

MASTER

Improve the innovation capacity with a virtual employee community

Bertens, R.C.

Award date:
2009

[Link to publication](#)

Disclaimer

This document contains a student thesis (bachelor's or master's), as authored by a student at Eindhoven University of Technology. Student theses are made available in the TU/e repository upon obtaining the required degree. The grade received is not published on the document as presented in the repository. The required complexity or quality of research of student theses may vary by program, and the required minimum study period may vary in duration.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain

Amsterdam, May 2009

**Improve the innovation capacity
with a virtual employee community**

by
Rob C. Bertens

BSc Industrial Engineering and Management — Eindhoven University of Technology 2005
Student identity number 0528468

in partial fulfilment of the requirements for the degree of

**Master of Science
in Innovation Management**

Supervisors:

Dr. A. de Jong, TU/e, Industrial Engineering & Innovation Sciences

Dr. J.J.L. Schepers, TU/e, Industrial Engineering & Innovation Sciences

Drs. J.W.G. Linssen, Innovation Factory

MSc J.A. Huisman, Innovation Factory

TUE. Department Industrial Engineering and Innovation Sciences.
Series Master Theses Innovation Management

Subject headings:
Communities, innovation strategy, organizations, Internet

Abstract

This thesis is the result of a graduation project focusing on the integration of a virtual employee community in the innovation process of a company. For companies that pursue continuous innovation, the ideas and insights of their employees are of crucial importance. But often communication and knowledge exchange between departments is not optimal. Employees throughout the company all possess their specific knowledge, and when this is combined in a virtual employee community, this leads to an increased innovation capacity. However until now, the potential of virtual employee communities in innovation is not investigated into detail. This thesis will provide a deeper insight into why and how a virtual employee community can support and improve innovation within organizations. It will also highlight several facilitating elements such as management support, motivation of community members and the role of trust. In this paper, the innovation process is represented as a stage gate model. To investigate the value of an employee community in innovation, all known initiatives regarding innovative virtual employee communities in The Netherlands have been investigated in practice. This involves several in-depth interviews as part of a case study at Achmea and a field study with other virtual employee communities. Furthermore, a survey has been done among all participants to verify the role of a virtual employee community in the stage gate model. This thesis creates a better knowledge base for the relation between a virtual employee community and the innovation capacity of an organization. The results induce that the highest added value of a virtual employee community is gained in first three stages of the stage gate process: Idea discovery, Scoping and Building the business case. Besides, guidelines will be given on how an employee community supports innovation and what activities should be done. Therefore this paper is both practical and theoretical relevant.

Executive summary

During the economic recession organizations should seize the opportunity to change the organization's strategy and become more innovative. To achieve this, setting up a virtual employee community is a valuable method. A virtual employee community is an online network or group of employees who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis. Bringing your employees together in a virtual community appeared to be highly beneficial for efficiency and innovation within an organization. For companies that pursue continuous innovation, the ideas and insights of their employees are of crucial importance. The own people have the seeds of great new products within them. By harnessing the creative energy of the entire group in a virtual community, unexpected outcomes are often the result. The integration of employees, their knowledge and skills is a fundamental enabler for innovation in organizations. Besides, costs can be reduced since people are able to do the preliminary research by combining all available knowledge and research information.

The topic in this master thesis is the potential of a virtual employee community to increase the innovation capacity. It is said to be difficult to nurture virtual employee communities aimed at improving the innovation capacity of a company. A lot of research has been done on the applications and role of customer communities, but the integration of a virtual employee community in the innovation process is rather new. Often organizations jump into virtual customer communities, however they often forget the potential of their employees. The aim of this master thesis is to find out how a virtual employee community supports the different stages of the innovation process of a company. This study provides important findings that are relevant for both theory and practice. The following research question is formulated:

How can a virtual employee community support and improve the innovation capacity of a company?

This research covers two fields from literature: virtual communities and innovation. First, an essential difference between managing organizations and virtual employee communities is that communities depend on members' voluntary contributions. Therefore, this research starts with an investigation of all context factors that influence the functioning of a virtual employee community. This resulted in a theoretical framework that covers the four structural elements of a virtual employee community: domain, community, practice and organization. These four elements are divided in several important factors (as can be seen in figure I). The impact that these elements and factors have on an employee community and innovation will be investigated in practice. Within organizations, communities are often linked to knowledge management, as it is an efficient method for communication between all departments of an organization. Besides community literature, relevant literature on innovation is used to investigate how and where a virtual employee community should be integrated. To investigate this, a clear and well-known model for representing the innovation process is chosen: the stage gate model. This model will serve to distinguish the different stages of the innovation process. The literature study resulted in the conceptual framework of figure I. To investigate the integration of an employee community in the stage gate model, the four elements of a community are investigated according to the various stages of the stage gate model. This investigation consisted of three parts: a case study within Achmea, a field study that consisted of five cases and a small survey. The main method

for data collection was doing in-depth interviews with thirteen people as part of the case and field study,

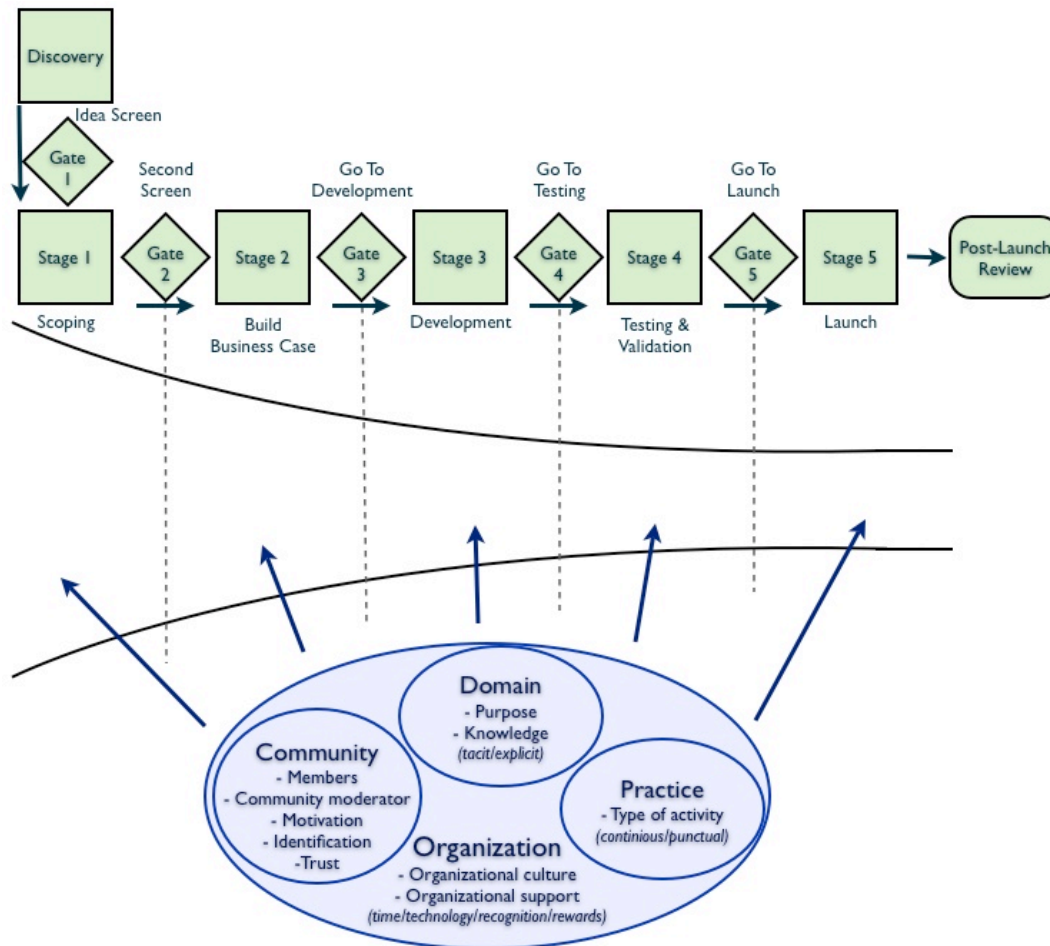


Figure I: Conceptual framework

Main conclusions

In order to create a virtual community that stimulates innovation, the community should consist of functional diverse employees. Since diversity is important for innovation, the community should be large and constitute of different people with different backgrounds and knowledge. However, a major condition for community-based innovation is the presence of motivated and active people, especially during the first stages. Without active employees, it will be extremely difficult to create a successful virtual community to increase the innovation capacity. The use intellectual resources efficiently, community members should be intrinsically motivated. The presence of active people is more important than the presence of people that work with innovation daily. The role of the organization in a virtual employee community is providing support to employees. Therefore management people need to participate in the community, because this demonstrates that they recognize the community as a valuable platform for innovation. However, it is important that a community is a bottom up innovation method, therefore the management should participate, not control. Besides, involving an innovative community moderator in the first stages of the stage gate process improves the effectiveness of the community. It enables people to use the potential of a virtual employee community in its full

extent. Finally, in general, rewards are not considered as useful in general, since communities exist because of voluntary participation. However, providing rewards is dependent on the goal of the community. In some cases it might be beneficial to provide a reward. In idea challenges this is common, first to initiate more contributions and second to thank the best idea contributor.

The innovation process can be divided in generally two parts; in the first part intellectual resources are used and in the second part tangible resources are consumed. Therefore, the main potential for a virtual employee community is the first part of the stage gate process. During the whole innovation process, a virtual employee community is a valuable method for monitoring innovation projects within organizations. When a product is being developed it is important to constantly report the progress made. By doing this, people can easily check the developments of innovations in the organization. Besides, they are able to provide relevant input. The other way around, the project team can also post specific questions in the community that might help them during the development or testing. By using the community as a monitor, the efficiency is increased. In addition to increasing the efficiency of innovation, a virtual employee community also improves the capacity to innovate. This capacity is traditionally dependent on the R&D department, and by uniting employees in a community the capacity is increased. The highest benefit will be gained in the stages idea discovery, scoping and partly during the business case.

The stage ‘idea discovery’ is focused on the identification and generation of opportunities, fresh ideas and novel concepts. Making these ideas visible and accessible to the employees in a community the opportunity to innovate will increase. The idea discovery within a community can be distinguished along two dimensions, as can be seen in figure II. Ideas can emerge as a result of a specific question (idea challenge) initiated by the organization, or it can be the result of community discussions. Furthermore, the distinction is based on the interaction around the idea. With low integration, the individuals in the community submit their ideas to the organization. With a high integration, the virtual employee community is able to start discussions around an idea and can refine it in order to improve the idea.

	Community initiative	Company initiative
High integration	Community based idea development	Community integrated idea challenge
Low integration	Idea box	Pure idea challenge

Figure II: Four forms of idea discovery through employee communities

Scoping is the first and inexpensive homework stage and has the objective to determine the project’s technical and marketplace merits. The use of a community in scoping is a completely new method for developing a product or service. This stage is the most important in creating a higher innovative capacity for an organization. Employee community integration within scoping leads to a faster and more diverse research for fewer costs in less time. The idea is the central

object, and the sociality around that idea leads to interaction between people by providing information and explicit knowledge, like market researches and competitor analyses. By doing this, the idea can be scoped and based on the input of the community members this results into a deeper understanding of the possibilities and opportunities of an idea. As a result of this iterative process, a small group of knowledgeable people will emerge around an idea. They can form the basis for the team that eventually will develop the product.

Finally, during the business case, the role is somewhat smaller, since the idea becomes too specific and it involves quantifying strategic decisions. But still the community is valuable in providing missing information and skills. Based on the group of enthusiasts in the scoping stage a team of dedicated people should be created. The business case can be developed in a sub-community and other community members can trace the progress made. When it appears that still a lot of information is unclear, than the community can be asked for input. After this stage the development is normally taken offline and then the community can be used as a monitor.

Since not a lot of experiences exist with innovative employee communities, this study needs more research. But it can be seen as a theoretical basis for the subject and can serve as a starting method for increasing the innovation capacity. This also indicates the additional value to management literature. This study represents important information for practitioners, for example to capture ideas better or to improve innovation efficiency in organizations. It enables a better organization of the fuzzy front end of the innovation process. This part of the innovation process is often not well developed within organizations.

Table of contents

ABSTRACT	2
1. COMPANY DESCRIPTIONS	9
1.1 INNOVATION FACTORY	9
1.2 ACHMEA	9
1.2.1 <i>The IPower community</i>	10
2. INTRODUCTION	11
2.1 RESEARCH QUESTIONS	12
2.2 OUTLINE	13
3. VIRTUAL EMPLOYEE COMMUNITIES	14
3.1 VIRTUAL BUSINESS COMMUNITIES	15
3.2 FOUR STRUCTURAL ELEMENTS OF VIRTUAL INTERNAL COMMUNITY	15
3.2.1 <i>Domain</i>	16
3.2.2 <i>Community</i>	17
3.2.3 <i>Practice</i>	19
3.2.4 <i>Organization</i>	19
3.3 CONCLUSION	21
4. INNOVATION	22
4.1 THE DIFFERENT STAGES OF THE INNOVATION PROCESS	22
4.2 FOUR ROLES IN THE INNOVATION PROCESS.....	23
4.3 STIMULATING ELEMENTS OF INNOVATION	25
5. CONCEPTUAL FRAMEWORK AND PROPOSITIONS	27
5.1 CONCEPTUAL FRAMEWORK	27
5.2 PROPOSITIONS IN THE CONCEPTUAL FRAMEWORK	28
5.2.1 <i>Domain</i>	28
5.2.2 <i>Community</i>	30
5.2.3 <i>Practice</i>	32
5.2.4 <i>Organization</i>	33
6. METHODOLOGY	35
6.1 RESEARCH METHODS	35
6.1.1 <i>Case study: Achmea</i>	36
6.1.2 <i>Field study</i>	37
6.1.3 <i>Survey</i>	38
6.2 RESEARCH VALIDITY AND RELIABILITY	39
7. EMPIRICAL RESULTS: CASE STUDY, FIELD STUDY AND SURVEY	40
7.1 PROPOSITIONS IN THE CONCEPTUAL FRAMEWORK	40
7.1.1 <i>Domain</i>	40
7.1.2 <i>Community</i>	42
7.1.3 <i>Practice</i>	45
7.1.4 <i>Organization</i>	46
8. DESIGN: EMPLOYEE COMMUNITY BASED INNOVATION	50
8.1 IDEA DISCOVERY	50
8.2 SCOPING.....	52
8.3 BUILDING THE BUSINESS CASE	53
8.4 MONITORING THE PROCESS	54

9. CONCLUSIONS, LIMITATIONS AND FURTHER RESEARCH	55
9.1 CONCLUSIONS AND CONTRIBUTIONS TO THEORY AND PRACTICE	55
9.2 LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH	57
APPENDIX 1 – VIRTUAL COMMUNITIES AND OTHER ORGANIZATIONAL FORMS	66
APPENDIX 2 – INTRINSIC MOTIVATIONS	67
APPENDIX 3 – REWARDS	69
APPENDIX 4 – THE STAGE GATE MODEL	70
APPENDIX 5 – INTERVIEWEES	71
APPENDIX 6 - COMPANY AND COMMUNITY DESCRIPTIONS	72
APPENDIX 7 – TABLE WITH DATA FROM INTERVIEWS	75
APPENDIX 8 – SURVEY	79
APPENDIX 9 – MEAN, RANGE AND STANDARD DEVIATION	81

1. Company descriptions

This paper represents the final project that is part of the master Innovation Management at the Eindhoven University of Technology. This master thesis concerns the use of a virtual employee community for improving the innovation capacity of an organization. But before this topic is introduced, a short introduction will be given on the company at which this research is executed. The master thesis project is carried out in cooperation with Innovation Factory. Innovation Factory is a consultancy company with expertise on internal virtual communities. Innovation Factory is currently running an internal community at Achmea, a financial service provider in The Netherlands. This community served as a context during the full duration of this master thesis project. Therefore, it is useful to provide a full company description.

1.1 Innovation Factory

Basically, Innovation Factory is a consultancy company aiming at making companies more innovative. However, Innovation Factory goes beyond analysis and advice alone in order to deliver true value to their clients. Innovation Factory specializes in organizing for successful innovation and provides methods and tools that enable a company to become more innovative. They help defining innovation strategy, manage innovation, and execute innovation. Besides, Innovation Factory is an expert in developing virtual communities for organizations and helps their clients to implement the vision and tools of a virtual employee community. The main goal is to actually help organizations with innovating, and to assist the client to get the innovation processes running smoothly. The vision within Innovation Factory is that innovation is improved by balancing three enablers of innovation: People, Organization and Support. People are the main drivers for innovation. They need the right competences and skills as well as an open and innovative culture. Besides, the organization, its structure, processes, and policies should promote innovation. And finally, the organization should use tools to support the first two elements, organization and people.

Innovation Factory has one office in Amsterdam and the company was founded and is directed by Han Gerrits, Professor of Technology and Innovation at the Vrije Universiteit Amsterdam. Innovation Factory has both people with a consultancy background as well as people with web-design and –tools capabilities. Currently, twelve people work at Innovation Factory. Clients include UPC, TNT, Corus and Achmea.

1.2 Achmea

Achmea is one of the biggest financial service providers in the Benelux. It provides to companies, institutions and consumers a broad package of insurance, banking and mortgage products and services. It wants to be socially involved, authoritative and an innovative service provider in financial services, assurance and care. The activities of Achmea can be divided in eight divisions that each has its own key activities:

- Care
- Agis
- Pensions
- Direct Distribution
- Intermediate Distribution
- Banking Distribution
- Social Security
- Europe

Achmea is part of Eureko, a large European organization in the financial service provider market and has activities in twelve European countries, such as Greece, Ireland, Turkey and Slovakia. The Achmea Group officially exists since January 1995 as a result of a merger between Zilveren Kruis and Avéro Centraal Beheer Group. The Achmea Group comprises a number of companies, for example Centraal Beheer Achmea, Zilveren Kruis, Interpolis, FBTO and Staalbankiers. In total 24.000 people work for Achmea. Since Achmea is an organization that consists of a lot of divisions, a lot of different cultures exist within Achmea.

Last years Achmea was aiming at and developing their operational excellence. Meanwhile Achmea is one of largest and most successful insurers of the Netherlands. And in order to secure this top position, in February 2007 Achmea started a new department with the aim to stimulate innovation within Achmea and to make it visible throughout the organization. Achmea is a company with a lot of different divisions. These divisions are an inheritance of a lot of takeovers and mergers in the past. Employees in these divisions did not know each other and they did not know what projects people in other divisions were doing. Therefore creating a higher employee engagement is a task for Achmea. Innovation Factory set up an online platform for Achmea to stimulate innovation and for connecting people and letting them share knowledge and content: 1Power.

1.2.1 The 1Power community

Recently the executive board of Achmea has identified that within Achmea a lot of knowledge is available that is not shared. Therefore, Achmea might miss opportunities in the field of innovation. Achmea aims at utilizing this knowledge by connecting people throughout all divisions of Achmea. Therefore, they have set up 1Power. 1Power is a virtual employee community that pursues to enhance employee engagement and stimulate innovation. The goal of 1Power is to connect all innovative and active people within Achmea and by doing this, a second goal is to improve the innovation capacity of Achmea. Within the 1Power community knowledge and experiences are shared and people of Achmea are connected to each other. 1Power members can post, read and share ideas and content resulting in online discussions aimed at innovation.

Currently, the community is used for connecting people and to ask questions on the forum to other employees. Within the community a lot of discussions on innovative activities and topics are being held. People start seeing the value that 1Power can provide to their work and daily activities. But since a virtual employee community is extremely new and no extensive experiences and literature exist in this field, research is needed on how a virtual employee community can increase the innovation capacity. To do this, 1Power is extremely valuable for investigating the innovative potential of an employee community, since this is one of the most progressive virtual employee communities. The community serves as an interesting context to this research.

2. Introduction

For companies that pursue continuous innovation, the ideas and insights of their employees are of crucial importance (Tang, 1998; Boeddrich, 2004; Krueger & Killham, 2006). The principle is that the own people often have the seeds of great new products within them (Cooper, 2001). Bottom-up innovative initiatives are becoming more and more important in modern multinationals (Koper et al., 2004). By harnessing the creative energy of the entire group, unexpected outcomes are often the result. The integration of employees, their knowledge and skills is a fundamental enabler for innovation in organizations (Tang, 1998). This is caused by the fact that innovations start with the inventiveness of creative people but also because of the commitment of people to turn an idea into a concrete enhancement. This commitment is high among employees that are developing their own ideas. Therefore, it is important that the person who comes with an idea is included in the group of employees who develop it (Nijhof et al., 2002). This increases the chances of realization of the potential innovation.

