to build arguments in this example, and in the process, new knowledge on the term finance is combined and made explicit.

Politics

As mentioned already, the building task *politics* serves to emphasize what we see as correct, normal, right or wrong, and in this case example, the entire discussion is concerned with what is ‘correct.’ The first sentence in this abstract from the discussion on the ‘Lead section’, mydogategodshat says:

> **Mydogategodshat (18:12, 14 December):** "I have removed "The simplest form of financial activity is debt." because it is obviously untrue."

He thereby signals, that he does not find it correct to say that 'debt' is a simple form of finance. In his argumentation for this statement, he lists several alternative topics:

> **Mydogategodshat (18:12, 14 December):** There are many forms of financial activity that are simpler than mortgages, bonds, and loans, for example, a cash purchase to name just one."

In the process of arguing against the statement in question, he makes use of explicit knowledge to support his arguments, and thereby combines this new knowledge with his perception of the term 'finance'. This is the first part of the discussion, and the explicit knowledge used in this entry, will be combined with other examples of explicit knowledge in the subsequent arguments.

Connections

There are many examples of how the two participants, mydogategodshat and WaltPohl, use the building tasks *connections* in the process of argumentation. The first example is by mydogategodshat, and this example serves as an opposition to the statement that debt financing is simple:

> **Mydogategodshat (18:12, 14 December): "**There are many forms of financial activity that are simpler than mortgages, bonds, and loans, for example, a cash purchase to name just one."

By use of the building task *connections*, mydogategodshat is combining this knowledge with the rest of the information in the article, which means that they through their discussion of the definition have combined knowledge on financing, in this case that mortgages, bonds, and loans are a part of what he defines as 'financial activities.'

The following sentence is also an example of how mydogategodshat makes use of examples to connect, and thereby make relevant, what he is saying about simplifying the description of 'finance':

> **Mydogategodshat (05:44, 15 December):** "Try floating a bond issue and by time you've paid hundreds of thousands of dollars in legal, accounting, and brokerage fees you will be longing for the simplicity of cash flow budgeting."

He makes the connection between the complex bond issue and the simplicity of cash flow budgeting, to make it relevant what he is saying about what would be the simplest way to describe 'finance'. This could also be an example of the building task *significance* as he signifies the complexity of bonds, to make 'cash flow budgeting' seem more simple.

In response to WaltPohl's argument that businesses make financial decisions without using finance techniques:

> **Mydogategodshat (06:37, 15 December):** "I would argue that making a financial decision is

not the same as finance. Buying a chocolate bar is a financial decision: It is not finance."

WaltPohl also makes use of connections in his argumentation. In response to mydogategodshat's argument that 'NPV' is a general finance topic, WaltPohl says:

> **Walt Pohl (05:03, 15 December):** "Plenty of individuals or businesses make financial decisions without using anything like NPV (eventhough they should).

In the process of discussing how to define the term 'finance', they made use of the building task *connections* in several occasions, and the once mentioned were just a few examples. By making connections, they managed to make relevant, or highlight, their arguments for the defining of 'finance'.

Sign systems and knowledge

There is also a distinction between 'academics' and 'non-academics' in their discussion on 'finance.' As previously discussed, this building task is not a director indicator of knowledge conversion processes. However, in the process of arguing for or explaining a given piece of knowledge, we privilege or disprivilege this piece of knowledge by use of our language. Moreover, it serves to highlight our area of expertise, and is therefore a part of our process of argumentation, as it makes our statements seem more valuable. The following is a very explicit example of the difference between or two participants, as they themselves bring awareness to the gap between them:

> **WaltPohl (05:03, 15 December):** "...this is still a rather academic view of finance."

In response to WaltPohl's statement, mydogategodshat says:

> **Mydogategodshat (06:37, 15 December):** "You seem to have an anti-academic predisposition."

These two sentences highlight the fact that the two participants have opposing views on the subject, and is as such an indicator what is the nature of their differing views.

In this third and final case example, the two participants in the discussion made use of the building tasks *connections*, *politics* and *sign systems and knowledge*, in the negotiation of how to best describe the term 'finance.' In the process of arguing for or against their definitions, they combine explicit knowledge so as to get a better understanding of the term, and not least their individual definitions.

The following will be a short summary of the findings in the analysis of the three case examples.