Due to the economic downturn, companies are searching for new and cheaper methods and tools that can change the company. These times are seen as the perfect time for a major change within companies; companies need to seize this period to become more innovative. Often organizations jump into virtual customer communities, however they often forget the potential of their employees. Organizations want to collaborate with customers to become more innovative (Fuller et al., 2006; Ebner et al., 2008), even though they are not able to cooperate with their own employees. Therefore it is particular important to investigate the potentials of a virtual employee community. Basically, it is a method for incorporating employees and to use their knowledge to benefit the innovation capacity of the company by sharing what they know openly with others (Hall, 2001a). It is seen as an innovative way to manage knowledge and sustain innovation (Dube et al., 2006; Kodama, 2006; Chow et al., 2007). A generally accepted definition for knowledge intensive virtual communities is the definition of Communities of Practice (Wenger, 1998; Hildreth et al., 2000; Wellman, 2001; Ardichvili, 2008): ‘a group of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis’ (Wenger et al., 2002, p.4). Regarding virtual employee communities, this group of people is a group of employees of a company. Within organizations, a virtual community connects employees and managers from all departments of the organization and enables them to exchange knowledge and experiences in that particular area (Saint-Onge & Wallace, 2003; Hildreth & Kimble, 2004).

The capacity to innovate is currently one of the most critical elements in sustaining competitive. The innovation process is often represented as the New Product Development (NPD) process (Kotler, 2003). The essence of NPD is the creation of new knowledge aimed at using this knowledge and interaction to solve problems and create products that have value in the marketplace (Chow et al., 2007). By integrating employees across diverse areas that have input and responsibilities during New Product Development (NPD) and commercialization processes, the NPD process can be accelerated (Verona, 1999; Du Plessis, 2008). Most innovations are not the result of a single inventor but rather of collaboration processes where many employees contribute their individual knowledge, experiences and strengths (Franke & Shah, 2003). The transfer of tacit to explicit knowledge is an important source for innovation. To steer innovation, tacit knowledge of employees is highly important (Du Plessis, 2008).

The main motivation why the management deliberately establishes virtual employee communities is to improve knowledge sharing among employees and to foster a creative and innovative organizational culture (Chiu et al., 2006; Chow et al., 2007). Virtual employee communities play an important role not only in knowledge management and the whole knowledge management life cycle, but also in the innovation process (Du Plessis, 2008). Employees throughout the company all possess their specific knowledge, but besides this specific knowledge, employees all possess ideas unrelated to their function in a company. When this can be captured in an employee community, this can lead to an increased innovation capacity (Albors et al., 2008; Ardichvili, 2008). Since the capacity of an R&D department is limited, an employee community can provide this capacity to come up with innovative solutions (Du Plessis, 2008). It enables new ways of collaboration and changes the way organizations harness knowledge and their capability to innovate (Agerfalk et al., 2008). Consequently, new and exceptional knowledge can be created. A virtual community creates an environment that is rich of innovation and creativity (Hildreth & Kimble, 2004).

Although many organizations have started to experiment with virtual communities, there is little theoretically grounded knowledge on how to develop, manage and improve such communities. A lot of research has been on how customer communities can support organizational processes (Nambisan, 2002; Fuller et al., 2006; Fuller & Matzler, 2007). Moreover, from literature it appeared that virtual employee communities have another potential than virtual customer communities (Koh et al., 2007; Agerfalk, 2008). Virtual employee communities provide access to all knowledge available within organization. Therefore, in literature, virtual employee communities are often connected to knowledge management (Wang & Lai, 2006; Ardichvili, 2008). Besides, research is done on how virtual employee communities can be supported within organizations (Scarbrough, 2003; Kwok & Gao, 2004; Chiu et al., 2006). However, the potential of employee communities in the innovation process and activities of an organization is not investigated in detail in literature (Chow et al., 2007; Ebner et al., 2008). Innovative employee communities like 1Power are rather new and it appears to be difficult to nurture them, since fostering and sustaining members' interest may require greater effort (Dube et al., 2006). Research towards understanding how such a community can support innovation is necessary. In this master thesis an attempt is undertaken to bridge this literature gap regarding the integration of employee communities in the innovation process. This paper will address several stimulating elements and factors that lead to a more effective community.

2.1 Research questions

The main topic of this study is the use of a virtual employee community to support the innovation capacity of a company. It is said to be that the reason why companies are unable to innovate successfully often can be linked to limited capacity of R&D departments. For an R&D department it is impossible to investigate all ideas and opportunities that are available in the market and organization. This research will create a deeper insight in which phase(s) a community can provide the highest value for innovation. The main research question is formulated as followed:

How can a virtual employee community support and improve the innovation capacity of a company?

For doing solid research it is important to develop a theoretical perspective prior to research in practice (Saunders et al., 2000). Therefore, to answer the research question, first insights from existing literature are gathered to create a structured basis. This involves both innovation literature and virtual community literature. A more comprehensive understanding on the relation between virtual communities and innovation will be created. Besides, a theoretical framework will be developed that contains the structural elements of a virtual employee community that are likely to influence community performance. These elements are necessary to give some practical guidelines on how a virtual employee community can be used to improve the innovation capacity of a company. The following sub-questions are stated:

1. *What is a virtual employee community?*
2. *What structural elements constitute a virtual employee community?*
3. *How is a virtual employee community related to innovation?*
4. *How can a virtual employee community be integrated in the different phases of the innovation process?*
5. *Which elements facilitate a virtual employee community to support this integration?*

2.2 Outline

To provide a better understanding on virtual communities, chapter 3 will introduce the topic and will provide an in-depth understanding of the structural elements. Chapter 4 will relate communities to innovation, because clear theoretical literature on this relation is missing, this chapter will discuss the innovative value of employee communities. The theoretical framework and propositions are provided in chapter 5. The methodology is discussed in chapter 6. After the methodology the exploration of practice is described, which consists of a case study, a field study and a small survey. In chapter 7 the propositions are tested by describing the results of the case study, the field study and the survey. A method for the integration of a virtual employee community in the innovation process is presented in chapter 8. Finally, this master thesis is closed in chapter 9 with a conclusion involving all implications from this research. That chapter also highlights the scientific relevance of this thesis, the managerial implications and suggestions for further research.

NB. In this master thesis, the terms virtual employee community and virtual internal community will be used interchangeably.

3. Virtual employee communities

Before engaging into the research objective of this master thesis, first a better insight in virtual employee communities is created. Communities exist both in real life and virtually. A real life community is bounded to a geographic location. Virtual communities use networked technology, such as Internet and Web 2.0 tools, to establish collaboration across geographical distributed participants and different time zones (Albors et al., 2008). This paper focuses on virtual communities. Virtual communities can be seen as an arrangement between people with shared interests (communities of interest), between customers from a certain organization (customer communities) or between employees of an organization (employee communities). Compared to virtual communities in general, the aspect that makes an employee community is the group of people that constitute the community; these are employees. Virtual internal communities are often described based on community of practice (CoP) literature (Lave & Wenger, 1991; Wellman, 2001; Du Plessis, 2008). Initially, CoPs were real life communities, but now, due to the proliferation of online collaboration tools, communities are often online aggregations of people within an organization (Ardichvili, 2008). The formal definition of CoPs developed by Wenger (Wenger, 1998; Wenger et al., 2002) is generally accepted: Communities of practice are 'groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis' (Wenger et al., 2002, p.4). The value of a community lies in the creation, sharing, harvesting and leveraging of knowledge (Du Plessis, 2008). CoPs appeared to be significant sources of innovation because of their constant adaptation to changing membership and changing circumstances (Von Hippel, 2005). Members are interacting on a regular basis in order to improve their performance (Michaelides & Morton, 2008). However, members do not necessarily work together daily, but they find value in their interactions (Du Plessis, 2008).

Just as a real life community a virtual one is a group of people with a common interest, however the group does not necessarily need a common geographic location (Rothaermel & Sugiyama, 2001; Sands, 2003). Therefore, in a virtual community the border of who is a member and who is not is less clear than in physical communities (Johnson, 2001). In fact the community itself is just a platform, its existence is apparent because of knowledge exchange and interaction between members (Wenger, 1998; Hildreth & Kimble, 2004). It might be the case that members in a virtual community never meet (Hildreth & Kimble, 2004). A virtual community is organized around a task, topic or idea. It is a socio-technical interaction network, which includes people, data, documents and messages (Ardichvili, 2008). This leads to a higher individual control, because general norms do not dominate as much as in traditional communities (Johnson, 2001).

An important aspect of virtual communities is building relationships between members: online social networking. Social networks offer people the opportunity to make online connections with people they already know from the offline world or with people they have never met before. The strength of relationships between staff members unleashes the full operational potential of an organization (Du Plessis, 2008). Through internal communities social networks are built in organizations in a natural, unforced way. Online network sociality strongly influences the extent to which interpersonal knowledge sharing occurs (Chiu et al., 2006). Knowledge is static, but within a social network knowledge evolves with the person that possesses that knowledge. Social networks often have connecting with people and building relationships as a main activity. Social

networks can also mature around objects: object-centered sociality (Breslin & Decker, 2007). In object-centered sociality people are interacting with each other around a certain object; e.g. YouTube around videos and Flickr around pictures.

3.1 *Virtual business communities*

Now the basis of a virtual community is discussed, we discuss it in a business context. Opposed to entertainment or social virtual communities, virtual business communities link together cross-functional people that are focusing on the same set of business processes (Chow et al., 2007). A community does not adhere to organizational boundaries and differs fundamentally from traditional ways of working (Wenger et al., 2002). This indicates the fundamental difference between CoPs and other organizational forms (see appendix 1). Opposed to virtual teams, membership is based on participation rather than on official status. Besides, opposed to a virtual community, a virtual team normally has a specific goal or is attached to a certain project (Wellman, 2001). For communities, it is important that the virtual location co-exists with the physical locations and departments of a company (Kimble et al., 2000); therefore an organization has to operate in two spaces: the physical and the virtual one (Wenger, 1998). People physically located in different places meet each other online. Furthermore, participation in an employee community is usually voluntary and dependent on the willingness of the employees.

More recently, a CoP is being associated with knowledge management in and between organizations. This is based on the tendency that people have begun to see communities as ways of developing social capital, new knowledge, stimulating innovation, or sharing existing tacit knowledge within an organization. Managers recognized the need to strategically manage knowledge available throughout the company. The community view recognizes that knowledge has to be continuously negotiated through interactive social networking processes (Wenger & Snyder, 2000).

Within organizations, communities can evolve in two ways (Dube et al., 2006). First, they can emerge naturally by the effort of a number of interested employees that unite to interact around a specific topic, interest or practice (bottom-up approach). Second, strategic (or top-down approach) communities are deliberately established by the management board who define its purpose and select its key members. In this master thesis, the second type of employee community is of interest. Since top-down created communities are difficult to foster and to apply for a specific purpose (Dube et al., 2006), a complete analysis of all structural elements is necessary.

3.2 *Four structural elements of virtual internal community*

Basically, every community is characterized by three structural elements (Wenger, 1998). The combination of domain, community, and practice is what enables communities of practice to manage knowledge (Wenger, 2004). This is a commonly adopted method for studying virtual business communities (Wellman, 2001; Agerfalk, 2008). When all three fields are sound, the community is able to successfully create new knowledge and lead to new ideas that can improve the innovation capacity of a company. For virtual business community, a fourth element can be identified: organization (Saint-Onge & Wallace, 2003). This is the company that runs or is part of the community. So, to investigate the potentials of a virtual employee community, four

elements need to be studied: domain, community, practice and organization. This model is valuable since it addresses both basic factors as facilitating factors. Besides, this model can be easily extended with additional factors as part of the four elements. With Wenger's (1998; 2004) model as the point of departure, factors that facilitate the four elements are added on the basis of their general acceptance in virtual community research (see figure 1). This is aimed at modeling the success and fail factors of the implementation of virtual communities within organizations.



Figure 1: Structural elements and its factors of a community

3.2.1 Domain

The domain is the specific topic that brings the members together and defines the key issues that members need to address; it is a sense of common identity for a community (Wenger, 2004). The domain is related to knowledge that is shared around the topic of the community. A community is not just a group of people, it truly has content, and therefore membership is a commitment to the domain (Wenger, 1998). The domain is the source of inspiration for members to participate and make a contribution to the community.

Purpose

When strategically setting up a community, the first step is to translate the strategy into a set of domains of knowledge (Wenger, 2004). Therefore, it is important that the community serves a certain purpose. The problem is that a proper domain cannot be a core competence, like service excellence. It needs to connect a strategic end to the daily activities of the community members in order to trigger them to participate (Wenger, 2004). The community has to put its efforts in directing the community to one clear vision, in order to create a higher shared value (Rothaermel & Sugiyama, 2001; Du Plessis, 2008). Therefore, when designing a community for a specific purpose it is important that the community members know what the knowledge domain is (Ardichvili et al., 2003).

Knowledge

Within communities, knowledge, information and experiences are shared. The knowledge that is shared is dependent on the community domain (Sawhney et al., 2005). Since this master thesis involves strategic internal communities, the organization should set the domain of the community, but on the other side it is important that the employees themselves decide on what knowledge to share in this domain. It is necessary to establish and communicate clear guidelines for acceptable and non-acceptable postings (Garfield, 2006). This overcomes the feeling of employees that their posting might not be important or relevant enough. Besides, contextual

details should be included with the knowledge to stimulate an effective usage of a community (Kwok & Gao, 2004). Consequently, new and exceptional knowledge can be created.

Knowledge can be divided in two types: explicit and tacit. Explicit knowledge can be coded in writing or symbols (Osterloh & Frey, 2000); it is knowledge in numbers or actual facts. Tacit knowledge is acquired by and stored within individuals and cannot be easily transferred as a separate entity. The transfer of tacit knowledge to explicit knowledge is not yet well understood (Du Plessis, 2008), but this is one of the areas where communities are important.

3.2.2 Community

The community is the group of people, the members, which are interested in the domain. In pursuing their interest in the domain, members engage in joint activities and discussions, help each other, share information and build relationships that enable them to learn (Wenger et al., 2002).. The community forms the social context in which knowledge development takes place (Koh et al., 2007).

Members

An essential difference between managing organizations and virtual internal business communities is that communities depend on members' contributions (Hagel & Armstrong, 1997; Agerfalk, 2008). Without the active participation of the community members knowledge sharing and creation becomes impossible (Ruppel & Harrington, 2001; Sawhney et al., 2005; Ardichvili, 2008; Shen & Cho, 2008). A community normally is constructed of a core group of members that supply social and intellectual leadership and a group of peripheral members (lurkers). In general it is considered that only one percent of members are active in posting and blogging. It is important to consider which employees are useful for that strategic purpose. This involves the indication of which attributes members should have to support that purpose. Two dimensions can be distinguished regarding type of members: (1) professional knowledge and (2) personal characteristics. The professional dimension is related to the function someone has within an organization (e.g. marketing, technical) and the personal dimension is related to characteristics like enthusiasm, creativity and interests in certain fields.

Another aspect that needs to be considered in strategic internal communities is the community size (Butler et al., 2002; Tedjamulia et al, 2005; Bross et al., 2007). In general, a large member-base is assumed to be beneficial, because this increases the amount of knowledge and its diversity available and can increase the competitive advantage of a company (Voelpel et al., 2008). However, members can experience difficulties in gathering valuable information when a community is very large (McLure-Wasko & Faraj, 2000). Small communities build an intimacy that leads to fuller disclosure and richer insights. The optimal size of a virtual community regarding effective communication is rather difficult to estimate and seems to be related to the needs and the effort involved (Yeoman et al., 2003). Also, the optimal community size is highly dependent on the purposes attached to the community. To ensure an ongoing community survival and encourage members to continue to interact, a critical mass should be maintained. The critical mass is achieved when the active contributor base in a community is large enough to both satisfy the needs of the contributors as well as those of the lurkers (Tedjamulia et al., 2005).

Community moderator

An effective community moderator is necessary for nurturing and sustaining a virtual community (Wenger, 1998; Kodama, 2006; Johnson, 2001; Koper et al., 2004; Koh et al, 2007). Moderator

involvement is needed for fostering members' active involvement in posting and viewing community content (Koh et al., 2007). He/she is ensuring adequate levels of community activity and membership growth. Community moderation is different from management support; a community moderator is taking action aimed at increasing the community's performance; management support is rather facilitating, as will be discussed later. For example, a community moderator can stimulate other members to participate in a discussion about a certain proposed idea (Kodama, 2001). The challenge for community moderators is to explore and treat the underlying needs of the community's members (Koh et al., 2007). Furthermore, he should guide the community more or less invisibly to creatively develop and refine accumulated community competencies (Kodama, 2001).

Motivation

A major requirement for building a successful community is its members' willingness to use the community as a source of new knowledge (Ardichvili et al., 2003). Therefore, a search for the cause and drive of human behavior in communities is vital. Basically, motivation is the reason for engaging in a particular behavior, a community for example. These reasons can be extrinsic as well as intrinsic. Extrinsic motivation is based on external incentives and often refers to rewards (which will be discussed later); it refers to doing something because it leads to a separable outcome (Ryan & Deci, 2000). Intrinsic motivation refers to doing something because it is inherently interesting or enjoyable (Ryan & Deci, 2000); it also includes the desire to feel competent and self-determinant (Hars & Ou, 2002). In general, people participate in communities based on intrinsic motivation. The most common motivations for participation in communities can be found in appendix 2.

Identification

Identification is a feeling of how someone can recognize itself with someone or something else (Ardichvili, 2008). Regarding communities, it is the sense of belonging and positive feeling toward a virtual community (Chiu et al., 2006). Identification is helpful in explaining the willingness to maintain committed to a virtual community. Due to a positive identification community members exchange information and increase its depth and breadth. Identification is also regarded as a motivational issue (Jian & Jeffres, 2006; Ardichvili, 2008). The members' identification within the community and with one another can be strengthened by offline events (Koh et al., 2007). Finally, identification enhances the perception of social unity and togetherness (Chiu et al., 2006).

Trust

The absence of face-to-face contact makes the sources of trust in virtual communities fundamentally different. In the physical world, trust is developed through our experience with others, information we have received about them and how they appear to us (Ishaya & Mundy, 2004). In a virtual community, trust is being developed between an individual and the group of strangers, eventually providing a positive result for the community as a whole (Ridings et al., 2002). Trust has been described as the key factor for participation in virtual communities (Kimble et al., 2000; Ridings et al., 2002; Chiu et al., 2006; Ardichvili, 2008). It is particularly important in behaviors such as knowledge sharing in a virtual community (Chiu et al., 2006).

In an internal organizational community, two types of trust are important: personal knowledge-based trust and institution-based trust (Ardichvili, 2008). Personal knowledge-based trust stems

from social interactions between trustor and trustee; can we predict what to expect from the other and how will the other behave in a certain situation. On the other hand, institution-based trust (also known as system trust) is related to organizational structures and procedures that should ensure trustworthy behavior and protect members from negative consequences of administrative mistakes (Ardichvili, 2008). Organizations should make the organizational expectations and procedures about the community transparent through clear and accessible communication of these expectations and rules (Ardichvili et al., 2003). This makes members feel safe to depend on that community or organization.

3.2.3 Practice

The practice refers to the set of frameworks, experiences, stories, styles, ways of addressing recurring problems and everything members share. Where the domain relates to the topic of the community, the practice is how the specific knowledge is developed and shared (Wenger, 1998). The practice accumulates practical knowledge in the domain more heavily than individuals. The community has to find a balance between joint activities and the construction of documents or tools (Wenger et al., 2002).

Type of activity

To put the domain of a community into action it is important that the community members participate around that domain and specific purpose. It is important to support their mutual engagement in a process of practice development. This mutual engagement in the practice makes community participation directly relevant to the work of members (Wenger, 2004). When individuals have a common practice, knowledge readily flows across that practice, enabling individuals to create social networks to support knowledge exchange (McLure-Wasko & Faraj, 2005). Participation comprises activities in a community that include, among other things, posting questions on forums, engaging in live chats, participating in synchronous conferencing discussion sessions, and providing asynchronous answers and feedback in discussion threads (Ardichvili et al., 2003). However, participation also means consuming content, since it may encompass engagement, thought and reflection; if members do not regularly read the material that others provide, the online group will not remain viable. Knowledge sharing activities in communities can be easily promoted when members share visions and goals (Kwok & Gao, 2004). To support collaboration in a community it is common to organize events like conferences or workshops connected to discussion forums (Koper et al., 2004). In the success of a community, it appears to be important to organize such face-to-face (offline) events (Wenger et al., 2002).

3.2.4 Organization

The organization is the company or group of companies of which the community is part. Communities within organizations are part of the organization but they do not adhere to the formal structure of the organization (Agerfalk, 2008). Communities become important to the functioning of a company, and even become crucial to companies that recognize knowledge as a key asset (Wenger, 2004).

Organizational culture

One of the most important conditions to a successful employee community is a stimulating

organizational culture (Ruppel & Harrington, 2001; Saint-Onge & Wallace, 2003). The organizational culture should encourage mutually supportive relationships between employees (Ardichvili et al., 2003). Employee communities involve a change in organizational culture; it should provide support and incentives as well as encourage knowledge-related activities by creating environments for knowledge exchange and innovation (Janz & Prasarnphanich, 2003). Organizations with a centralized, bureaucratic management style can restrain new knowledge creation, whereas a flexible, decentralized organizational structure encourages knowledge sharing, and particularly tacit knowledge (Sharratt & Usoro, 2003). In the most ideal way, a virtual community should be an intrinsic part of the organization's culture and the way a company operates everyday.

Organizational support

Since employees are not self-motivated to join a top-down initiated community (Dube et al., 2006; Koh et al., 2007), the organization must provide more than casual support to function optimally (Wenger, 2004). The organization starts a community with a specific purpose; this purpose might be different from what employees seek in their daily activities. The support should enable other people to see the value of a particular community (Saint-Onge & Wallace, 2003). Without this support, communities are unlikely to achieve their full potential (Wenger et al., 2002). The company should provide resources to the internal community in order to lead to a successful use of the community (Millen et al., 2002). These resources can be translated into organizational activities that support employees using the community:

Time: In order to support a community, an organization can provide their members time. This time can be provided in two forms, online and offline. Firstly, online time refers to the participation of members in the community. The extent to which an employee participates in a community is constraint by their time available (Bross et al., 2007) and the part of this time they are willing to spend in the community. Employees participate in internal communities additional to their regular tasks, and since participation in virtual communities can be quite time consuming (McLure-Wasko & Faraj, 2000) employees might choose not to participate. Voluntary participation does not fit with this culture. Secondly, offline time refers to the promotion of the community by organizing offline events and conferences (Millen et al., 2002). By organizing an offline event, like a workshop, the members' identification within the community and with other members can be strengthened (Koh et al., 2007). Offline interaction increases the social presence of community members and can positively influence online community activity (Bross et al., 2007).

Technology: The foundation of the community's architecture is the technology infrastructure that supports collaboration (Saint-Onge & Wallace, 2003); funding this supportive community technology is part of the organizational support. Supporting tools and technology make online group communication possible and support the group's interactions. When designing online communities, two aspects are of importance: usability and sociability (Koper et al., 2004). The community should be easy to use, both practical as well as technological, and it should enable members to share information and documents easily (Wang & Fesenmaier, 2003). Sociability governs the social interactions in a community (Koper et al., 2004); it enables people to find each other and exchange knowledge.

Promotion/recognition: The organization needs to encourage the virtual employee community to continue to develop and evolve to meet its own and the organization's purpose. To enable this the community needs promotion and recognition. Promotion refers to internal marketing of the virtual community. The importance and usefulness of a community should be promoted. To attract employees, they need to see the personal value of it, and therefore promotion should aim at increasing the perceived usefulness of the community (Koh et al., 2007). Both the community itself as well as their members need to be recognized for their contribution to the organization's success (Millen et al., 2002; Saint-Onge & Wallace, 2003). Recognition is also essential within the community itself; visibility gained through participation in virtual communities provides recognition for a person's expertise and knowledge on a subject and gives rise to psychic payoffs such as self-efficacy and self-esteem (Butler et al., 2002). For recognition on the company's level, achieved successes need to be communicated throughout the company.

Rewards: Companies can stimulate participation by providing rewards (Bartol & Srivastava, 2002; Ardichvili, 2008). Rewards can be seen as a form of recognition or sponsoring effort. Generally, in a community the norm exists to assist each other free of charge (Franke & Shah, 2003). Therefore, rewards normally do not play an important role in communities. However, regarding strategic employee communities, rewards can play a role and can stimulate employees to participate. Community members that are not self-motivated, are normally motivated by rewards. Rewards can be distinguished in tangible and intangible rewards. Tangible rewards are often monetary or in the form of some kind of present. Intangible rewards are non-physical, for example status and career advancement. According to Wenger et al. (2002) one of the best rewards is providing intangible rewards. An effective reward is bound to three key requirements (Agarwal, 1998). Rewards should be (1) dependent on specific behaviors; (2) equitable (ratio outcomes and inputs); and (3) valuable to employees. It is rather difficult for companies to reward behaviors in a community because these are informal arrangements among participants (Bartol & Srivastava, 2002). Even though a reward can be detrimental, when it is informative, the extrinsic incentive is able to enhance the intrinsic motivation (Tedjamulia et al., 2005); this is called the crowding-in effect. Therefore, an organization should provide rewards in a way that not hampers intrinsic motivation. Also, it should stimulate collective action (Jeppesen & Frederiksen, 2006). Literature describes several rewards, which can be found in appendix 3.

3.3 Conclusion

As discussed in this chapter, a community exists because of knowledge exchange and interaction between its members (Wenger, 1998; Hildreth & Kimble, 2004). To enable this, a community can be structured in four structural elements. Communities can be incorporated for several purposes. For this research this involves increasing the innovation capacity of a company. Companies are setting up employee communities as a way to improve knowledge management and to improve the communication between employees. To jump into this research it is important to first review existing literature on what drives innovation within organizations and how this can be translated to a virtual employee community for innovation. The following chapter reviews literature on innovation within organizations.

4. Innovation

Now, we know what a virtual employee community is, it is useful to develop a better understanding of innovation in relation to a virtual employee community. Innovation represents the single largest opportunity for companies to differentiate their businesses (Chow et al., 2007). Most innovations are the result of collaboration processes where many individuals contribute their individual knowledge, experiences and strengths (Franke & Shah, 2003). Innovation is defined in most innovation literature as something that has economic impact and it can be related to new products, services or processes. Innovations are seen as the introduction of new products, services or processes that provide added value to the customer and thus have an economic impact (Goffin & Mitchell, 2005). In this paper innovation is basically considered as the introduction of products or services that are new to the organization (Goffin & Mitchell, 2005), but also improvements on existing services and products are seen as innovation. Innovations are normally organized according to an innovation process that is often mentioned as the New Product Development (NPD) process (Kotler, 2003). NPD is the process by which an organization uses its resources and capabilities to create a new product or improve an existing one (Cooper, 2003). The essence of NPD is the creation of new knowledge aimed at using this knowledge and interaction to solve problems and create products that have value in the marketplace (Chow et al., 2007). It is a business process that is highly knowledge-intensive and therefore involving a virtual employee community can be exceedingly beneficial. Various models exist to represent the various stages of the NPD process, in this paper the stage gate model is chosen. This will be discussed into more detail in the next section.

Communities combine two important resources for innovation: knowledge and people (Dougherty, 1992). The core of a firm's competitive advantage is embedded in the intangible, tacit knowledge of its employees (Du Plessis, 2008), and these competencies do not exist apart from the people who develop them (Dougherty, 1992). Even though innovation and knowledge creation have become major topics in organizations, literature on the effect of virtual employee communities on the innovation capacity of a company is rather limited. The scarcely available literature available on communities for innovation is mostly applied to customer communities (Chan & Lee, 2004; Sawhney et al., 2005; Fuller et al., 2006). The role of customer communities is often supportive, but sometimes these are used to discover viable ideas and new demands as input to the innovation process. The literature base on virtual customer communities is not sufficient for understanding the role of virtual employee communities in innovation. Within virtual employee communities a lot more intensive knowledge and skills are available, besides virtual employee communities are often linked to knowledge management (Agerfalk et al., 2008). Knowledge management is the most important input to innovation (Jantunen, 2005) and consequently is a way of keeping up-to-date with developments in the market and technology (Du Plessis, 2008). Since the potential of a virtual employee community is relatively unclear in literature it useful to connect the literature fields of innovation and virtual communities.

4.1 *The different stages of the innovation process*

For connecting the field of a virtual employee community and innovation it is helpful to understand the innovation process (Ebner et al., 2008). Various models exist, ranging from three step methods to 10 or more step methods. When a virtual employee community is integrated in

the NPD process, it should be clear what knowledge is needed in every phase. Therefore, a constraint for a useful model in this research is that it has clear and identifiable steps. First, this is to overcome discussions during data collection on the various phases and its tasks. And secondly, it enables an easier identification of tasks that potentially can be outsourced to the community. A model that satisfies this prerequisite is the stage-gate model by Cooper (2001) (see figure 2). The stage-gate process breaks the NPD process into discrete and identifiable stages with each stage consisting of a set of prescribed activities. The model consists of one initial stage (idea discovery) followed by five stages (scoping, building business case, development, testing/validation and launch). Each stage is designed to gather information needed to progress the project to the next gate or decision point. Gates have a common format and are decision points that do not involve new activities. A more extensive explanation of its stages and gates can be found in appendix 4. The stage gate model is a clear and systemic model for representing the innovation process and it can be adapted to all kinds of companies. Besides, according to Innovation Factory, the stage-gate model is very common and it is used very often in all kinds of businesses. A disadvantage often mentioned in literature is that it reduces the flexibility needed for new products (Sethi & Iqbal, 2008). But when used in community-based innovation, this inflexibility leads to providing clear guidelines on tasks for developing an idea in a community. It can guide unstructured interaction within a community to a more structured result. This will not restrict the interactivity since these guidelines are important at the backside of a community and do not influence the interaction between members. Finally, it is important to highlight that this model serves as a context for translating the innovation process to an employee community.

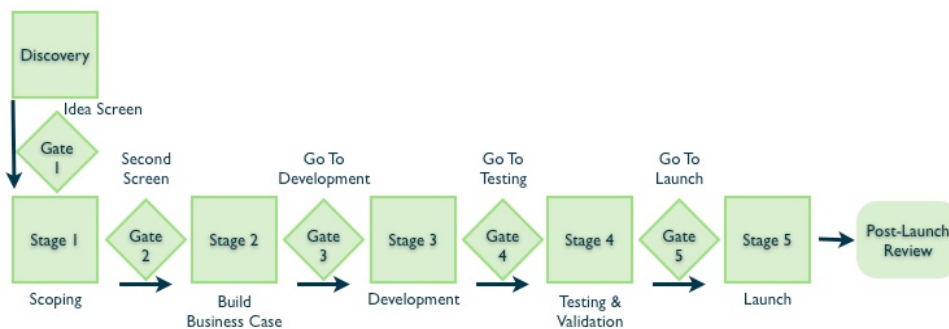


Figure 2: The Stage Gate Model (Cooper, 2003)

The innovation process can be generally divided in two parts, the fuzzy front end and the development or project part (Murphy & Kumar, 1997; Koen et al., 2002). In the first part (idea discovery, scoping and partly the business case) it is important to use intellectual resources (Boeddrich, 2004) and to stimulate creativity and interaction between different knowledge fields. The second part (partly the business case, and the development, testing/validation and launch) is goal oriented and involves the consumption of tangible resource. This phase is executed by a certain team and is much more formal and structured (Cooper, 2003). Organizations focus much more on the second part (Boeddrich, 2004). The fuzzy front end is often regarded as the greatest weakness in product innovation in organizations (Khurana & Rosenthal, 1997).

4.2 *Four roles in the innovation process*

The innovative potential of online communities can be utilized throughout all stages of the product innovation process (Ebner et al., 2008). Organizations realize that knowledge can only

create value when it is shared inside and assimilated through the company and its innovation process. Virtual employee communities enable to access and harness knowledge within employees and change the capability of organizations to innovate. ‘Smart’ organizations can take advantage of this collective capability to share knowledge and drive innovation (Agerfalk et al., 2008). Mainly based on virtual customer communities literature (Nambisan, 2002; Fuller et al., 2006) and partly on employee communities (Koper et al., 2004; Andriessen, 2006), four roles in the NPD process can be distinguished (see figure 3). The classification of the four roles is based on the nature of knowledge that is needed in the innovation process. These roles are: a virtual community as a (1) resource, (2) co-creator, (3) user and (4) learning entity. The first three roles are based on customer community literature and the fourth role is based communities of practice theory. The roles will be discussed in the context of virtual employee communities.

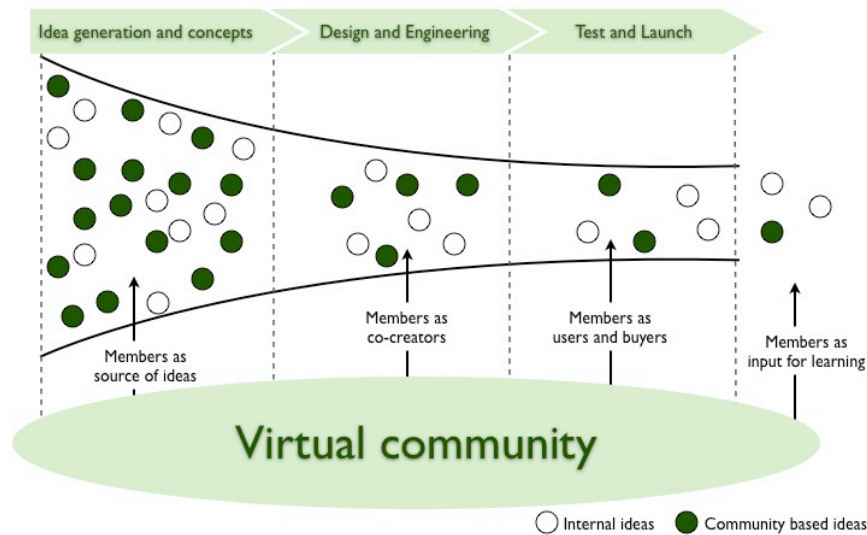


Figure 3: Utilization of Virtual Communities in NPD (adapted from Fuller et al., 2006)

The first role, a virtual community as a resource, is focused on the identification and generation of opportunities, new ideas and novel concepts. All innovations originate from ideas (Boeddrich, 2004). Traditionally, the R&D department is the main driver for this. Since the capacity of an R&D department is limited, a virtual employee community can provide the capability to come up with innovative solutions (Du Plessis, 2008). Employees throughout the company can be a source of ideas for improving production, products and services. Making the distributed ideas visible and conveniently accessible to employees in a virtual community will increase the possibility to innovate (Ebner et al., 2008). Following this iterative process the most promising ideas and concepts can be selected out of a range of alternatives and then be processed further. Each member can contribute ideas, connect with other idea contributors, and elaborate on ideas in cooperation with other members. Members supply their creativity and problem solving skills by having discussions on one another’s ideas (Agerfalk et al., 2008). By sharing knowledge, an idea can be selected as a potential for a new product. According to two researches (Hildreth & Kimble, 2004; Andriessen, 2006) the main potential of virtual communities for innovation is to capture and select ideas.

Secondly, a virtual community can also play a role as a co-creator. In this role their participation ranges from product design to product development activities. Each member is able to provide

input to a certain product or service design based on its own experience; tacit knowledge can play an important role. In order to play a role as co-creator higher levels of product/technology knowledge are needed (Nambisan, 2002). Therefore, employee communities can provide input on technical specifications and product design by contributing their creativity and problem solving skills. Community members do this by elaborating a detailed product concept, and evaluating or challenging it, but they can also discuss and improve optional solution details.

In the third role as a user, communities can provide two valuable inputs: product testing and product support (Fuller et al., 2006). Employees can test and experience the new product features by running simulations. The community members provide support and their feedback on the use of the product or service; in this case, employees are seen as experimental markets for product concept. Involving employees enables organizations to detect product flaws before it is launched to customers. Employees in different parts of the organization can be called upon to troubleshoot or provide support to other employees in the organization. This idea is based on involving lead users in software products (Nambisan, 2002). Related to this, is that the community can provide input on customer demands and requirements by presenting the product or concept to the customer. Besides, service organizations, like Achmea, have a valuable under-utilized internal source of new service ideas—the contact personnel (Bowers, 1989). Employees who have routine contact with consumers are familiar with their needs.

A virtual community is also conceivable for the reflection and learning phase (Ebner et al., 2008). Company-wide communities enable collective learning in the workplace (Ardichvili, 2008). By sharing reflections and feedback in the community a database of learning principles can be created. In order to reduce overall costs of developing high-quality products and services the exchange of learning objects has been recognized as a promising solution (Koper et al., 2004). In a virtual employee community this knowledge is constantly up-to-date as it is attached to people in the community. Knowledge grows with people. Knowledge is information that is experienced and interpreted by a person, and by means of a community these stories, symbols and routines can be exchanged and used for as an input for new projects. Actually, this role can be important during the full process.

4.3 *Stimulating elements of innovation*

Compared to the traditional perspective of innovation, virtual communities possess three benefits that enable collaborative innovation (Sawhney et al., 2005): (1) interactive communication; (2) intense and rich interaction; and (3) a large and diverse audience. But to support innovative results, it is useful consider elements that stimulate innovation. In this section, four considerations will be discussed. First, it is important that the technical, marketing, manufacturing, and sales department collaborate (Dougherty, 1992; Verganti, 1997). By bringing together people from different markets, products and technologies, the chances of good ideas emerging are higher (Goffin & Mitchell, 2005). Cooperation increases efficiency and assures alignment of product concept with company strategy and functional strategies (i.e. the technology, marketing and manufacturing strategies) (Verganti, 1997). Cross-functional exchange of knowledge enlarges the knowledge base available and also reduces uncertainty on future constraints and opportunities (Verganti, 1997). By building virtual internal business communities, people throughout the company can be connected.

Secondly, by connecting people with different backgrounds, knowledge will be combined and exchanged between these people. This stimulates creativity and supports innovation (Davila et al., 2005). The difference with the former point is that this one is aimed at supporting creativity; as the first one is aimed at involving all parties to ensure efficiency. To stimulate innovation, it is necessary to create shared understandings from disparate perspectives by using and building on the unique insights (Dougherty, 1992). For innovation, selected innovative individuals need to share and grow with each other (Davila et al., 2005) by building knowledge networks (Goffin & Mitchell, 2005). A community should provide a platform that enables employees to build knowledge networks that support innovation. This is likely to support the emergence of innovative ideas (Hildreth & Kimble, 2004). Since knowledge for innovation is normally based on experience and socially constructed (Dougherty, 1992; Davila et al., 2005), this highlights the main potential of using virtual communities in the innovation process.

Thirdly, the innovation method must be an ongoing process, not a single point event (Goffin & Mitchell, 2005). Innovations are not developed in one day; it needs interaction between people for a longer time, in order to build on each other's knowledge and ideas. Therefore, the first major responsibility of management is to define the innovation strategy and the resulting portfolio characteristics (Davila et al., 2005). A virtual internal community can facilitate this ongoing process, and therefore it is important to emphasize the importance of a community and the role it plays in innovation. An important requirement for increasing the innovation capacity is to integrate innovation into the company's basic business mentality (Davila et al., 2005). Building a virtual internal community is a way to support this.

Finally, since all innovations originate from ideas, it is favorable to provide structure to what an idea is. Ideas that arise in the workplace can be related to six characteristics (Boeddrich, 2004). First, ideas are worthless without realization. In some manner ideas need to be captured by bringing them out of people's heads and putting them to the test in the organization. Secondly, ideas become more valuable when they are discussed more. People must be allowed to play with fuzzy and weird ideas. Thirdly, ideas are fuzzy elements of problem-solving knowledge. An idea is a rough draft that needs to be developed into feasible solutions; ideas do not provide direct solutions to a problem. Fourthly, ideas are mass-produced articles. Ideas are generated in every company. When a company claims that it does not have ideas this means that it has no system to store and process them. Fifthly, ideas in the workplace are intellectual products of employees. For employees, ideas are highly valuable products of their thoughts about companies' problems. It is important that managers pay full attention to these ideas in order to encourage people. Finally, ideas do not emerge in the workplace, they emerge during activities not related to the workplace, for instance during daydreaming or jogging (Boeddrich, 2004).