6.4 Summary of analysis

As already discussed in section 5.1, the building tasks *significance*, *politics*, *connections and signs systems and knowledge*, are more applicable in the process of negotiation of meaning which the discussion pages in Wikipedia represent. As argued by Burke (1969), the chosen building tasks represent the tasks, or argumentative tools, which we would make use of in a process of negotiating meaning, whereas the building tasks relationship, activities, and identity are used for the process of 'identification' – the process in which we

orient our discourse to the community which we feel a belonging to, by use of these building tasks.

'Caffeine' was the first case example, and was a discussion of what was the correct way to construct the caffeine molecule. Although the discussion was separated in two, the overall topic of the discussion was concerned with 'correctness'. Five individuals participated in the discussion, and their knowledge sharing process included the combination of explicit knowledge, as well as the externalization of implicit knowledge. As an example, the implicit knowledge of molecular structures was made explicit, and thereby created new knowledge on molecular structuring. In addition, the October discussion also included an example of knowledge can be passed on via the wiki, as the knowledge generated in this discussion, is actively passed onto others, so that they might learn from their knowledge sharing process as well.

The second case example, 'Paracetamol', was a discussion of what name to use for the article currently referred to as Acetaminophen. In that respect, the discussion was one in which the four individuals in the group was looking for a definite solution, and was as such an either/or discussion. Their knowledge sharing process included the conversion processes of externalization and combination. The externalization process was exemplified in the comment made by Matt (15:45, 20 November), in which he makes use of an example to justify his claims. The example was a personal experience, and served as a way of signifying the dangers of using the wrong name.

The final case example was 'Finance,' and was, like the first case, a discussion of what was 'correct', in this case, what would be the correct way to describe 'Finance,' and what subjects to include in the article. The building tasks politics and connections were the dominant, but there were also example of sign systems and knowledge. There were many examples of how the two participants combined explicit knowledge in the process of argumentation, and the combining of knowledge therefore served as an argumentative tool.

7.0 Conclusion

The purpose of this thesis was to investigate whether the wiki could function as a space for the processes of knowledge conversion as defined by Nonaka and Takeuchi, and if so, whether these processes could be identified through discourse analysis. The problem statement was as follows:

> *Can processes of knowledge conversion be seen in a wiki? If so, what do they look like? And can language based building tasks explain Nonaka and Takeuchi's knowledge conversion processes?*

In order to answer these questions, theories concerning knowledge creation were presented and discussed, as well as tools for analysis, in this case James Paul Gee's notion of the seven building tasks. The object of analysis was three examples chosen from the discussion pages of the wiki pages *Caffeine, Paracetamol* and *Finance* from Wikipedia. The discussions were examples of how a group of individuals engaged in a process of negotiation of meaning, as they tried to reach consensus on various topics. In the process of negotiation, they made use of various argumentative tools and examples, and these were the object of the analysis.

In regards to the knowledge conversion processes of Nonaka and Takeuchi, the findings of the analysis suggest that wikis are appropriate for the knowledge conversion process of *combination*, but that the process of *externalization* is less likely to occur. As the purpose of the wiki is to let people meet in a virtual environment in which they can share and combine knowledge, it may seem as an obvious conclusion to this analysis. However, what seems to characterize the wiki, but also differentiates itself from other knowledge management systems, is the combination of it being a system for both knowledge storage and knowledge sharing, and that both the processes of creation as well as argumentation, can be found in the same pages. It is a place for individuals to meet in a written dialogue – across borders and time zones – in which they discuss topics ranging from molecular structures to naming conventions.

One of the characteristics of the wiki, which is not seen in many other systems for knowledge management, is the consistent storage of the wikis history, where all activities in the wiki are registered, and the information is available to all. This provides users with a means to always revert or go back to previous editions, which means that nothing ever gets lost in the wiki. Another characteristic is the decentralized control of the contents of the wiki. All users of the wiki are inherently in control of the contents of the wiki. This enables a more free flow of information, as the sharing of knowledge does not involve other people than the sharers themselves.

The discourse analysis of the three case examples proved that Gee's theory of the seven building tasks was useful in the identification of knowledge conversion processes. In particular four of the seven tasks were applicable; *significance, connections, politics* and *sign systems and knowledge* proved useful. These building tasks represent the tasks we use as argumentative tools in a process of negotiation, whereas the building tasks *relationship*, *activities*, and *identity* are used for the process of 'identification,' which, according to

Burke (1969) is a process fundamental to being human and communicating, as we try to identify common interests, values, perceptions, or experiences to feel a sense of belonging. The building tasks *relationships, activities,* and *identities* are therefore the building tasks we use to accomplish this need to 'belong.'