5. Conceptual framework and propositions

In this chapter literature on virtual employee communities and innovation management are combined to provide an understanding on how a virtual employee community can support the innovation capacity of a company. Reviewing literature is essential in order to create awareness of the current state of knowledge (Saunders et al., 2000). The insights from literature in the previous chapters provide the theoretical grounding for the required circumstances to have a positive effect on the innovation capacity of a company. Before engaging in an in-depth data collection, a conceptual framework will be developed. The conceptual framework is aimed at connecting all aspects of inquiry of a research (Saunders et al., 2000). Therefore this conceptual framework should cover all research questions previously developed and it should guarantee a full understanding of the integration of a virtual internal community in the NPD process. For this master thesis it is investigated how a higher innovation capacity is created, when the interaction and knowledge exchange between members in an employee community is applied to the needed knowledge and interaction in the innovation process. The goal of this chapter is to develop theoretically grounded propositions.

5.1 Conceptual framework

A virtual community exists because of knowledge exchange and interaction between its members (Wenger, 1998; Hildreth & Kimble, 2004). For employee communities this implies that a community exists because employees and managers from all departments exchange knowledge and experiences. In the conceptual framework two accepted models from literature are linked: (1) the innovation process of a company and (2) an employee community and its four structural elements. After having developed the framework, two explorative interviews have been held in order to assess the validity and to refine the usefulness of this theoretical basis. This is part of the research design that will be discussed in the next chapter. These two interviews also provided a better understanding in the elements that constitute the framework; which increase the validity (Yin, 1994). The conceptual framework is presented in figure 4.

As the concept of employee community for innovations is new and hardly investigated, general theories about this approach do not yet exist. Therefore it is impossible to deduce propositions purely from theory. Therefore besides the propositions that will be developed in the next section, this research will also involve the context of these propositions. We need to develop the concept in a real-world setting by doing in-depth empirical research; this will be explained in the next chapter. This is to provide a deeper understanding on the role of an employee community in innovation.

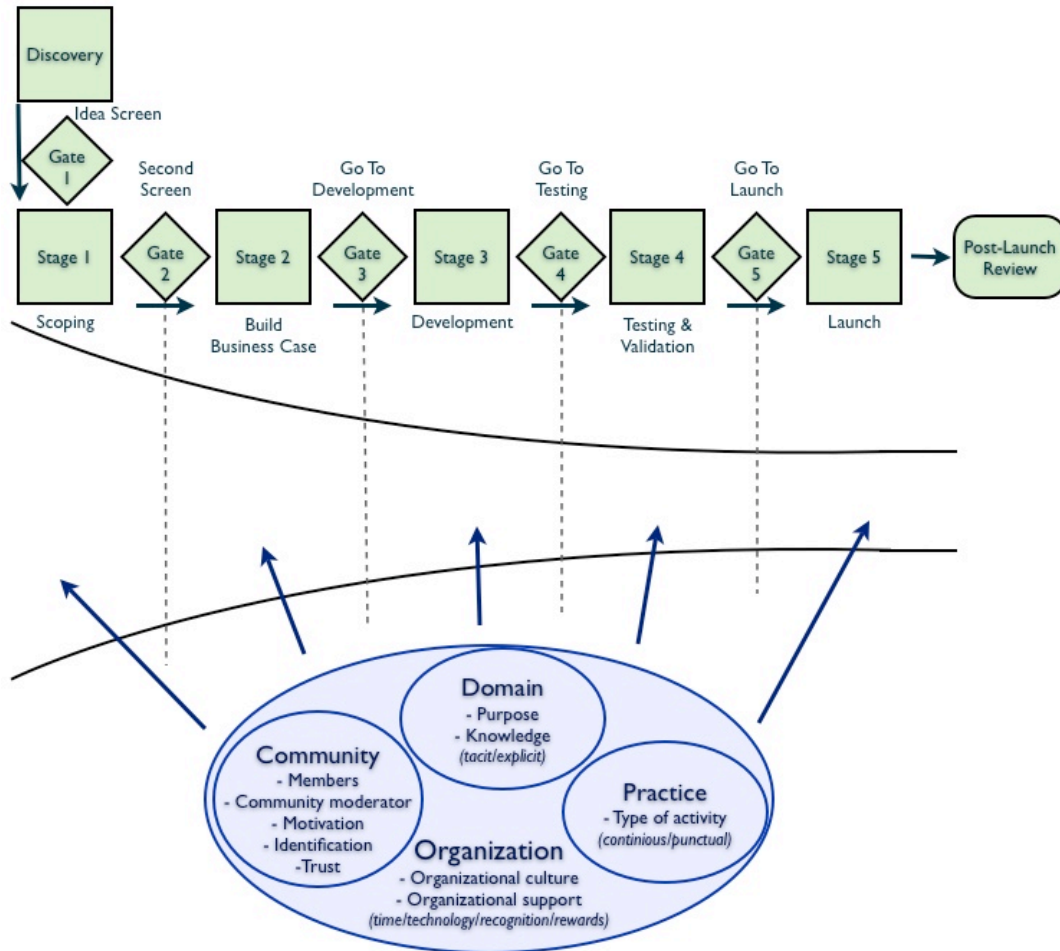


Figure 4: Conceptual Framework

5.2 Propositions in the conceptual framework

In this section literature on virtual employee communities and innovation are combined in the conceptual framework to develop theoretically grounded propositions. These propositions concern the integration of employee community in the stage gate model and are organized along the four structural elements of a community.

5.2.1 Domain

In this thesis the domain of a community is stimulating innovative activities of employees. Online communities can be utilized throughout all stages of the product innovation process (Ebner et al., 2008). As discussed in chapter 4, the innovation process can be generally divided in two parts, the fuzzy front end and the project part. In the first part intellectual sources are used (Boeddrich, 2004). Members can generate ideas and collaborate with each other based on using the knowledge base of members (Hildreth & Kimble, 2004). Ideas are relevant until the building the business case stage (Boeddrich, 2004). Since the capacity of an R&D department is limited, a virtual employee community can provide the capability to come up with innovative solutions (Du Plessis, 2008). Based on this, in the stages idea discovery, scoping and the business case the purpose of a virtual employee community is to improve the innovation capacity of an

organization. On the other hand, during all stages of the stage gate model, a virtual employee community can monitor innovative activities. During the second part of the stage gate process, tangible resources are consumed, and creativity and interaction is less important (Boeddrich, 2004). Therefore, monitoring of innovation projects is the main purpose during these stages. By doing this, a community can provide a quick insight in the ongoing activities, and employees can coordinate all projects in the organization. This is only possible when employees report all their activities regarding a specific innovation project. Employees can provide input and ask feedback in every stage (Saint-Onge & Wallace, 2003; Ebner et al., 2008). As a result, a virtual employee community can solve immediate individual problems by posing questions to the community. This increases the efficiency of innovation and is related to the learning role as discussed in chapter 4. A virtual employee community provides an in-house infrastructure for innovation (Kodama, 2001) and thus increases coordination.

Proposition 1: The purpose of a virtual employee community in the stages idea discovery, scoping, and business case is to improve the innovation capacity of a company

Proposition 2: The purpose of a virtual employee community in the stages business case to launch is to monitor innovation projects within a company

The essence of new product development is the creation of new knowledge aimed at using this knowledge and interaction to solve problems and create products that have value in the marketplace (Chow et al., 2007). In order to innovate it is necessary to create shared understandings from disparate perspectives by using and building on the unique insights (Dougherty, 1992). During the first stages, creativity plays an important role. Creativity involves the production of useful new ideas, or ideas that can be implemented to solve some significant novel problem (Mumford, 2000). Ideas become more valuable when they are discussed more (Boeddrich, 2004). The aim is to find support, enthusiasm and to play with the ideas in the community. Therefore, during the first stages of the stage gate model, it is important that members mainly share tacit knowledge (e.g. experience, opinions). Besides, the transfer of tacit to explicit knowledge is a critical resource for innovation in organizations (Osterloh & Frey, 2000). As said earlier, tacit knowledge is acquired by and stored within individuals and cannot be easily transferred as a separate entity. Communities are seen as valuable entities for capturing tacit knowledge (Hildreth & Kimble, 2005). In the scoping phase, people are searching for more explicit knowledge (e.g. market researches), but also tacit knowledge and feedback on ideas is considered to be of high importance. In this paper, research information is also considered as explicit knowledge. The objective of the scoping stage is to eliminate unsound concepts prior to devoting resources to them (Cooper, 2003). Therefore, members should share both tacit and explicit knowledge. In the business case stage, more in-depth research information and knowledge is needed. This stage involves a more detailed investigation – both market and technical. When a virtual employee community is involved this might result in a full research within the community. In the next stages, a project team is formed and the use of intellectual resources becomes less important. Products and services are being developed within teams and the involvement of large groups of people is often not beneficial in these stages (Cooper, 2003). Therefore, in the stages development, testing/validation and launch knowledge that should be shared is highly dependent on the demands in the community. In the process, employees call for expertise that is not available in the team (Mumford, 2000). People might be searching pure tacit knowledge (opinions on a certain design), but they might also be searching pure explicit

knowledge (manuals for certain development processes). Besides, in the final stages, members should constantly communicate the progress made in the community. This increases the usefulness of the virtual employee community for monitoring innovation projects.

Proposition 3: In the stage idea discovery tacit knowledge is needed to increase the innovation capacity of a company

Proposition 4: In the stages scoping and business case both tacit and explicit knowledge is needed to increase the innovation capacity of a company

Proposition 5: In the stages development, testing and validation and launch the knowledge is dependent on the specific question posted in the community

5.2.2 Community

While management practices, such as an employee community, can improve the likelihood of innovation, ultimately, it is the individual who will develop the innovation (Mumford, 2000). In general, regarding the professional dimension, the NPD process requires cross-functional knowledge and experiences (Tang, 1998; Cooper, 2001). Innovation is more likely to occur when expertise is evident across different departments and knowledge areas (Goffin & Mitchell, 2005). Moreover, by bringing together people from different markets, products and technologies, the chances of good ideas emerging are higher. Also, creativity is stimulated (Mumford, 2000). Therefore, in an innovative employee community, people with a diverse background with respect to relevant knowledge and experiences should be involved. The community environment should consist of, for example, employees with marketing knowledge and employees with knowledge on internal processes. It requires collective action and therefore innovators should encourage participation from all concerned (Goffin & Mitchell, 2005); this creates a faster and more efficient innovation process. The optimal member composition of an internal community can vary according to different roles in the NPD process. But since community participation is based on voluntary motives, it can be expected that the community organizes itself and that people react to topics that are most relevant to them (Dube et al., 2006). A large and functional diverse community also ensures a higher usefulness in the stages development, testing and launch. In the first stages a large member base is mainly aimed at increasing creativity. In the latter stages this is aimed at covering all knowledge fields to ensure usefulness. In addition it ensures a higher coverage of innovation projects within an organization. The participation of members depends on a sufficient base of content and interaction and on the community's ability to organize the searching for information properly (Tedjamulia et al., 2005). Besides, a functional diverse virtual employee community is better able to cooperate with all departments and ensures a more efficient product development process.

Proposition 6: The members should be functional diverse throughout all stages of the innovation process

The usefulness of a community moderator (or leader, facilitator) is dependent on the goal of the virtual community, but normally virtual employee communities need to be facilitated by a coaching community leader (Wenger, 2004). The community leader is also identified as a major element of the community during the explorative interviews. When a moderator is absent, a proposal or idea would not necessarily develop into a viable innovation or product (Kodama,

2001; Koper et al., 2004), even if a community member suggested a product or service based on an exceptional idea. Therefore the moderator should connect people to each other and promote valuable content. The discussion between people is viable for developing more successful ideas (Boeddrich, 2004). For that reason, the moderator needs to find, capture and value the ideas proposed in the community. He needs to identify the possible innovations that arise within the community in order to provide its owner time and resources to develop the idea (Mumford, 2000). For example, a community leader can stimulate other members to participate in a discussion about a certain proposed idea. Innovative community leaders should establish design and strategies for innovation through a virtual employee community, thereby he should also promote corporate action (Kodama, 2001). Given the voluntary social context, community leaders play an important role in developing the necessary social climate to generate community participation (Koh et al., 2007). The community leader should facilitate the transaction from traditional thinking to more collective action for innovation (Kodama, 2001). Since these discussions and intellectual resources are especially important during the idea discovery and scoping stage (Boeddrich, 2004), the presence of a community moderator is expected to be more valuable in these stages.

Proposition 7: The presence of an innovative community moderator is particularly important during the stages idea discovery and scoping

It is difficult to motivate physically dispersed members to actively participate in a virtual employee community (Koh et al., 2007). Research on knowledge sharing in organizational communities suggests that intrinsic motives are far more powerful (Osterloh & Frey, 2000; Janzik & Herstatt, 2008). Extensive internal communication, and extensive involvement in innovation are two important factors to successful innovation through employees (Nijhof et al., 2002). Intrinsic motivation is crucial when tacit knowledge in and between people must be transferred. Therefore, during the idea discovery and scoping stage intrinsic motivation of employees is likely to stimulate innovative activities in the virtual employee community. Besides, during the fuzzy front end of innovation (idea discovery and scoping), the organization uses intellectual resources and creativity is beneficial (Boeddrich, 2004). Therefore, it is important that people are intrinsically motivated in these stages. In contrast, extrinsic motivation tends to produce stereotyped repetition of what already works. Extrinsic incentives were found to be less powerful, and in sometimes, even disadvantageous (Osterloh & Frey, 2000). In the stages development, testing/validation and launch the organization consumes tangible resources and intellectual resources are less important. In addition, since the interaction is higher during idea discovery and scoping, motivation to participate plays a more important role. Insights in the main motivations for participation in internal communities for innovation will be obtained by doing research in practice as will be discussed in the next chapter.

Proposition 8: High intrinsic motivation is particularly important during the stages idea discovery and scoping

As said, identification is helpful in explaining the willingness to maintain committed to a virtual community (Chiu et al., 2006). To stimulate people to use the virtual employee community throughout the full innovation process it is important that the identification is high. Based on this, it can be expected that in the stages development, testing/validation and launch the identification should be high in order to function as a monitor for innovation. In order to identify

with the virtual employee community, the community must represent topics that people meet during their daily work (Koh et al., 2007). When more people report their projects and innovations in the community, identification is likely to grow. When this is done, people will feel the urge to participate in the community (Tedjamulia et al., 2005). A high identification is often not present during the start of a community; it grows as it is used more. It should become top-of-mind and by doing this people identify with the projects and people in the community. However, identification does not stimulate creativity and does not especially lead to new ideas. Therefore, we expect it to be more important during the latter stages. Besides during these stages the interaction is lower, and intrinsic motivation is considered to be less important.

Proposition 9: High identification is particularly important during the stages development, testing and validation and launch

Within a virtual employee community a lot of strategic knowledge and information is shared. Therefore, it is important that high levels of interpersonal trust are present during all stages. Trust is crucial for success in designing a virtual employee community for innovation (Ridings et al., 2002). Because of the highly valuable and strategic knowledge in a community for innovation, trust can be problem in becoming a useful platform for innovation. During the explorative interviews, it appeared that trust can be a big issue and it can be related to intellectual property. Trust is especially important when new or exceptional knowledge is shared (Ardichvili, 2008). New ideas are an example of trustworthy knowledge. During the full process trustworthy knowledge is shared, but this is often linked to an existing business case or project (Cooper, 2003). And therefore the fear of losing intellectual property to other people is likely to be lower. During the idea discovery and scoping stage ideas are shared. To stimulate that employees share their ideas, high trust is important. Ideas are intellectual products of employees and can be seen as highly valuable products of the employee's thoughts about companies' problems (Boeddrieh, 2004). In addition, trust is important to improve collaboration (Johnson, 2001), and collaboration within a virtual employee community is particularly high in the first stages.

Proposition 10: High trust is particularly important during the stages idea discovery and scoping

5.2.3 Practice

Within a virtual employee community, people with different backgrounds engage in discussions and combine their knowledge and experience; this supports the emergence of innovative ideas (Hildreth & Kimble, 2004). Setting up a community between people from different departments and functional areas is not that difficult; the real challenge is to access the breadth and depth of knowledge and expertise pertinent to new product or service development (Verona, 1999). It is useful to distinguish two dimensions of involvement of the community (Fuller & Matzler, 2007): (1) the level of integration and (2) the continuity (see figure 5). The first one describes how actively the community is involved, varying from passive integration (by specific questions) to active integration (interaction). And the second one describes the frequency of interaction, varying from one time only (specific question) to continuously (interaction). The community view recognizes that, for innovation, knowledge has to be continuously negotiated through interactive social networking processes, and therefore the interaction during the first stages should be higher. And regarding ideas that emerge through a community, they become more

valuable when they are discussed more (Boeddrich, 2004). In the later stages, when the project team is already formed, the discussions become less relevant. When members encounter a new situation or issue they have not seen before, they can get relevant, contextualized, and validated advice from the community (Saint-Onge & Wallace, 2003). In section 4.2 different roles of a community in the innovation process are described, based on this and related to the stage gate model, propositions concerning the desired type of activity are developed.

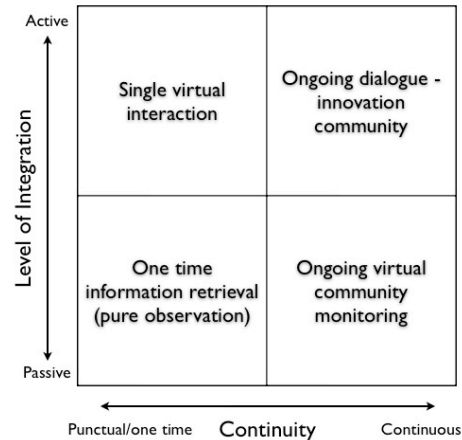


Figure 5: Forms of community integration (based on Fuller & Matzler, 2007)

Proposition 11: In the stages idea discovery and scoping continuous interaction is the type of activity that supports innovation in a company

Proposition 12: In the stage business case, both punctual as well as continuous interactions is the type of activity that supports innovation in a company

Proposition 13: From the stages development to launch punctual interaction is the type of activity that supports innovation in a company

5.2.4 Organization

Both related to knowledge management as well as to innovation, the organizational culture is seen as the most important driver for a successful implementation. This structural element is general and is applicable to all stages of the stage gate process. It is very important that the organization has an innovative climate where employees know that their ideas will be given a chance (Tang, 1998; Nijhof et al., 2002). The culture should encourage knowledge-related activities by creating environments for knowledge exchange and innovation (Janz & Prasarnphanich, 2003). This prevents the emergence of a common barrier: knowledge hoarding. This is the reluctance to knowledge sharing and hiding away something for your own future purposes. This is related to trust. When the culture in an organization is open, normally trust is high as well and knowledge hoarding is not considered to be a big issue (Ardichvili, 2008). A flexible, decentralized organizational structure encourages knowledge sharing, particularly tacit knowledge (Sharratt & Usoro, 2003). A virtual employee community increases collaboration within organizations (Hildreth & Kimble, 2004). And to stimulate this an open culture is beneficial to both the improvement of discussions around ideas as well as the interaction in the later stages of the innovation process. Community members should view knowledge as a public good, belonging to the whole organization (Ardichvili et al., 2003). Employees must feel free to

share ideas and knowledge in a company, and when such a culture dominated, people are also willing to share their ideas online in a community (Kwok & Gao, 2004).

Proposition 14: An open organizational culture is important for the success of a virtual employee community during all stages of the innovation process

Virtual communities usually need some organizational support to function optimally (Wenger, 2004). Furthermore, leadership and commitment appear to be absolutely necessary to drive the successful implementation of an innovation strategy (Goffin & Mitchell, 2005). Promoting healthy collaboration in virtual employee communities takes management support at all levels (Millen et al., 2002). Therefore it is extremely important that managers throughout the company promote the benefits that the community brings to the organization and the individuals (Saint-Onge & Wallace, 2003). Management involvement is needed for fostering members' active involvement in posting and viewing community content (Koh et al., 2007). By doing this, the community and their members are recognized for their contribution to the organization's success. In addition, since ideas are highly valuable products of employees, managers should encourage these employees (Boeddrich, 2004). Generally, in a community the norm exists to assist each other free of charge (Franke & Shah, 2003). People should use a virtual community because they are intrinsically motivated. Therefore, providing time to participate in the virtual community does not lead to a higher effective use (Fahey et al., 2007). Regarding rewards, it can be stated that rewards are detrimental to creativity (Mumford, 2000), which is important in the first stages of the innovation process. Besides, in one study rewards had a damaging effect on the exchange of knowledge (Fahey et al., 2007). However, according to innovation literature, the level of innovation that is needed will never be achieved if people do not have the proper rewards (Davila et al., 2005). But regarding virtual employee communities, rewards are not considered to be very useful especially during the first stages of the stage gate process. The most important form of organizational support is promotion and recognition by management. In the first stages, management can support employees in their ideas by participating in discussions around an idea. And in later stages the management should use the virtual employee community in their activities; by doing this other employees are supported to use the virtual community as well (Fahey et al., 2007). Thereby, a community increases the engagement of employees with company and the innovation process. Employees are able to start discussions with the management in order to clear up implementations in their work field. By participating in the virtual employee community recognition by management can be easily shown. However, it is important that management does not coordinate (Agerfalk, 2008); management should be one of the members and not the leader or controller of the virtual employee community.

Proposition 15: Providing members time to participate in a virtual employee community is not an effective form of organizational support during all stages of the innovation process

Proposition 16: Providing members rewards in a virtual employee community is not an effective form of organizational support in the stages idea discovery and scoping

Proposition 17: Showing recognition by management participation in a virtual employee community is an effective form of organizational support during all stages of the innovation process

6. Methodology

To investigate the integration of a virtual employee community in the innovation process, the research methodology will be discussed in this chapter. Virtual employee communities for increasing the innovation capacity are new and hardly investigated, and no general theories on this specific topic exist. This implies that this research is exploratory. Explorative research involves describing a problem, context or situation that is rather unknown (Yin, 1994). This research is based on the previously presented conceptual framework. The framework is used to construct propositions based on general literature. The framework was assessed for its usefulness by doing two explorative interviews about communities and innovation. The first interview has been done with an innovation manager in a Dutch hospital that is considering the introduction of a virtual internal community. The second exploratory interview has been held with the project manager of two customer communities (see appendix 5). By doing an innovation related interview and a community related interview the external validity of the conceptual model is increased.

The objective of this thesis is to arrive at a full understanding of how an employee community can support the innovation capacity of a company. It is investigated whether a higher innovation capacity is created, when the interaction and knowledge exchange between members in an employee community is applied to the needed knowledge and interaction in the stage gate model. The first two sub questions of this research and partly the third question are answered based on literature in the previous chapters. The empirical research is aimed at answering the remaining questions. The data collection involves the structural elements of the community as presented in the theoretical framework: domain (what), practice (how), community (who), and organization. These elements will be displayed on the different stages of an innovation process. It will result in a clear understanding of what a community should do in every stage of the innovation process. Besides, it will be assessed whether a community adds value to every stage or not. The method for doing research and for collecting data will be presented in this section.

6.1 Research methods

Before engaging in an in-depth data collection it is important to determine which data and information to include or exclude in this study. Therefore the unit of analysis will be determined. The unit of analysis is the object that will be the focus of interest for the research project (Van Aken et al., 2007). Since this research is focused on developing a deeper understanding on how an employee community can support innovation, organizations that have an employee community or act as a facilitator (like Innovation Factory) are important to determine the unit of analysis. Consequently, the unit of analysis is individual persons that are related to an innovative virtual employee community. Since this research is executed at a strategic level, this mainly involves experts and practitioners of employee communities.

Since this research is aimed at identifying the why and how, it is considered as a qualitative research. Qualitative methods investigate the why and how of certain events, not just what, where, when (Yin, 1994) and are more appropriate in the early stages of research (exploratory research) (Saunders et al., 2000). In order to collect data relevant to this master thesis, three techniques have been used: a case study within Achmea, a field study, and a small survey. These methods are selected in favor of a large quantitative research, because the topic is new and only a

few similar initiatives exist. Besides, the level of detail and context in these methods is much deeper. The main method for data collection is doing in-depth interviews as part of the case and field study. The existing virtual employee communities are now in the phase of connecting people in an organization, but the next phase will be to involve the virtual employee community in the innovation process. This has not been done until now. This again stresses the highly explorative character of this research. The case study and the field study are the main sources of input to test the propositions; the survey serves to quantify certain conclusions on the propositions. The survey mainly tested certain statements concerning the propositions. The interviews that are part of the case and field study were transcribed accurately shortly after the completion of the interviews. Several summary statements and key quotations about each of the elements were organized in text documents. This process resulted in a set of tables based on common themes and facilitated cross-case analysis (see appendix 7).

6.1.1 Case study: Achmea

A case study is done within the virtual employee community of Achmea: 1Power. The reason that 1Power is chosen for the case study is that this virtual employee community is easily accessible since it is project of Innovation Factory. Besides, this community is extremely useful as it strives to stimulate innovation. Therefore, it is used to describe the process behind an innovation driven community into more detail. A case study is suited to trace operational links rather than frequencies or incidences (which is more suited for a survey) (Yin, 1994). To gather data, participative observation and four in-depth interviews have been done.

In the first phase of case study, participative observation is done. By participating in the 1Power community, it can be experienced from an insider's perspective (Van Aken et al., 2007). By participating, a better understanding will be developed on what a virtual employee community is and how it is used. Since a community is a social event, it is beneficial to do participative observation. 1Power will be analyzed to investigate what kinds of activities take place and how 1Power is currently stimulated and organized. During the research I attended meetings and workshops that concern 1Power. A major part of the participative observation was analyzing several documents that are available on 1Power; these documents involve interviews with 1Power members about their activities and their view and opinion on 1Power. Doing participative research is the only way to access these documents. This part of participative research will be referred to as document analysis in the discussion of case study (chapter 7). The analysis will result in describing implications and problems of 1Power and motivational reasons of community members to participate.

In second phase, four interviews were held within Achmea. These involved three innovation managers that are a member of 1Power, and one interview with the project leader of 1Power (see appendix 5). Two of these three innovation managers are closely related to 1Power, since they are part of the department that runs this project. They are chosen since they have more than common knowledge on the subject of this thesis. The third innovation manager is a general member of 1Power, but as he has recently started the scoping stage of a new opportunity through the community, he is able to provide valuable insights. Finally, the project manager of 1Power is particularly valuable for this research since she has the most knowledge and experience with the topic of this thesis. The interviews were semi-structured, because these are more flexible and allow new questions to be brought up during the interview as a result of what the interviewee

says (Saunders et al., 2000). The interviews focused on identifying how a virtual employee community can support each stage of the innovation process (based on the conceptual framework). The context of these interviews was 1Power. It is aimed at discovering the link that people put between innovation, themselves, the company and the community. Furthermore, the interview tried to identify the practice of the members themselves, by asking what their innovative activities are in 1Power. A summary of findings of the interviews can be found in tabular form in appendix 7.

6.1.2 Field study

In-depth face-to-face interviews about the role of a virtual employee community in the innovation process are done with nine innovation managers and persons that have experience with developing virtual internal communities (see appendix 5). All respondents have two key characteristics. First, they are experienced key practicing people in a virtual employee community, like project managers of employee communities; second, they had a more than general understanding of innovation.

This thesis involves the gathering of perceptions and views of different people (with knowledge on virtual internal communities) on how the community can be integrated to stimulate innovation; interviews are the most suitable way of capturing this data (Saunders et al, 2000). The in-depth interviews are used to arrive at an explanation of the structural elements of a community displayed on the innovation process, as presented in the conceptual framework. Until now, it is rather unclear what the effect of an employee on innovation is. Therefore, the semi-structured interviews will lead to a detailed description of the activities and knowledge that stimulate innovation through a virtual employee community. During the interviews a list of themes and questions will be covered and there is space for new questions. The aim of the interviews was to identify how knowledge creation in a community can be applied to knowledge creation in the innovation process.

Since not many initiatives of virtual employee communities exist yet, it was difficult to find useful cases. Because of confidentiality reasons, virtual employee communities are only known internally and are not communicated to the public. But by contacting different organizations and by searching the Internet, useful people for the interviews were identified (see appendix 6). After a thorough search, it can be stated now that nearly all initiatives have been contacted. Eventually, seven interviews have been held in the field of employee communities and innovation. Since two interviews were done with two people simultaneous, it involved nine persons. The reason behind this was related to time availability on the interviewees' side. Three interviews are related to similar initiatives of a virtual employee community and their project managers. And four were related to consulting companies that provide virtual employee communities to organizations. All interviews involved experts on the topic of this thesis. Of these persons, three are employees of Innovation Factory and two of them are part of another consulting company, as can be seen in appendix 5. It is important to use the data collected from the interviews in its full potential. For that reason the interviews have been recorded on tape and written transcripts have been made and interesting and important statements were highlighted. This made it easier to organize the interviews and use it to provide an answer to the research questions. A summary of findings of the interviews can be found in tabular form in appendix 7.

6.1.3 Survey

Since the topic is very new, it is not possible to take a large sample and to investigate results or tangible outcomes of virtual employee communities. Therefore, a small survey is applied to all persons involved in both the case study and the field study. The aim was to quantify certain propositions in addition to the case study and field study. Besides, a survey increases reliability of the conclusion of this research since the influence of the researcher is decreased, which is normally high in interviews. Given that virtual employee communities are now at the phase of connecting people and a platform for ideas, no real products or services have been developed yet as a result of a community. Therefore, the survey highlighted the most relevant stages of the stage gate model in the conceptual framework by a presenting a fixed sum scale. Besides, it investigated which types of employees and knowledge appear to be most valuable in an innovative community. The specific activities and knowledge per stage are assessed in the case study and field study. In short, the in-depth interviews gain insights in how the community supports innovation in every stage, and the survey gains additional (quantified) insights in the use of an employee community and its facilitating elements in general.

The mode of survey administration consisted of an online survey that was emailed to the participants. The advantage is that it is less time consuming and the respondents are more flexible in when they fill in the survey. The types of questions in the survey were closed. Open-ended questions were not necessary, since the in-depth interviews provided sufficient insights. A disadvantage of surveying is its inflexibility, but in this research this does not play a role since it is combined with qualitative interviews. The survey is assessing the potentials of an employee community, and it is not striving to assess results (which are not available). Therefore, the persons that participated in the empirical analysis and the case study can be aggregated into one sample. The survey has been sent to all interviewees that took part in this research; therefore the survey sample was thirteen. This sample is seen as representative for employee communities for innovation. Nine respondents have answered the survey; this is a response rate of 69,2%. Because of the small sample size, the results of the survey are solely used to quantify the conclusion, and no extensive factor analysis is done.

For nearly all constructs in the survey, respondents were asked to indicate their (dis)agreement with a set of statements using a seven-point Likert scale which ranged from 'strongly disagree' to 'strongly agree'. However, in several questions it was important to consider the relative importance, therefore a fixed sum scale was used (Cooper & Schindler, 2003) (see appendix 8). This was to investigate in which stages of the stage gate model the role of an employee community is the most important. And it was also used in developing the most useful knowledge in an employee community. Since outcomes of virtual employee communities are missing, the survey assessed a direct link with innovation mainly. However, two measure scales have been adopted from existing literature. To measure the innovative potential of an employee community, we conducted a scale of five items based on the five functions of an innovation system by Davila et al. (2005). Organizational support was operationalized as the participation of senior management in the community and the monitoring by them. The management support measure is based on a measure proposed by Sethi et al. (2006). But again, the direct link is asked, since it is impossible to develop a survey that addresses correlations, since no outcomes of employee communities are available yet.

Results of the survey have been analyzed using several techniques. Because of a small size, most data testing techniques could not be used. Mainly, means were compared with its standard deviation in order to assess the statements in the survey (see appendix 9). One sample t-tests could not be performed since the distributions are non-normal and the sample size is nine. A t-test is normally used for samples larger than thirty. However, since a t-test can provide valuable insights, these are used to test several propositions. But it is important to remember that results are based on a small sample size. And therefore it is useful to assess the interviews as well. Besides, to test the fixed sum scales and to find the most relevant item, nonparametric tests are performed. The permutation test for paired replicates is used; it assesses the difference between two samples ($d_i = X_i - Y_i$) by building a matrix (Siegel & Castellan, 1988). This nonparametric statistical test is used for comparisons in dependent two-sample cases.

6.2 Research validity and reliability

In order to guarantee the quality of the research it should be assessed according to certain logical tests. Since this research is mainly explorative three tests are common: construct validity, external validity and reliability (Yin, 1994). Construct validity refers to establishing correct operational measures for the concepts being studied (Yin, 1994). To increase construct validity the concept should be covered completely (Van Aken et al., 2007), and therefore semi-structured interviews are suitable, since these allow the respondents to come up with new topics related to the concept. It is also important to select the specific types of changes in relation to the research objectives (Yin, 1994). To ensure this, a conceptual model based on literature was constructed. The construct validity is also improved since the research uses multiple sources of evidence, like scientific literature, a case study, in-depth interviews and a small survey.

External validity refers to the domain to which the study's findings can be generalized (Yin, 1994). Therefore, it is chosen not to limit this research to one case study, but to involve a higher diversity of initiatives. Because of the involvement of different community initiatives as input, a high external validity of the results can be expected.

Reliability demonstrates that the operations of a study can be repeated with the same results when another type of instrument was used (Yin, 1994). The goal of reliability is to minimize the errors and biases in a study. To increase the research instrument reliability, different research methods have been used. Furthermore, the interviews were recorded on tape to increase a reliable transcription, which enables to capture the exact nature of explanations (Saunders et al., 2000). To ensure a reliable data analysis and minimize errors, tables were constructed that represented the results of the interviews in a tabular form (see appendix 7). And the survey improved reliability since it reduces the influence of the researcher.

7. Empirical results: case study, field study and survey

In this chapter, the results of the case study, the field study and the survey are outlined. The evaluation is structured according to the propositions along the four structural elements of the theoretical framework. The discussion will entail the acceptance or rejection of the propositions. The case study provides an insight in the process behind an innovation driven employee community. The results of the case study are based on the interviews and participative research (including document analysis). In addition, the interviews as part of the field study provided useful insights. The survey is used to quantify and strengthen the discussions on the propositions.

7.1 Propositions in the conceptual framework

The propositions that will be assessed in this chapter concern the integration of a virtual employee community in the stage gate model and are organized along the four structural elements of a community. Besides testing the propositions, more broad results will be discussed to provide additional valuable insights in the elements of a virtual employee community.

7.1.1 Domain

Purpose

Proposition 1 concerns the purpose of a virtual employee community during the first three stages of the stage gate model. Based on the survey, P1 is supported: the purpose in stages idea discovery, scoping and business case is to increase the innovation capacity of a company. The survey participants had to divide a fixed sum of 120 over the six stages; this resulted in the highest score for idea discovery ([ideadisc] mean=44,44, stdev=11,02) followed by scoping ([scop] mean=32,78, stdev=10.93). However, since the standard deviation of the business stage is rather high compared to the latter three stages ([buscase] mean=13,33, stdev=11.99) (see appendix 9), this stage is considered useful as well. To significantly test the most useful stages for increasing the innovation capacity, several one-tailed permutation tests for paired replicates were performed (Siegel & Castellan, 1988). It is confirmed that idea discovery and scoping are equally important stages, because it could not be rejected that they differ significantly ([ideadisc][scop] $d=105$, $p>0,05$). On the other hand, both idea discovery and scoping are significantly different from the other stages; this implies that idea discovery and scoping are the most important stages. But based on the standard deviation, the business case can be considered as a potential relevant stage as well. But insights from the case and field study are useful for this. Regarding the case study, 1Power in fact concerns every stage of the NPD process, since it helps people to find answers to specific questions and problems. However, in practice, 1Power provides the most value in the scoping stage. When people are working on an idea, 1Power can help them to the next level. It is not a platform for purely launching ideas. It actually increases the innovation capacity. Until now the business case has never been fully performed by a virtual employee community. However, several interviewees stated that they are striving to do this in the future, which leads to object centered sociality. The interviews indicated that the main purpose for employee communities is communicating ideas and providing a way for the development of that idea. This is normally organized around the idea discovery and scoping

stages. The organization does not provide resources before they believe in future business results of that idea. Ideas die before they get a chance because the R&D department does not have the capacity to investigate and develop all ideas. The community is able to do the preliminary research around ideas and to complete the business case. In chapter 8, a more rich discussion on how to increase the innovation capacity of a company will be provided. P1 is supported.

Proposition 2 concerns the purpose of a virtual employee community in the development, testing and validation and launch. Based on the case and field study P2 can be confirmed: the purpose in these stages is to monitor innovation projects of a company. However, this monitoring function is present during every stage, but during the last three stages, this is the main function. As appeared in the case study, in these stages people can obtain help from the community on specific topics that appeared difficult. When people are working on new services or innovations, they can get stuck at certain moments. This is where 1Power plays a role. The survey quantifies the acceptance of the monitoring function during the full stage gate process, since a community improves coordination ([*coor*] mean=5,78, stdev=1,202). A one-sample t-test was also significantly different from the middle value 4 ($p=0.002$). Since the standard deviation is rather high, it is interesting to provide some details that appeared from the case and field study. In the field study it appeared that an internal community is often used as a coordination tool to retrieve information on current innovation projects and progress of ideas that emerged through the community. The community serves as a monitor and employees are able to provide feedback. This is particularly important after an idea has emerged through a community; thus, the stages development, testing/validation and launch. The community is transparent and open, and everybody can see what other people are doing regarding innovation. According to the document analysis in the case study, 1Power is an innovation platform that enables employees to keep up to date with all initiatives within Achmea. Currently 120 projects can be found in 1Power; in every project a short description is given and its team members are presented. Although not all projects are available on 1Power, it is seen as a valuable monitor for projects throughout Achmea. However, for 1Power it is important that more people share their projects on 1Power. Also, more feedback should be provided to the community during projects, it should be kept up-to-date to improve coordination. To enable this, 1Power needs more authority as was indicated during several interviews. P2 is confirmed.

Knowledge

Proposition 3 concerns the knowledge that needs to be shared in the idea discovery stage. Based on the survey it can be confirmed that tacit knowledge needs to be shared to increase the innovation capacity. And since idea discovery and scoping are the most valuable stages for this, P3 is confirmed. Participants of the survey had to divide a fixed sum of 90 over three types of knowledge (tacit, explicit and research information); this resulted in the highest score for tacit knowledge ([*tacit*] mean=48,89, stdev=13,64). This statement is also assessed using the permutation test for paired replicates. From this analysis it is concluded that tacit knowledge significantly has a higher influence on the innovation capacity compared to explicit knowledge and research information ([*tacit*][*expl*] $d=250$, $p<0,05$ for both tests). Besides, explicit knowledge and research information are considered equally important ([*expl*][*info*] $d=0$). As appeared during the field study, during idea discovery it is important that people put their ideas on the platform, the aim is to find support and enthusiasm and to gather mostly tacit knowledge (e.g. experience, opinions). Besides specific knowledge, posting inspiring news items and content on innovation by community members and the moderator is also useful. P3 is confirmed.

Proposition 4 concerns the knowledge that needs to be shared in the stages scoping and business case. Based on the case and field study P4 can be confirmed: employees need to share both tacit and explicit knowledge in order to increase the innovation capacity. However, the survey indicated a lower importance of explicit knowledge in general ([expl] mean=21,11 stdev=8,21), it still is considered as useful. The field and case study indicated that during scoping, people are searching for tacit knowledge, but also explicit knowledge (e.g. market researches) is considered to be of high importance. Some interviewees support the initiative to do a full research within a community aimed at the development of an idea and leading to a business case. This is done with a new insurance at Achmea. Through the community the idea emerged to develop a new kind of insurance, but since Achmea did not offer such insurance yet, a lot of research information and explicit knowledge was needed. Therefore, the community was asked to come up with existing researches and knowledge on the applications and feasibility of this insurance. Consequently, in the scoping stage a better research will be obtained with less (or no) costs and in less time. This initiative shows the increased innovation capacity by 1Power. A design for this methodology will be presented in chapter 8. In the business case stage the use of explicit knowledge, and especially research information, is even more important, since in this stage the idea is quantified by the input of several researches by other members. P4 is supported

Proposition 5 concerns the knowledge that needs to be shared in the stages development, testing/validation and launch. Based on the case and field study P5 can be confirmed: the knowledge is dependent on the question posted in the community. This is related to the monitoring function of a virtual employee community. During the interviews it appeared that knowledge is dependent on questions posted by the members. These questions relate to daily activities of an employee or a specific method or product. An example: in 1Power, a member was developing a new technique for visualizing the growth of an unborn baby. However, he had some problems with its applications. But by posing a question on 1Power, he was able to go ahead with this innovation. Other members are asked for both explicit as well as tacit knowledge, but also names of interesting persons are shared as a response. The aim is to help each other by solving problems, clearing ideas or by delivering explicit knowledge or market and technical information. Besides, since employee can contact other employees it is possible to learn from each other by sharing knowledge and experiences. Therefore a community is supposed to increase the efficiency significantly. In the development stage specific knowledge is needed that is not available in the project team. In the testing phase it is possible to release the product internally in the form of alpha testing, although this depends on the type of product and the target group of the product. During the launch stage no new input is required, however the project members should share both tacit as well as explicit knowledge that they developed during the project. "A virtual employee community increases the possibility to access specialized knowledge". This function is improved when people can be found based on their competences and knowledge. By doing this, valuable people for certain projects can be found. This is something that is seen as somewhat difficult within 1Power. But, P5 is confirmed.