Based on the chosen building tasks, a series of questions can be made to be used for the discourse analysis for identifying knowledge conversion processes in a discussion between a group of individuals:

- Does the text make a distinction between what is good, right, wrong, correct, or proper?
- Does the text make some things seem more significant or not than others?
- Does the text make connections between things more apparent or irrelevant?
- Does the text privilege or disprivilege certain types of knowledge?

In regards to the lack of, or questionable, examples of processes of externalization, it can be questioned whether the amount of data was inadequate to identify possible processes of externalization, or if the case itself, Wikipedia, is simply not the type of wiki in which to find this kind of process. A more project based organization would most likely contain more dialogue in which work routines and personal experience would be expressed at greater length. The contents of Wikipedia is after all encyclopedic, and will as such not contain many discussions and dialogues containing personal experiences and work routines, as the goal of most discussions is to find qualified (and previously published) sources to support their arguments. The reason could also be that the wiki is simply not capable of converting implicit knowledge to explicit, at least not as described by Nonaka and Takeuchi.

On the other hand, Nonaka and Takeuchi's definition of implicit and explicit knowledge may be too narrow, and the fact that they choose to separate the two, as opposed to say that they are connected, makes the process of knowledge conversion somewhat simplistic and rigid. If the intention of the process of externalization is to enable individuals to externalize their experiences and knowledge of work routines, and that this process entails a dialogue between two or more people, then it could be reasoned, that the wiki could function as a tool for externalizing implicit knowledge, as it provides for both a place to document the knowledge, but also a place where the documentation happens as the knowledge is shared.

Wikis as watercoolers? The title is meant to refer the reader to the talk around the watercooler – also referred to as 'watercooler talk.' It is often said that the types of conversations carried around, not just the watercooler, but in the hallways, before and after meetings, and during the morning rounds can be very valuable to an organization, as it is often in these types of conversations that new knowledge is created through the process of externalizing implicit knowledge or by combining explicit knowledge. However, these conversations cannot be captured, whereas the 'talk' in the wiki can. The intention of the thesis was therefore to study whether wikis could function as watercoolers, as that will provide for a knowledge management tool that not only enables the international knowledge sharing, but also keeps a record of all transactions.

In this case, it seems that the wiki could function as a ‘watercooler’, and that valuable conversations and processes of knowledge sharing are taking place in the wiki. In addition, that these conversations are documented and preserved for others to see, and thereby keeps the knowledge in motion.

8.0 Summary

Title: Wikis as watercoolers?

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Aarhus Universitet – Handelshøjskolen, April 2009

The preserving and managing of knowledge is of interest to many organizations today. With employees shifting jobs more frequently, and people spread all over the world, the interest in international knowledge sharing and knowledge creation has increased.

Along with the increased interest in knowledge management, we see new tools for managing knowledge more and more often, and some of these are based on wiki software. Wiki based technology used for knowledge management, allows employees to share their knowledge with the rest of the organization, and in addition allowing others to edit, discuss and change that knowledge in a cooperative manner, and it differentiates itself from traditional knowledge management tools, but its seemingly ease of use, and not least user-based control.

But how can wikis be watercoolers? It is often said that management fails to recognize the valuable conversations carried around the watercooler. And yet some may value it, but might not consider the potential of capturing this knowledge, in the process of being created. The title of the thesis refers to the wikis ability to capture these conversations, in which knowledge is shared and combined, and thus becomes new and valuable knowledge to the organization.

The case example chosen for this thesis is Wikipedia. Wikipedia is the online encyclopedia written and edited by the more than 75.000 contributors, who all contribute voluntarily. The structure of Wikipedia is fairly simple, and consists of wiki pages (which currently count ten million) and the discussion pages found behind each wiki page. The discussion pages are where contributors to the wiki page discuss its content and not least its validity.

The discussion pages are the primary interest of this thesis. Here, contributors to the wiki pages engage in sometimes lengthy (written) discussions, in which the contents of the wiki pages are 'negotiated'. The process of negotiation involves the sharing of explicit knowledge, and sometimes the externalization of implicit knowledge.

According to Nonaka and Takeuchi, the key to knowledge creation is the conversion of implicit and explicit knowledge. The process of externalization is a process of converting implicit to explicit knowledge, albeit through a face-to-face dialogue, where the habits and personal experience of a group of individuals can be externalized. The process of combination is a process of combining explicit knowledge, so as to create new knowledge. This is also a social process, but can however take place in a virtual environment and is not

restricted to a face-to-face dialogue.

For the purpose of identifying processes of knowledge conversion, James Paul Gee's notion of the seven building tasks was utilized. According to Gee (2006) we always and simultaneously build seven different realities, and that these realities represent our perception of the world, and what we consider good, significant and relevant. Moreover we use them to illustrate what type of activity we are engaging in, how we identify ourselves, and what type of relationship we wish to have with whom we are speaking to.

For the analysis, three examples were chosen from three different discussion pages. The analysis showed that the process of knowledge sharing comes very natural with this type of technology, as there are countless examples of how participants engage in discussions, however not all types of knowledge sharing seem to apply.

The findings of the analysis led me to conclude that the wiki can be a place for the knowledge conversion process of *combination*, and that the process of *externalization* seems less likely, at least in the definition of Nonaka and Takeuchi. However, if the intention of the process of externalization is to enable individuals to externalize their experiences and knowledge of work routines, and that this process entails a dialogue between two or more people, then it could be reasoned, that the wiki could functions as a tool for externalizing implicit knowledge, as it provides for both a place to document the knowledge, but also a place where the documentation happens as the knowledge is shared.

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Links:

Wikipedia: http://wikipedia.org

Den Store Danske: http://www.denstoredanske.dk/

About Wikipedia: http://en.wikipedia.org/wiki/Wikipedia:About

Microsoft Sharepoint Server: http://office.microsoft.com/en-gb/sharepointserver/FX100492001033.aspx

Wikipedia statistics, visitors: http://siteanalytics.compete.com/wikipedia.org/?metric=uv

Is the image of the Caffeine Molecule correct? [edit]

The image of the caffeine molecule on the page is different from the one on this shirt. Which one is the correct one? -- AS Artimour (talk) 21:01, 7 April 2008 (UTC)

> Isn't one just rotated 180° from the other? What difference were you noticing? DMacks (talk) 21:23, 7 April 2008 (UTC)
>
> > They are the same molecule in two different orientations, but both correct. Take either one, and flip them on the X and Y axes, and there you go! – ClockworkSoul 06:15, 8 April 2008 (UTC)
> >
> > > Aren't the places of H_3C and CH_3 switched on the shirt? I knew about the rotation already though. -- AS Artimour (talk) 19:00, 9 April 2008 (UTC)

The direction of writing the methyl group (H_3C and CH_3) makes no difference to the identity of the molecule depicted. You just write H_3C if carbon is bonded to something to its right.

The two depictions (t-shirt and article) represent the same molecule.

Ben (talk) 19:17, 9 April 2008 (UTC)

Is it intuitively obvious to chemistry types that there are C's at most vertices, and also a CH on the far left, in order to make up the C8H10N4O2 count? E.g. compare your picture with [10]. (Er, wait, that one's wrong too??? Missing 2N. Perhaps see also instead... [11] at shopping link [12]) As a layman, I couldn't figure out why the molecule count wasn't right in your version. I'm not familiar with the editing tools for images, and may still need a commons account? Plus I wonder if the diagram obeys some convention for implied C and CH. --*SportWagon (talk) 20:03, 21 October 2008 (UTC)*

> The Skeletal formula article talks about this standard type of molecular diagram and what is "known but implied". DMacks (talk) 20:12, 21 October 2008 (UTC)
>
> > Thanks. Sorry. I rather thought the answer must be "yes". Perhaps all skeletal formula diagrams should somehow direct users to that article? E.g. at all images e.g. Image:Caffeine.svg "Description" should maybe link "Chemical Structure" to Skeletal formula? (And/or equivalent links could be made around the diagram use on the referring page, without distracting experts).--*SportWagon (talk) 20:38, 21 October 2008 (UTC)*
> >
> > > A link from the img-description sounds like a great idea! For article content, if there's a place where the structure itself is discussed, a link could be easy to include (in body-text or image-caption). However, for infobox images, there's no good place (and that's really the only place articles about chemicals are guaranteed to have a diagram of the chemicals themselves)...no caption or descriptive text. OTOH, there are often several types of images (the "3D balls" one below the skeletal one), and we recommend to image creators to make them "oriented" the same way so everyone can see how they correspond and learn what means what. So between that and the image (which leads to its description and therefore "explains itself"), I think that's the best general guideline for this kind of thing. The WP:Chem working group is in the process of validating and upgrading the infobox content for the chemicals pages, I'll suggest this as a Best Practices for skeletal-diagram images. DMacks (talk) 01:54, 22 October 2008 (UTC)