7.1.2 Community

Members

Proposition 6 concerns the member composition of a virtual employee community. Based on the survey P6 can be confirmed: members should be functional diverse throughout all stages of the

innovation process ([funcdiv] mean=6.89, stdev=0,33). A one-sample t-test confirms this significantly as well ($p=0,000$). Besides, in every interview it was indicated as well that an employee community for innovation should consist of functional diverse employees. Quotation: “Since diversity is important for innovation, the community should be large and constitute of different people with different backgrounds and knowledge; create a broad base”. For example, 1Power has been set up to connect all divisions within Achmea. They strive for functional diversity, first to stimulate innovation and second to increase the chances of finding relevant knowledge. Besides, in the document analysis (in the case study) it appeared that people highly value the diversity of employees in 1Power, they can get in contact with people that are doing the same things in another field. Moreover, when the scoping stage is done through the community, it is eminent that many knowledge fields are available in the community to ensure a fully covered research. To stimulate innovation, no pre-selection should be made. People with specific knowledge gather around the topics of their interest; it is a self-selection process. According to Alliander, the people that have less knowledge on a certain idea can provide new highly valuable insights. The survey also indicated that active and motivated members are almost as important as the functional diversity (see appendix 9). Using the permutation test for paired replicates, it appeared that functional diversity is slightly more important than the availability of active members ([motiv][funcdiv] $d=5$, $p<0,05$). It is most beneficial to have a community with motivated diverse people. The survey distinguished four types: people that work with innovation, functional diverse people, general employees and active/motivated members; all these four types are significant. This implies that all these employees are important in an employee community, and generally, members must be active and functional diverse. It is less important to include people that work with innovation or general employees. However, it is important to include people with special talents and knowledge, since these can be of extra additional value when developing products or services. P6 is supported.

Community moderator

Proposition 7 concerns the presence of an innovative community moderator during the stages idea discovery and scoping. The survey indicated that the presence of an innovative community moderator is extremely important ([moderator] mean=6,22, stdev=0,833). A one-sample t-test confirms this significantly as well ($p=0,000$). To assess whether a community moderator is particular important during idea discovery and scoping, the case and field study are analyzed. During the interviews it appeared that two contrary perspectives exist regarding the presence of a community moderator. First, two cases did not use a community moderator. The platform is provided and promoted; members start discussions and find interesting topics themselves. Therefore the only role of a moderator would be promotion. One interviewee said: “Since it is an organizational community, people are professional and know what is useful and what not. Members regulate the community by themselves”. On the contrary, several interviewees indicated a high importance of an innovative community moderator for stimulating innovative activities. In one case in the field study, the community moderator promotes valuable ideas that are present in the community and is stimulating interaction around ideas and provides interesting content. Another case, Innovation Factory, states that the main activity is to motivate and trigger people and to indicate interesting discussions relevant to certain members. They also formulate questions for several members in order to assure a higher response rate. Furthermore, another important activity is to organize management support. They ask and stimulate management to participate in the community and to post enthusiastic messages. The community moderators of 1Power are the invisible force behind the community. Community moderators stimulate

members and this leads to a higher interaction that is eminent in the first stages. Besides, since community based innovation is new, people are distant in posting ideas and performing the scoping stage in the community. Therefore, the community moderator should help members in discovering the usefulness of a virtual employee community. Based on this, P7 is confirmed.

Motivation

Proposition 8 concerns the importance of intrinsic motivation in the stages idea discovery and scoping. The survey indicated that intrinsic motivation is extremely important ([motiv] mean=6,33, stdev=1,000). A one-sample t-test confirms this significantly as well ($p=0,000$). To assess whether intrinsic motivation is particular important during idea discovery and scoping, the case and field study are analyzed. To support innovation, members should participate based on willingness. Obligatory participation does not lead to the desired results as appeared in the case study. People that were assigned as members did not participate. "Since people are not yet part of team and do not yet have the resources to develop their idea, their motivation should be high in order to translate the idea into a specific concept". Employees find that innovation needs a higher priority within Achmea. And 1Power is a valuable initiative to achieve this. During the document analysis, it was found that the innovative goal is a reason for employees to join 1Power. Besides, one interviewee stated: "I like to work on innovation and new things. Therefore, I become very enthusiastic of all new ideas and discussions on 1Power". According to the document analysis, the main motivation for participation in an employee community is intrinsic; lurkers highly value the personal satisfaction and active contributors value usefulness. To support the attraction of motivated people, in the case study it appeared that open registration is a success factor in developing the community. People that ask for registration are more passionate about the domain and are more willing to participate in discussions. According to the field study, to increase the success of an internal community the interests of employees need to be captured. Cap Gemini identified that one of the main motivations of members is attention for their idea. To increase the innovation capacity of a company, employees should be intrinsically motivated to present their idea in the community. Which supports P8. Within Deloitte, the usefulness of the community is that the community opens doors for people that have an idea. One of the most important sources of motivation for participation in an employee community are usefulness related benefits, or 'what's in it for me?' The opportunity to present an idea is something that employees value. When the motivation of all members is high, discussions around ideas become more valuable. According to Cap Gemini people need to be triggered to do this. Therefore, it can be stated that a high intrinsic motivation is important in the stages idea discovery and scoping. P8 is supported.

Identification

Proposition 9 concerns the importance of a high identification in the stages development, testing/validation and launch. Based on the case and field study P9 can be confirmed: a high identification is particularly important during these stages. Work is the central issue and binding factor in the community. According to Winkwaves, in order to identify with a community, the community must represent the topics that people meet during their daily work. Deloitte states that when members find a specific idea a good idea, then they feel a higher identification. People are able to constantly track the progress made by an idea in the community. When people identify themselves with that idea, people are more willing to use the virtual employee community as a monitor. Currently, virtual employee communities aim at the first two stages of the innovation process; therefore it is difficult to investigate the monitor function during the

other stages. Within Achmea identification is seen as a problem. Since Achmea is an aggregation of different companies that partly operate in the same markets, people identify with their own label rather than the overarching Achmea label. People think they can post ideas and content related to Achmea and not for specific brands. Achmea employees should be made clear that 1Power is a method that should be used in the daily activities. When people identify with the community and organization they are more willing to share what they are doing within Achmea. Cap Gemini increases the identification by letting certain people participate, for example management. But they also increase the identification by initiating certain themes. This is aimed at activating specific groups; for example by organizing an idea challenge around a new Microsoft product, Microsoft Surface. Another method is by organizing offline events, people will get to know the community members and thereby the identification can be improved. But because of lacking experience P9 could not be supported.

Trust

Proposition 10 concerns the importance of high trust. Based on the case study P10 can be confirmed: trust needs to be particularly high during the stages idea discovery and scoping. One of the major issues concerning knowledge sharing and innovative activities in 1Power is trust. A barrier is its internal competition; this was mentioned during all in-depth interviews within the case study. As said earlier, Achmea has a lot of different divisions that perform partly the same activities, and therefore knowledge sharing within a community might cause a tangling of interests. The main implication this has on innovation is the unwillingness to share innovative ideas or valuable knowledge. People are reluctant to share ideas since they are afraid that other people will pick up the idea and start developing it within their own division. This supports P10. A method that is used by Achmea to defeat this problem is by dividing 1Power in sub-communities. Now, 1Power is using cockpits; in a cockpit project groups can share confidential knowledge and information with a selected number of employees. But these cockpits can only be used when a certain project is attached to it. A new solution for 1Power can be to divide 1Power into sub-communities related to the divisions. By doing this, 1Power is a general community, but people can become member of their own division where they can share division-confidential information. On the contrary, in the field study trust is not considered as a big issue. Within Deloitte it has not been a problem. Until now the public idea sharing has not lead to problems related to trust. People know how to cope with this and high trust is normally present within innovative employee communities. Trust should be high to stimulate people to release their ideas and find valuable input for that idea, and therefore P10 can be confirmed.

7.1.3 Practice

Type of activity

Proposition 11 concerns the type of activity that supports innovation during the stages idea discovery and scoping. Based on the case and field study P11 is supported: continuous interaction supports innovation during these stages. Community members feel that interaction enables an inspiring environment. Within 1Power, when an idea is presented, people provide their opinions and have discussions on the usefulness of an idea; it is aimed at refining the idea and its possible applications. During the idea discovery, ideas can be posted spontaneously or as a result of an idea challenge initiated by the organization. An example is an idea challenge within a cable company: employees all over the world were asked for ideas on how to apply a new service. In both the case and field study it appeared that a success factor of employee

communities is the combination of offline and online. During the 1Power workshops one member stated: “1Power should organize more of these events, because now the platform starts to live and I can meet interesting people that can help me, and that is important for me”.

In the scoping stage it is important that people provide useful knowledge and information around the idea. A community is able to do the full research in the scoping stage. To achieve this, high interaction is necessary. The new insurance developed through 1Power is an interesting example for this. Community members had discussions around the opportunities and experiences with comparable insurances. The continuous interaction appeared to increase the innovation capacity significantly and Innovation Factory and Achmea consider this as the main potential of a virtual employee community. Deloitte supports this method too. In chapter 8, a more detailed discussion is given. P11 is strongly supported.

Proposition 12 concerns the type of activity that supports innovation during the business case stage. Based on the case and field study P12 cannot be confirmed: it is unclear which type of activity supports innovation in the business case stage. During the business case stage currently punctual interaction is more common, but, according to Deloitte, in the future it might proceed to object centered sociality where interaction is more continuous. Since not a lot of experience is available, a small team is working on the business case and the community is asked for specific researches or knowledge. It would be beneficial to combine all researches that are available within an organization in a wiki or a toolkit. By doing this a database with business cases can be developed that can be used in new business cases. But based on the existing results, P12 cannot be confirmed, since it is still unclear and experiences are missing. Future research should investigate this. P12 could not be confirmed.

Proposition 13 concerns the type of activity that supports innovation during stages from development to launch. Based on the case and field study P13 can be confirmed: punctual interaction supports innovation in these stages. In the stages development, testing/validation and launch, the community is a monitor for progress made of all ideas that emerged through the community. People can constantly check the idea and are able to provide feedback. It is used to see what is happening in an organization. However in practice it appeared that feedback normally is not given, it is more common to ask specific questions to the community, since in these stages the needed knowledge becomes too specific. This is in line with P13. According to Cap Gemini, when interaction is too high in this stage, people might get frustrated by too much input. Furthermore, as one interviewee puts it: “If you start co-creating in these stages, then you actually go back to beginning, because there the benefit of co-creation is already provided”. However, when developing software products, during this stage it can be used as an open source community. During the testing and validation stage, the community can be used for the first testing phase. But this is dependent on the type of product: is the community suited? A common testing technique that can be done through a virtual employee community is alpha testing. It is also possible to ask the contact personnel for specific input from the clients. During the launch, besides monitor and punctual interaction, the community does not play a large role. It is possible to use the employee community as an additional commercial channel, but this is not common and not related to innovation. P13 is confirmed.

7.1.4 Organization

Organizational culture

Proposition 14 concerns the importance of an open organizational culture during all stages. Based on the case and field study P14 can be confirmed: an open organizational culture should be created. The culture within an organization has a major impact on the success of an employee community. Generally it is important that employees want to cooperate and share knowledge. According to Winkwaves, when there is no knowledge sharing culture within an organization it will be difficult to enable this online in a virtual employee community. In the case study, the organizational culture is one of the main barriers for the community. A major issue in the Achmea culture is commerciality and rivalry. For 1Power this implies that the closer someone gets to a commercial opportunity, the less someone is willing to share this. People tend to think in terms of their department or division, and this results in the fact that people do not want to share on 1Power. As one member puts it: "We need to tell each other more about what we are doing and thereby we need to share successes and failures. Within Achmea this is done too little." Therefore, Achmea is stimulating bottom-up innovation by collaboration, and by doing this innovation can become part of the daily activities. 1Power is a culture carrier and can become the connection between all divisions. Within Alliander the community is part of a culture-changing program. Eventually this will help in becoming a new and more open Alliander. On the other hand, within Cap Gemini, new employees in the organization are selected that prefer cooperation, and this also has a positive effect on the community. When the culture is open and knowledge sharing is promoted, the community is likely to be more successful. This confirms P14.

Organizational support

Proposition 15 concerns the issue to provide employees time to participate in a virtual employee community. Based on the case and field study P15 can be confirmed: providing time to members to participate is not an effective form of organizational support. The most important finding is that an employee community is without obligations. Therefore, in none of the cases employees were provided time to participate in the community. Only during the start of a community it might be necessary to provide several employee time to generate content for example for a wiki. But in general, members post ideas and ask questions within the community based on intrinsic motivation and therefore it is not necessary to provide additional time. "When time is provided, this does not lead to valuable input from employees". For 1Power, the main idea is that the community saves time, because people solve problems and find useful information that can speed up several activities of employees. P15 can be confirmed.

Although no proposition has been made on the technology, from the case and field study interesting implications on this element appeared. The community should be easily accessible and useable. Besides, technology should ensure that useful information is easy to find. Within Alliander it appeared that young people were more willing to adopt the technology than older people. The community should be comprehensible and easy to use. A major feature is a searching tool, because people and content should be easily found. However, to increase the effect on innovation the technology should be able to capture the social activity to a higher extent, as appeared in the case study. But practical guidelines for doing this are missing. As one interviewee stated it: "Can we measure the effects of 1Power on innovation within Achmea?" But since no real community-based innovation has emerged, there is no experience on how to do this.

Proposition 16 concerns the issue that rewards are not beneficial during the stages idea discovery and scoping. On the contrary, the survey proves that providing rewards to a virtual employee community is considered useful in general ([reward] mean=5,11, stdev=1,054). A one-sample t-test confirms this significantly as well ($p=0,013$). However, compared to the mean the standard deviation is rather high which indicates different opinions in the sample. Therefore insights from the case and field study are necessary. Interestingly, the interviewees did not support rewards. Especially economic incentives were not supported. Money is not a motivator for creativity. The reward that members receive is the possibility to present their idea to the organization. According to Cap Gemini, the ultimate reward is the realization of their idea. However, within Deloitte a sort of work related reward was provided to idea contributors. Employees of Deloitte were asked to contribute ideas based on a specific customer problem. The management chose the best ten ideas and the idea contributors got the opportunity to go to Dubai for a week with this group of ten people. This week was not meant as a leisure trip, but the aim was to let them develop the idea into a real concept within one week. At the end of the week the best concept was taken into production. The aim of this reward is to receive more ideas from the employees. Therefore, rewards appear to be beneficial for receiving more ideas during the idea discovery. This is opposed to P16. Although structural rewards are not supported, several interviewees indicated that it can be beneficial to provide small rewards, but this is a small extra. Within 1Power currently no rewards are provided, however the project team is searching for proper methods to provide small incidental rewards to active members. But this should be something useful and related to innovation. It should not be a habitual reward. P16 is not supported.

Proposition 17 concerns management participation in the community as part of organizational support. Based on the survey P17 can be confirmed strongly: management participation is an effective form of organizational support ([manpart] mean=6,156, stdev=0,726). A one-sample t-test confirms this significantly as well ($p=0,000$). Within Achmea it appeared that management activities in the community are important; posts by managers receive more readers and initiate more discussion. This is also apparent in the field study. Management should promote the usefulness of a community. And by doing this, management also recognizes the role a community plays within an organization. According to Winkwaves, however, management should only support and not intervene too much in discussions, since it is a bottom-up platform. "Something can work really well when it belongs to the employees, but when the boss is intervening too much, this will work detrimental". As appeared in the survey, management should not monitor the community too much ([mammon] mean=4,67, stdev=1,225). A one-sample t-test does not significantly confirm a higher value than 4 for management monitoring ($p=0,141$). Within 1Power, from time to time management is asked to write articles on their projects (development stages) or short forum posts that stimulate employees (support ideas). However the management in general does not participate on own initiative. Therefore, it can be concluded that organizational support for 1Power is not optimal. 1Power needs more attention and a better status in the organization. According to several interviewees the highest recognition would be to give 1Power a role in the innovation process. However, within the 1Power project team there is no consensus on this issue: focus on knowledge sharing or stimulate innovation? P17 is confirmed.

	Data collection method	Data test technique	Results	Conclusion
P1	Survey, case and field study	Mean and stdev Paired replication Qualitative	mean=44,44, stdev=11,02 mean=32,78, stdev=10.93 d=105, p>0,05	Supported
P2	Survey, case and field study	Mean, stdev, t-test Qualitative	mean=5,78, stdev=1,202, p=0.002 Transparent, share projects, monitor during development, testing and launch	Supported
P3	Survey and field study	Mean, stdev Paired replication Correlation Qualitative	mean=48,89, stdev=13,64 d=250, p<0,05 r=0,743, p<0,05 Share ideas, find support, provide enthusiasm	Supported
P4	Case and field study	Qualitative	Full research within a community	Supported
P5	Case and field study	Qualitative	Monitoring function Dependent on questions posted by the members	Supported
P6	Survey, case and field study	Mean, stdev, t-test Qualitative	mean=6.89, stdev=0,33, p=0.000 Functional diversity in every stage	Supported
P7	Survey, case and field study	Mean, stdev, t-test Qualitative	mean=6.22, stdev=0,833, p=0,000 No community moderator \leftrightarrow stimulating community moderator	Supported
P8	Case and field study	Mean, stdev, t-test Qualitative	mean=6,33, stdev=1,000, p=0,000 Willing to present idea, will to interact, usefulness, show competence	Supported
P9	Case and field study	Qualitative	Identification leads to higher interest in other projects, lack of experience	Not supported
P10	Case study	Qualitative	Internal competition, intellectual property, fear of stealing of ideas	Supported
P11	Case and field study	Qualitative	Continuous interaction supports creativity, idea refinement	Supported
P12	Case and field study	Qualitative	Tendency to both continuous and punctual, but experience is lacking	Not supported
P13	Case and field study	Qualitative	Monitor, feedback, specific questions	Supported
P14	Case and field study	Qualitative	Trust, willing to cooperate	Supported
P15	Case and field study	Qualitative	Time does not lead to desired activities	Supported
P16	Case and field study	Mean, stdev, t-test Qualitative	mean=5,11, stdev=1,054, p=0,013 Idea realization, receive more ideas, work related reward	Not supported
P17	Survey, case and field study	Mean, stdev, t-test Qualitative	mean=6,156, stdev=0,726, p=0,000 Management posts initiate more discussion	Supported

Table 1: results of the empirical analysis

8. Design: Employee community based innovation

As discussed in the previous sections, a virtual employee community can be integrated in all stages, but, as proved by Proposition 1, for increasing the innovation capacity of a company the highest benefit will be gained in the stages idea discovery, scoping and partly during the business case. Since in this thesis the main application of a virtual employee community is improving the innovation capacity of a company, it is useful to discuss the interaction within the employee community and these three stages into more detail. In the stages development, testing and validation and launch the virtual employee is used to monitor innovation within an organization, as appeared in Proposition 2. This monitor function will also be discussed shortly in this chapter.

8.1 Idea discovery

The pre-stage idea discovery is focused on the identification and generation of opportunities, fresh ideas and novel concepts. Making the distributed ideas in an organization visible and conveniently accessible to the employees and organization will increase the opportunity to innovate. A virtual employee community creates higher transparency than normal innovation methods. The idea discovery through an employee community can be distinguished along two dimensions. The first dimension is related to the party that takes the initiative: (1) community member initiative and (2) company initiative. The first one involves active community members that post ideas or opportunities. This is true bottom-up innovation. Second, as a company initiative, the organization asks the community to provide useful ideas in general or based on a certain problem; often mentioned as an idea challenge. This is a top-down initiated bottom-up innovation method. The second dimension of idea discovery is based on the interactivity in idea submission. This dimension involves the level of integration of the community in the resulted ideas: (1) low integration and (2) high integration. With low integration the idea is submitted to the organization and the organization decides which one is the most useful; the idea contributor is thanked for his idea. With high integration, the community is able to start discussions around the submitted ideas to refine his/her idea within the community. With high integration it is desirable to let the community select the most valuable ideas. The two distinctions made, result in the four forms of idea discovery in figure 6.

	Community initiative	Company initiative
High integration	Community based idea development	Community integrated idea challenge
Low integration	Idea box	Pure idea challenge

Figure 6: Four forms of idea discovery through employee communities

With regard to idea discovery as a community initiative, which is in line with Proposition 11, the employees are allowed to take much more initiative, because they can start discussions and propose new topics, not being dependent on the organization. When low integration of the community members is involved, the community platform can be considered as an idea box. Community members are able to post ideas in the community, but the community is not involved in the process after the idea post. The management can decide whether to use the idea or not. On the other hand, in the case of high integration, the community is involved more actively and this leads to community-based idea development. Discussions around a specific idea are stimulated and are aimed at refining the idea by letting people provide improvements. Therefore forums are the main method for participation in this type of idea discovery. Participation in community initiated idea discovery is often based on intrinsic motivation and the interaction between community members provides the highest value. To stimulate community initiatives, the community platform should provide an inspiring environment around the ideation process. Besides, it is important to post customer problems or challenges related to daily activities to support interaction. All this content together should trigger people to start discussions and to provide new ideas. As proved by Proposition 3, the discussions involve the exchange of generally tacit knowledge. Besides, in the idea discovery stage it is considered extremely important to provide support and enthusiasm. And therefore community based idea development is considered to improve the innovation capacity of an organization.

The other dimension concerns idea discovery as a company initiative. Often mentioned as an idea challenge. An idea challenge is an idea-generating tactic in which an organization disseminates details of a specific problem or situation through a community. The company poses a certain question to the community. This question is often related to a problem or future development and the community is asked to provide their ideas around this topic. An example mentioned during the interviews was an idea challenge based on Microsoft Surface. This is a new product of Microsoft and basically is a touch screen table. Employees of Cap Gemini were asked to provide ideas around the specific functionalities of this table. An important issue regarding idea challenges is that focus should be applied with care. Since in an idea challenge specific ideas are required, it is important to release a specific idea challenge. This can be done by applying several criteria to the challenge. Proposition 16 indicated that idea challenges normally involve a reward as an extrinsic motivator for participation. This reward can be a present, but a more useful reward is to provide the idea contributor resources for developing the idea. For example the Dubai idea trip, as was done by Deloitte. During an idea challenge it is possible to just ask for ideas or to integrate the community more intensely by allowing discussion around the ideas. According to Proposition 11, a community integrated idea challenge is supposed to increase the innovation capacity more than a normal idea challenge. The discussions and refinement is highly beneficial in creating higher quality ideas. Community members can start discussions around the submitted ideas in order to refine them. The organization is not dependent on the R&D department.

After the idea discovery stage a gate will follow. Gates provide an assessment of the quality of the project, ensuring that your business does the right projects. This first gate involves a gentle screen and does not yet involve a lot of investments. To increase the innovation capacity the influence of the first gate should be minimal. Since no investments are involved yet, the idea can proceed to scoping when there are sufficient enthusiastic employees around that idea. As proven

in Proposition 8, intrinsic motivation is needed for this. In addition, it is important that employees provide enthusiasm; when there are not a lot of responses to an idea, the idea possibly is not a viable one. Besides, as part of Proposition 17, management support is important in this gate. Management can stimulate people by posting a positive message to go ahead with their idea and start scoping it. The idea selection can also be more formal in the form of a Dragon's Den (based on the TV show), as is done by several organizations in the empirical analysis. The Dragon's Den is a committee that chooses the most useful ideas and provides resources to that idea. The Dragon's Den is more useful in an idea challenge.

8.2 Scoping

Scoping is the first and inexpensive homework stage and has the objective of determining the project's technical and marketplace merits (Cooper, 2001). An employee community provides additional capacity to scan and scope ideas. Just as in the idea discovery stage, it is important that the community consists of a diverse variety of employees with all kinds of knowledge and skills, in line with Proposition 6. The use of a virtual employee community in scoping is a completely new method for developing a product or service. Where an employee community in the idea discovery resembles methods used in customer communities, in the scoping stage there are no similar methods. In customer communities, customers provide ideas or design features, but in this case, employees are completing a full research on the feasibility of an idea. And therefore continuous interaction is extremely important, as proven by Proposition 11. This increases the innovation capacity since the employee community is doing the preliminary homework by combining all knowledge and relevant documents. This is the main potential of a virtual employee community to increase the innovation capacity of an organization. During empirical research it appeared that not a lot of initiatives exist in this field. However, nine out of thirteen interviewees support this methodology.

Full community integration within scoping increases efficiency and leads to a faster and more diverse research for less costs in less time. During empirical analysis this type of integration was called object-centered sociality (as described in chapter 3). The idea is the central object, and the sociality around that idea lead to people interacting by providing information and explicit knowledge, like market researches and competitor analyses. As appeared in Proposition 3 and 4, in the idea discovery stage people share mostly tacit knowledge and in the scoping stage people share both tacit and explicit knowledge and research information. The explicit knowledge and research is necessary for increasing the innovation capacity. To enable this, it is important that one or more persons guide the process based on intrinsic motivation (Proposition 8). Besides, they guard the idea and harmonize knowledge. These persons should know exactly which researches and knowledge should be gathered. This is based on existing scoping methods and guidelines that are common in the organization. Therefore according to Proposition 7, the community moderator should activate and motivate people in the stages idea discovery and scoping.

To stimulate an efficient use of the community, it is beneficial to develop a toolkit that helps in completing the scoping phase. This toolkit provides a design for the scoping document. This is a guide that indicates everything that decision makers need to know in the gate after the scoping stage. By providing this guide, a more complete analysis will be done and the community can be

used more efficiently in that specific missing input can be asked. For instance, developing a wiki can be part of the toolkit where the design is given and employees can complete an idea by providing their knowledge. A condition for this toolkit is that it does not frustrate the creativity of community members. Since lots of employees are able to provide support, knowledge and information, the research is often more widely covered and better supported.

As a result of this iterative process, a small group of knowledgeable people will emerge around an idea. The most enthusiastic people are likely to be willing to participate in the following stages of the product development. These enthusiastic people are necessary for bringing the idea to the business case stage. They can form the basis for the team that eventually will develop the product. They are devoted to providing resources to the idea. When confidential information, such as financial details, is needed, it is possible to form a sub-community with these enthusiastic people. Achmea uses the so-called cockpits where people can share knowledge with selected people. These cockpits are linked to a certain idea or project. This increases trust that is particularly important during the stages idea discovery and scoping, as stated by Proposition 10. When trust is low, the organization needs to find methods to increase it. Achmea wants to achieve this by developing white label products. White label products are products that do not have a brand yet. All people can provide their knowledge, and at the end of the scoping stage it is decided which division is most suited for this product or service. It is also possible that a white label product leads to different versions, one for every division with a certain market.

The gate that follows in order to proceed to building the business case is more formal than the first gate. But before this gate is entered it is subjected to several criteria in order to assess whether all information is available. This is a task of the idea owner or developer. Which stresses the importance of intrinsic motivation in this stage as proved by Proposition 8. When information is missing it might be necessary to do additional research or ask for it specifically within the community. Since the method as just described is new and not well developed we advise to use the formal method for approval in this stage. During empirical analysis it appeared that it is still unclear to what extent a community is able to take strategic decisions. Future research should indicate whether it is beneficial to transfer decision power from the management board to the community and to what extent.

8.3 Building the business case

The stage building the business case opens the door to product development. It is a detailed investigation stage that clearly defines the product and verifies the attractiveness of the project prior to heavy spending (Cooper, 2001). As was indicated by Proposition 1, it is agreed that the role of a virtual employee community is smaller in this stage. In the business case the strengths of the people that have shown their value are applied. Based on the group of enthusiasts in the scoping stage a team of dedicated people should be created. However, it is also possible that management might want to assign certain skills or people to the project. The ideal method is that within the community a culture will be created where people create teams of enthusiastic people based on an idea. Within Deloitte, team formation is normally done by sending an email, but a community can replace this by forming groups of people around an idea (partly) within the community.

As proved by Proposition 4, the community provides input to the heavy stage front homework by proving explicit knowledge. However, this stage cannot be fully executed by the community, since the idea becomes too specific and it involves quantifying strategic decisions. The most beneficial type of activity could not be confirmed, as appeared in Proposition 12. In this stage the interaction with the community becomes lower (punctual), but still the community can provide a higher innovative potential. The business case should be developed in a sub-community and other community members can trace the progress made (the monitor function). After this stage the development is normally taken offline and then the community can be used as a monitor for innovation projects (Proposition 2) and thus leads to more punctual interaction, as stated by Proposition 13.

8.4 *Monitoring the process*

As proved by Proposition 2, a virtual employee community is a valuable method for monitoring innovation within organizations. When a product is being developed it is important to constantly report the progress made. By doing this people can easily check the developments around innovation in the organization. As stated by Proposition 9, identification is important in order to enable this. It leads to a higher involvement inside and outside the own work field. The other way around, the project team can also post specific questions in the community that might help them in the development or testing, as stated by Proposition 13. The monitoring process has two sides, a public and a private one. First the public side should be accessible by all community members. It involves a general description of the project but also several typical characteristics that indicate the relevant knowledge fields of that particular project. This enables community members to identify relevant projects, and overcomes that people are working on the same topics. The private side is a sub-community that involves all team members and possibly several management people. Within the sub-community people can share specific information and discussions can be more deeply. It should also be used as a database with relevant documents and project plans. The decision on what should be private and what should be public is dependent on the team members.

9. Conclusions, limitations and further research

A virtual employee community is a new method for increasing the innovation capacity of organizations. But since this methodology is new and not a lot of examples exist, there is a lack of structured and theoretically grounded knowledge. From literature it appeared which stages are the most important for achieving this, and from a case and field study it appeared how this can be done. The research started with describing relevant literature. This resulted in the combination of both virtual communities and innovation literature. Aspects from both fields are highlighted in order to construct a framework and a set of propositions that served as the basis for analyzing virtual employee communities for innovation. In-depth data were collected from six organizations that were involved in topic of this study. Implications from practice have been identified that were used to describe how a virtual employee community can increase the innovation capacity of an organization.

9.1 Conclusions and contributions to theory and practice

This study started with providing a better theoretical ground for virtual employee communities. There is little theoretically grounded knowledge on how to develop, manage and improve such communities. Describing the literature of communities of practice, knowledge management and partly customer communities has improved the understanding on nurturing internal business communities. This master thesis has also made the first attempt to bridge the literature gap regarding the innovative potential of an employee community by applying innovation literature to employee communities. Mostly, it is solely related to knowledge management. But now it can be confirmed that it is a valuable method for innovation. The largest potential is to increase the innovation capacity by integrating a virtual employee community in the stages idea discovery, scoping and partly the business case. After these stages a team is already formed and the use of intellectual resources is lower; it is focused at the consumption of tangible resources. This research found that a virtual employee community generally supports five aspects:

- It increases the efficiency of the innovation process in a company
- It is a communication system that enables employees to connect to other employees with specialized knowledge
- It enables better coordination of innovative projects throughout the organization
- It enables the capturing of information on the innovation performance and learning disciplines throughout the years
- It improves the alignment between organizational and personal objectives

To guarantee the innovative potential of an employee community, employees throughout all departments need to be united. This leads to an easy and efficient method for collaboration. By using the collective wisdom available in a community, the collaboration could lead to better and faster problem solving and decisions. Normally people have created a collective blind spot, and by uniting all departments within a community, people can be made aware of this blind spot. The combination of different knowledge bases enables new perspectives in existing markets and stimulates innovation and enables employees to work more efficiently. Besides, employees can ask specific questions to the community in order to solve problems or find missing knowledge. It unlocks the value of knowledge in an organization. An employee community stimulates bottom-up innovation from all employees; it is no prerequisite that they work with innovation. Therefore,

the main conclusion for the member composition is to strive for functionally wide spread employees that are active and are willing to participate. To enable a better use of intellectual resources, intrinsic motivation appeared to be particularly important during the first three stages. Within employee communities it appeared that the main motivation is the perceived usefulness. When people experience that they find knowledge and people that they otherwise would not have found, then they are motivated to participate.

This study provides important information for both practice and theory in that it describes the value of a virtual employee community in the different stages of the innovation process. An internal community does not only increase the efficiency of innovation, but by integrating it in the first part of the innovation process the innovation capacity is increased as well. It can break down the R&D silo and allows a broader range of collaborators that participate. By setting up an employee community, R&D within organizations can be transformed into something more diverse and inclusive, and it leads to new possibilities for creation and discovery throughout the organization. Since there are no methods available for doing this, this research significantly contributes to management theory. The method described enables organizations to stimulate bottom up innovation. Besides, it shows organizations the possibilities to gather and develop ideas more efficiently. In the innovation process, a virtual employee community serves two main purposes: (1) increase the innovation capacity (during idea discovery, scoping and partly the business case); (2) a monitor for innovation projects in an organization (generally starting at the business case). This is facilitated by five aspects mentioned earlier.

In the idea discovery stage, an employee community is a valuable method for making distributed ideas from all parts of the organization accessible. Within organizations a lot of ideas are not captured, therefore, organizations should create a formal location where employees share and discuss their ideas. A virtual community enables employees to discuss these ideas that might lead to new products (Agerfalk et al, 2008). The community creates higher transparency than an R&D department. In this study four methods for doing this are presented: two based on the company's initiative and two by the community's initiative. To increase the innovation capacity, after an idea is presented, discussions need to be stimulated and this starts with sharing tacit knowledge and support and opinions are brought to that idea. This leads to idea refinement and enables a first screening of an idea. And it results in the possibility to skip the first gate of the stage gate model. To do this efficiently, the community members should provide enthusiasm and support.

As appeared in this study, community integration in the scoping stage leads to a higher innovation capacity. The capacity can be found to provide intellectual sources to bring an idea to the next level. It is important that employees provide explicit knowledge and relevant research information. However, caused by a lack of experience, it appeared that it is still difficult to use a community in the scoping stage. But when successfully executed, the employee community is able to do the preliminary homework by combining all knowledge and relevant documents. And this solves the capacity problem of the R&D department. Full community integration within scoping leads to a faster and more diverse research for fewer costs in less time.

After the scoping stage, the role of a community will be lower. In the business case stage, the community can still provide useful knowledge and research information, but in general, the required information becomes too specific for a community. But ideas are relevant until the business case. After this, the main function will be monitoring innovation projects. By doing this, an organization improves the utilization of knowledge of employees and the use of previous researches. The community is a valuable method for showing what is happening in the

organization and what occupies people. In the ideal form, an employee community is a monitor for all innovative projects within organizations. This enables employees to provide relevant input to the project. On the other side, when someone gets stuck at a certain moment, that person can ask for specific knowledge, experiences or skills from the community.

To strengthen the research, additional factors, such as motivation, community moderator and organizational support are considered. This increases the managerial relevance since it provides guidelines and implications on how to stimulate and implement an employee community. The conclusions drawn are an answer to research sub question 5. First, to increase the innovation capacity, members should be intrinsically motivated to participate. This is particularly important during the stages idea discovery and scoping. In addition, the importance of intrinsic motivation is stressed by the fact that it is not beneficial to provide time for participation within a community.

Second, organizational support appeared to be crucial. Since it is a bottom-up innovation method, the organization needs to support this method in order to be effective. Support can be shown by promotion within the organization, or by participating in the community and stimulating enthusiastic employees. The organization must provide resources necessary for the community, such as costs to set up the platform, and costs for promotion. An organization can also decide to provide rewards. But providing rewards is dependent on the goal someone has envisioned for the community. During an idea challenge it is beneficial to provide rewards, but normally it is not common and participation should be based on intrinsic motivation. Finally, since a virtual employee community is a bottom up method, it is important that the organization does not put too much control on the community.

Thirdly, an important facilitating element is an innovative community moderator. He or she should promote corporate action and should make members aware of interesting topics. The moderator is particularly important during the idea discovery and scoping, since employee need to share intellectual resources more actively in these stages. The community moderator plays a facilitating role and should not participate too much in the community.

Another major issue is the presence of high trust. Without trust people are unwilling to share their ideas and knowledge. Trust in a community appeared to be dependent on the organization, some companies are open and trust is no issue and in others it is seen as a major issue. The main method for improving trust is by increasing the social awareness of a community. When people know each other, trust is often higher and people are more willing to share knowledge.

Finally, a crucial success factor is the combination of online and offline activities. Offline interaction helps virtual community members understand, trust, and identify with one another, and thus provides a stronger base for online community activity. Offline events increase the usefulness for the community members, and this is crucial for intrinsic motivation.

9.2 *Limitations and suggestions for further research*

Even though this explorative research has added to both the strategic management and organizational science literature, it does have certain limitations. First, since not a lot of initiatives of virtual employee communities for innovation exist and not a lot of experience is available it might be that the results of this study are only limited applicable in the future. Although much information is collected with care, the results should not be considered

definitive. Because of the emerging nature and broad range of the topic, this study forms a scientific basis for the subject.

Another limitation that needs to be mentioned is the fact that the gathered data is service oriented rather than product oriented. The first-movers on the field of virtual employee communities for innovation appear to be service providers and developers of intangible products. This tendency is caused by the fact that knowledge intensive organizations, such as service providers, are searching for new methods to manage and combine knowledge throughout all departments. On the other hand, the main innovative potential of employee communities lies in the first three stages; in these stages no physical production is done. These stages include idea discovery and its development into a business case and no real production takes place. Therefore the results of this research can be seen as generally applicable to both services as well products. It concerns the use of intellectual resources and exchange between employees throughout an organization.

The study was the first in describing the exact innovative potential of a virtual employee community. To increase its external validity, future studies based on a larger number of employee communities should describe how well this method could be used in the innovation process. Testing and refining the design for employee community-based innovation will result in the development of a useful tool that should ultimately increase innovation within organizations. Further research will then be able to identify and analyze challenges in this field. This should also assess how many ideas or projects can be executed simultaneously in a community without decreasing the efficiency and motivation of its members. Besides, for future research, it might be interesting to compare service and product manufacturing organizations.

In addition, this study has described the interaction of an employee community in the stage gate model into detail. It has mainly focused on the activities that stimulate innovation through the various stages of the stage gate process and has put less emphasis on the decisive capabilities of an employee community in the innovation process, because of lacking experiences in this field. Therefore, further research should investigate the ability of a virtual employee community to make decisions on useful and successful ideas and projects. In this possible future direction of research, the role of decision-making should address both the role of a company and the community itself in employee community-based innovation.

Furthermore, in this research it is described that the process from idea discovery to the business case can be efficiently done within a community. What remains rather unclear is the type of ideas and projects that are suitable for this type of product development. This research addressed the issue of internal competition that was found in the case study at Achmea. Other factors, such as the newness of the innovation, can also be of substantial influence on the applicability of employee community-based innovation. Because of the emerging nature of the topic, this could not have been assessed at the moment of doing this research.

Finally, for further research it would be useful to investigate how a virtual employee community can be effectively integrated in the scoping stage. It would be useful to develop a toolkit or clear methodology on how to perform the scoping stage. But to enable this, more experience should be available on this application.