Naming Conventions [edit]

I have noticed some confusion among pharmacy patients about the information available on the internet concerning paracetamol/acetaminophen. It is usually due to the, often undefined, interchangable use of the two names. I would like to encourage the use of the abbrevation APAP (which is does not have a second version) when referring to the drug when the other names are not defined on the page. Thank You. --Matt 161.45.236.217 17:54, 2 November 2006 (UTC)

> There are policies on the wikipedia defining the naming of the articles. For drugs the naming is in general the INN name (which is in this case paracetamol, hence the article is on this page). If you think there are things to clarify, then I would recommend that a section about the naming is added, with an explanation aimed at resolving the confusion. APAP can be created as a redirect to the INN name of paracetamol, in general it is discouraged to use the abbreviation as the main name of the article, since there may be other uses for the acronym. I hope this clarifies. --Dirk Beetstra T C 22:11, 2 November 2006 (UTC)
>
> > I understand that the use of names is usually standardized on Wikipedia, which has been fairly good about providing information to paitents. (Although the whole truth sometimes causes some fear, but that is expected and easily dealt with.) I really was suggesting the use in all cases on the internet, not just here. I just want to make sure that paitents don't get the naming conventions confused with another drug. We had a woman recently who had some liver damage because she read that her medicine contained Paracetamol, so she reasoned that she could take here usual tylenol for her pain (4tabs) She was lucky. Personally, I think that we should only use one name, and I don't care which one, but I'm not in the position to change anything.Matt 161.45.237.73 15:45, 20 November 2006 (UTC)

Appendix 4

The problem is that we are not in a position to use more than one name for a given drug. While we try to set up redirects as far as this is possible, the article has to be stored at a single place on the servers. Equally, Wikipedia does not give medical advice: we summarize published material on certain compounds which happen to be used as drugs, which is rather different. A change in the article name would make this information *harder* to find for many users. Physchim62 (talk) 17:42, 20 November 2006 (UTC)

I disagree with using the name "paracetamol" without "acetaminophen" simply because acetaminophen is almost never called paracetamol in the United States although it apparently is in the UK. We are writing an encyclopedia for the masses, so restricting ourselves to just standard INN names is really an ivory tower kind of exercise that only a chemist might appreciate. I therefore propose that the title be changed to "paracetamol or acetaminophen" —The preceding unsigned comment was added by Woodcore (talk • contribs) 14:00, 9 January 2007 (UTC).

I have removed "The simplest form of financial activity is debt." because it is obviously untrue. There are many forms of financial activity that are simpler than mortgages, bonds, and loans, for example, a cash purchase to name just one. I also doubt the value of the new material. If seems that the article is turning into a meandering description of select finance topics instead of being a concise introduction to finance in general terms. mydogategodshat 18:12, 14 Dec 2004 (UTC)

> By your definition, what doesn't count as finance? Barter? -- Walt Pohl 05:03, 15 Dec 2004 (UTC)
>
> > I am not defining finance. The removed statement is about "financial activities" which is much broader than finance. Even if we changed the statement to read "In finance, the simplest form of activity is debt.", I still have doubts about it. I think that it can be argued that areas of working capital management are simpler than debt financing. Try floating a bond issue and by time you've paid hundreds of thousands of dollars in legal, accounting, and brokerage fees you will be longing for the simplicity of cash flow budgeting. At any rate, its probably unnecessary to claim that one area of finance is the simplest. mydogategodshat 05:44, 15 Dec 2004 (UTC)

If we decide to start adding select finance topics to this article, we have to decide which ones. Probably the most general finance topic is the time value of money, discounting, NPV, ect. These concepts are used in all of finance. mydogategodshat 02:49, 15 Dec 2004 (UTC)

> Maybe, but this is still a rather academic view of finance. Plenty of individuals or businesses make financial decisions without using anything like NPV (even though they should). -- Walt Pohl 05:03, 15 Dec 2004 (UTC)
>
> > You seem to have an anti-academic predisposition. I see no problem with including these core finance topics. Your statement that plenty of individual or businesses make financial decisions without using these core finance techniques is quite true. But you have to ask, Is it finance. I would argue that making a financial decision is not the same as finance. Buying a chocolate bar is a financial decision: It is not finance. Using your "anti-academic" definition, how do you differentiate finance from management accounting or managerial economics. mydogategodshat 06:37, 15 Dec 2004 (UTC)

Appendix 5