References

- Agarwal, N.C. (1998). 'Reward systems: emerging trends and issues'. *Canadian Psychology*; Vol. 39; No 1-1; pp. 60-70
- Agerfalk, P.J., Edenius, M. & Hrastinski, S. (2008). 'Framing participation in organizational online communities: research challenges'. 31st Information Systems Research Seminar in Scandinavia; pp. 1-10
- Alavi, M. & Tiwana, A. (2003). 'Knowledge management: the information technology dimension'. In: Easterby-Smith, M. & Lyles, M.A. (Eds). 'The Blackwell Handbook of Organizational Learning and Knowledge Management'. Blackwell, Malden, MA, pp. 104-121
- Albors, J., Ramos, J.C. & Hervas, J.L. (2008). 'New learning network paradigms: Communities of objectives, crowdsourcing, wikis and open source'. *International Journal of Information Management*; Vol. 28; No. 3; pp. 194–202
- Andriessen, J.H.E. (2006). 'Knowledge Communities in fives'. IS - 2006-01 Delft Innovation System Papers; pp. 1-29
- Ardichvili, A., Page, V. & Wentling, T. (2003). 'Motivation and barriers to participation in virtual knowledge-sharing communities of practice'. *Journal of Knowledge Management*; Vol. 7; No. 1; pp. 64-77
- Ardichvili, A. (2008). 'Learning and Knowledge Sharing in Virtual Communities of Practice: Motivators, Barriers, and Enablers'. *Advances in Developing Human Resources*; Vol. 10; No. 4; pp. 541 - 554
- Barney, J.B., (1991). 'Firm Resources and Sustained Competitive Advantage'. *Journal of Management*; Vol. 17; No. 1; pp. 99-120
- Bartol, K.M. & Srivastava, A. (2002). 'Encouraging knowledge sharing: the role of organizational reward systems'. *Journal of Leadership and Organizational Studies*; Vol. 9; No. 1; pp. 64–76
- Benabou, R. & Tirole, J. (2003). 'Intrinsic and Extrinsic Motivation'. *Review of Economic Studies*; Vol. 70; No. 3; pp. 489–520
- Bitzer, J., Schrettl, W. & Schröder, P.J.H. (2004). 'Intrinsic Motivation in Open Source Software Development'. *Journal of Comparative Economics*; Vol. 35; No. 1; pp. 160-169
- Boeddrich, H.J. (2004). 'Ideas in the Workplace: A New Approach Towards Organizing the Fuzzy Front End of the Innovation Process'. *Creativity and Innovation Management*; Vol. 13; No. 4; pp. 274-285
- Bowers, M. R. (1989). 'Developing New Services: Improving the Process Makes It Better'.

Journal of Services Marketing; Vol. 3; No. 1; pp. 15-20

Breslin, J. G. & Decker, S. (2007). 'The Future of Social Networks on the Internet: The Need for Semantics'. IEEE Internet Computing Magazine; Vol. 11; No. 6; pp. 86-90

Bross, J., Sack, H. & Meinel, C. (2007). 'Encouraging Participation in Virtual Communities: The "IT-summit-blog" Case'. IADIS International Journal on WWW/Internet; Vol. 5; No. 2; pp. 113-129

Butler, B., Sproull, L., Kiesler, S. & Kraut, R. (2002). 'Community effort in online groups: who does the work and why'. In: Weisband, S. & Atwater, L. (2002). Leadership at a Distance; Lawrence Erlbaum Publishers, Mahwah, NJ.

Chan, T. & Lee, J. (2004). 'A Comparative Study of Online User Communities Involvement in Product Innovation and Development'. 13th International Conference on Management of Technology -- IAMOT (2004)

Chiu, C., Hsu, M. & Wang, E. (2006). 'Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories'. Decision Support Systems; Vol. 42; No. 3; pp. 1872-1888

Chow, A.W., Goodman, B.D., Rooney, J.W. & Wyble, C.D. (2007). 'Engaging a corporate community to manage technology and embrace innovation'. IBM Systems Journal; Vol. 46; No. 4; pp. 639-650

Cooper, L.P. (2003). 'A research agenda to reduce risk in new product development through knowledge management: a practitioner perspective'. Journal of Engineering Technology Management; Vol. 20; No. 1-2; pp. 117-140

Cooper, D.R. & Schindler, P.S. (2003). "Business research methods". McGrawHill: New York.

Davila, T., Epstein, M.J. & Shelton, R. (2006). 'Making innovation work: how to manage it, measure it, and profit from it'. Fourth printing; December 2006; Wharton School Publishing

Dougherty, D. (1992). 'Interpretive barriers to successful product innovation in large firms'. Organization Science; Vol. 3; No. 2; pp. 179-202

Du Plessis, 2008. 'The strategic drivers and objectives of communities of practice as vehicles for knowledge management in small and medium enterprises'. International Journal of Information Management; Vol. 28; No. 1; pp. 61-67

Ebner, W., Bretschneider, U., Leimeister, M. & Krcmar, H. (2008). 'Virtual Communities for Innovations: Users' requirements for the development of an academic SAP User Group'. Proceedings of the 41st Hawaii International Conference on System Sciences; pp. 1-8

Fahey, R., Vasconcelos, A.C. & Ellis, D. (2007). 'The impact of rewards within communities of

practice: a study of the SAP online global community'. *Knowledge Management Research & Practice*; Vol. 5; No. 3; pp. 186-198

Franke, N. & Shah, S. (2003). 'How communities support innovative activities: an exploration of assistance and sharing among end-users'. *Research Policy*; Vol. 32; No. 1; pp. 157–178

Füller, J., Bartl, M., Ernst, H. & Muhlbacher, H. (2006). 'Community based innovation: How to integrate members of virtual communities into new product development'. *Electronic Commerce Research*; Vol. 6; No. 1; pp. 57-73

Füller, J. & Matzler, K. (2007). 'Virtual product experience and customer participation—A chance for customer-centred, really new products'. *Technovation*; Vo. 27; No. 6; pp. 378–387

Garfield, S. (2006). 'Ten reasons why people don't share their knowledge'. *KM Review*; Vol. 9; No. 2; pp. 10-11

Goffin, K. & R. Mitchell (2005). *Innovation Management: Strategy and Implementation Using the Pentathlon Framework*. Palgrave Macmillan.

Hagel, J. & Armstrong, A.G. (1997). 'Net Gain: Expanding Markets through Virtual Communities'. Boston: Harvard Business School Press

Hall, H. (2001a). 'Input-friendliness: motivating knowledge sharing across intranets'. *Journal of Information Science*; Vol. 27; No. 3; pp. 139-146

Hall, H. (2001b). 'Social exchange for knowledge exchange'. Paper presented at *Managing Knowledge: Conversations and critiques*, 10–11 April 2001; University of Leicester Management Centre.

Hars, A. & Ou, S. (2002). 'Working for free? – Motivations of participating in open source projects'. *International Journal of Electronic Commerce*; Vol. 6; No. 3; pp. 25–39

Hildreth, P.M., Kimble, C. & Wright, P. (2000). 'Communities of practice in the distributed international environment'. *Journal of Knowledge Management*; Vol. 4; No. 1; pp. 27-38

Hildreth, P.M. & Kimble, C. (2004). 'Knowledge Networks: Innovation Through Communities of Practice'. Idea Group Inc (IGI)

Ishaya, T. & Mundy, D.P. (2004). 'Trust Development and Management in Virtual Communities'. *LNCS*; Vol. 2004; pp. 266-276

Jantunen, A. (2005), 'Knowledge-processing capabilities and innovative performance: an empirical study'. *European Journal of Innovation Management*; Vol. 8; No. 3; pp. 336-349

Janz, D. & Prasarnphanich, P. (2003). 'Understanding the antecedents of effective knowledge management: The importance of knowledge-centered culture'. *Decision Sciences*; Vol. 34; No. 2; pp. 351-384

- Janzik, L. & Herstatt, C. (2008). 'Innovation Communities: Motivation and Incentives for Community Members to contribute'. Proceedings of the 2008 IEEE ICMIT; pp. 350-355
- Jian, G. & Jeffres, L.W. (2006). 'Understanding Employees' Willingness to Contribute to Shared Electronic Databases: A Three-Dimensional Framework'. Communication Research; Vol. 33; No. 4; pp. 242-261
- Johnson, C.M. (2001). 'A survey of current research on online communities of practice'. Internet and Higher Education, Vol. 4, pp. 45-60
- Khurana, A. & Rosenthal, S.E. (1998). 'Towards Holistic Front Ends In New Product Development'. Journal of Product Innovation Management; Vol. 15; No. 1; pp. 57 - 74
- Kimble, C., Li, F. & Barlow, A. (2000). 'Effective Virtual Teams through Communities of Practice'. Management Science Research Paper; No. 9; pp. 1-15
- Kodama, M. (2001). 'Innovation through Strategic Community Management: The Case of NTT DoCoMo and the Mobile Internet Revolution'. Creativity and innovation management; Vol. 10; No. 2; pp. 75-87
- Kodama, M. (2006). 'Strategic Community: Foundation of Knowledge creation'. Research-Technology Management; Vol. 49; No. 5; pp. 49-58
- Koen, P.A., Ajamian, G.M., Boyce, S., Clamen, A., Fisher, E., Fountoulakis, S., Johnson, A., Puri, P. & Seibert, R. (2002). "Fuzzy Front End: Effective Methods, Tools and Techniques". In: Belliveau, P., Griffin, A. & Somermeyer, S. (2002). "The PDMA Toolbook for New Product Development". Wiley, New York, NY, USA
- Koh, J., Kim, Y.G., Butler, B. & Bock, G.W. (2007). 'Encouraging Participation in Virtual Communities'. Communications of the ACM; Vol. 50; No. 2; pp. 69-73
- Koper, R., Pannekeet, K., Hendriks, M. & Hummel, H. (2004). 'Building communities for the exchange of learning objects: theoretical foundations and requirements'. Research in Learning Technology; Vol. 12; No. 1; pp. 21-35
- Kotler, P. (2003). 'Marketing Management'. Prentice Hall; Eleventh Edition
- Krueger, J. & Killham, E. (2006). 'Who's driving innovation at your company?'. Gallup Management Journal; Vol. sep-oct; pp. 1-6
- Kwok, J.S.H. & Gao, S. (2004). 'Knowledge sharing community in P2P network: a study of motivational perspective'. Journal of Knowledge Management; Vol. 8; No. 1; pp. 94-102
- Lave, J. & Wenger E. (1991). 'Situated Learning: Legitimate Peripheral Participation'. Cambridge: Cambridge University Press
- McAlexander, J.H., Schouten, J.W. & Koenig, H.F. (2002). 'Building brand community'. Journal of Marketing; Vol. 66; No. 1; pp. 38-54

- McLure-Wasko, M. & Faraj, S. (2000). ‘It is what one does’: why people participate and help others in electronic communities of practice’. *Journal of Strategic Information Systems*; Vol. 9; No. 2-3; pp. 155 - 173
- McLure-Wasko, M. & Faraj, S. (2005). ‘Why should I share? Examining social capital and knowledge contribution in electronic networks of practice’. *MIS Quarterly*; Vol. 29; No. 1; pp. 35-57
- Michaelides, R. & Morton, S.C. (2008). ‘Managing Innovation through Virtual Global Communities: Challenges and Benefits’. *Proceedings of the 2008 IEEE ICMIT*; pp. 1216-1221
- Millen, D.R., Fontaine, M.A. & Muller, M.J. (2002). ‘Understanding the benefit and costs of Communities of Practice’. *Communications of the ACM*; Vol. 45; No. 4; pp. 69-73
- Mumford, M.D. (2000). ‘Managing creative people: Strategies and tactics for innovation’. *Human Resource Management Review*; Vol. 10; No. 3; pp. 313-351
- Murphy, S. & Kumar, V. (1997). ‘The front-end of new product development: a Canadian survey’. *R&D Management*; Vol. 27; No. 1; pp. 5-15
- Nambisan, S. (2002). ‘Designing virtual customer environments for new product development: Toward a theory’. *The Academy of Management review*; Vol. 27; No. 3; pp. 392-413
- Nijhof, A., Krabbendam, K. & Looise, J.C. (2002). ‘Innovation through exemptions: building upon the existing creativity of employees’. *Technovation*; Vol. 22; No. 11; pp. 675-683
- Osterloh, M. & Frey, B.S. (2000). ‘Motivation, knowledge transfer, and organizational forms’. *Organization Science*; Vol. 11; No. 5; pp. 538-550
- Ridings, C.M., Gefen, D. & Arinze, B. (2002). ‘Some antecedents and effects of trust in virtual communities’. *Journal of Strategic Information Systems*; Vol. 11; No. 3-4; pp. 271–295
- Rothaermel, F.T., & Sugiyama, S. (2001). ‘Virtual Internet communities and commercial success: individual and community-level theory grounded in the atypical case of TimeZone.com’. *Journal of Management*; Vol. 27; No. 3; pp. 297-312
- Ruppel, C.P. & Harrington, S.J. (2001). ‘Sharing knowledge through Intranets: a study of organizational culture and Intranet implementation’. *IEEE Transactions on Professional Communication*; Vol. 44; No. 1; pp. 37-52
- Ryan, R.M. & Deci, E.L. (2000). ‘Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions’. *Contemporary Educational Psychology*; Vol. 25; No. 1; pp. 54–67
- Saint-Onge, H. & Wallace, D. (2003). ‘Leveraging Communities of Practice for Strategic Advantage’. *Butterworth-Heinemann*
- Sands, M. (2003). ‘Integrating the Web and email into a push-pull strategy’. *Qualitative Market Research*; Vol. 6; No. 1; pp. 27-37

- Saunders, M.N.K, Lewis, P. & Thornhill, A. (2000). 'Research Methods for Business Students'. Second Edition; Prentice Hall International, New Jersey
- Sawhney, M., Verona, G. & Prandelli, E. (2005). 'Collaborating to create: The Internet as a platform for customer engagement in product innovation'. *Journal of Interactive Marketing*; Vol. 19; No. 4; pp. 4-17
- Scarborough, H. (2003). 'Why your employees don't share what they know'. *Knowledge Management Review*; Vol. 6; No. 2; pp. 16-20
- Sethi, R., Smith, D.C. & Whan Park, C. (2006). 'Cross-functional product development teams, creativity, and the innovativeness of new consumer products'. *Journal of Marketing Research*; vol. 38; No. 1; pp. 73-85
- Sethi, R. & Iqbal, Z. (2008). 'Stage-Gate Controls, Learning Failure, and Adverse Effect on Novel New Products'. *Journal of Marketing*; Vol. 72; No. 1; pp. 118-134
- Sharratt, M. & Usoro, A. (2003). 'Understanding Knowledge-Sharing in Online Communities of Practice'. *Electronic Journal on Knowledge Management*; Vol. 1; No. 2; pp. 187-196
- Shen, C. & Cho, H. (2008). 'Why People Contribute to Online Learning Communities: A Case Study on Motivational Factors'. Paper presented at the annual meeting of the International Communication Association, Sheraton New York, New York City
- Siegel, S. & Castellan, N. J. Jr. (1988). "Non-parametric Statistics for the Behavioral Sciences". 2nd ed. Singapore: McGraw-Hill.
- Tang, H.K. (1998). 'An integrative model of innovation in organizations'. *Technovation*; Vol. 18; No. 5; pp. 297-309
- Tedjamulia, S.J.J., Dean, D.L., Olsen, D.R. & Albrecht, C.C. (2005). 'Motivating Content Contributions to Online Communities: Toward a More Comprehensive Theory'. *Proceedings of the 38th Annual Hawaii International Conference on System Sciences*; pp. 1-10
- Van Aken, J.E., Berends, H. & Van der Bij, H. (2007). 'Problem Solving in Organizations: A Methodological Handbook for Business Students'. Cambridge University Press, 2007
- Van Strien, P.J. (1997). 'Towards a Methodology of Psychological Practice'. *Theory & Psychology*; Vol. 7; No. 5; pp. 683-700
- Verganti, R. (1997). 'Leveraging systemic learning to manage the early phases of product innovation projects'. *R&D Management*; Vol. 27; No. 4; pp. 377-92
- Verona, G. (1999). 'A Resource-Based View of Product Development'. *The Academy of Management Review*; Vol. 24; No. 1; pp. 132-142
- Vestal, W. (2006). 'CoPs in progress: APQC and Texas Medical Association'. *Knowledge Management Review*; Vol. 9; No. 1; pp. 8-9

- Voelpel, S.C., Eckhoff, R.A. & Förster, J. (2008). 'David against Goliath? Group size and bystander effects in virtual knowledge sharing'. *Human Relations*; Vol. 61; No. 2; pp. 271-295
- Von Hippel, E. (2005). 'Innovation by User Communities: Learning from open source software'. *MIT Sloan Management Review*; Vol. 42; No. 4; pp. 82-86
- Wang, Y. & Fesenmaier, D.R. (2003). 'Assessing Motivation of Contribution in Online Communities: An Empirical Investigation of an Online Travel Community'. *Electronic Markets*; Vol. 13; No. 1; pp. 33-45
- Wang, C.C. & Lai, C.Y. (2006). 'Knowledge Contribution in the Online Virtual Community: Capability and Motivation'. *Knowledge Science, Engineering and Management*; Vol. 4092; pp. 442-453
- Wellman, B. (2001). 'Physical place and cyberplace: The rise of personalized networking'. *International Journal of Urban and Regional Research*; Vol. 25; No. 2; pp. 227-252
- Wenger, E. (1998). 'Communities of Practice: Learning, Meaning, and Identity'. Cambridge: Cambridge University Press
- Wenger, E. (2004). 'Knowledge management is a doughnut: shaping your knowledge strategy with communities of practice'. *Ivey Business Journal*. Vol. 68; No. 3; pp. 1-8
- Wenger, E., McDermott, R. & Snyder, W.M. (2002). 'Cultivating Communities of Practice: A guide to managing knowledge'. Boston: Harvard Business School Press
- Wenger, E. & Snyder, W.M. (2000). 'Communities of Practice: The Organizational Frontier'. *Harvard Business Review* Jan-Feb.: pp. 139-145
- Williams, R.L. & Cothrel, J. (2000). 'Four Smart Ways to Run Online Communities'. *Sloan Management Review*; Vol. 41; No. 4; pp. 81-91
- Wright, P.M., Dunford, B.B. & Snell, S.A. (2001). 'Human resources and the resource based view of the firm'. *Journal of Management*; Vol. 27; No. 6; pp. 701-721
- Yeoman, A., Urquhart, C. & Sharp, S. (2003). 'Electronic Library for Health and Its Virtual Branch Libraries Moving Communities of Practice Forward: The Challenge for the National'. *Health Informatics Journal*; Vol. 9; No. 4; pp. 241-251
- Yin, R.K. (1994). 'Case study research: Design and Methods'. Second edition; Sage Publications
- Zahay, D., Griffin, A. & Fredericks, E. (2004). 'Sources, uses, and forms of data in the new product development process'. *Industrial Marketing Management*; Vol. 33; No. 7; pp. 657-666

Appendix 1 – Virtual Communities and other Organizational Forms

Organizational Form	Practice	Boundaries	Membership	Role in organization	Lifetime
Virtual community	Define own practice, create, share and develop knowledge	Flexible	Self selected, based on knowledge	Voluntary	Dependent on value to members
Business or functional unit	Predefined practice, based on task or process; shape the organization	Clearly defined	Selected by management, based on task	Full job	Dependent on organization's lifetime
Team	Predefined practice, specific organizational task, take care of projects	Clearly defined	Selected by team or management, based on task	Full job or part of it	Dependent on institutional schedule
Network	No real content, form relationships	Undefined	Based on connections, e.g. friends, colleagues	Voluntary	Dependent on existent connections

Table based on Wenger (1998)

Appendix 2 – Intrinsic motivations

Receiving intellectual benefit/Usefulness

Within knowledge intensive communities an important motivation to participate is the intellectual benefit that someone experiences (Chiu et al., 2006; Ardichvili, 2008). The intellectual benefit ensures the usefulness for someone. To stimulate participation the usefulness in daily activities should be high (Wenger, 2004). Intellectual benefits include developing expertise, expanding one's perspective and finding new challenges. This is related to the usefulness that people see in a community. In practice this normally involves gathering information and knowledge through a community, for instance by posting a question on a forum.

Enhance reputation and career/show competence

Employees contribute to a virtual community in order to enhance their reputation and career (Hall, 2001a; Butler et al., 2002; Scarbrough, 2003; Sharratt & Usoro, 2003; Kwok & Gao, 2004; Ardichvili, 2008). This is an individual factor that is labeled with the metaphor ladder by Scarbrough (2003). Knowledge is shared in the pursuit of status and career advancement and is driven by individual competition and the desire for status; knowledge sharing is linked to winning the competition. People tend to actively contribute to online communities when they perceive that this enhances their professional reputations (Ardichvili, 2008). By contributing to a community, people build a reputation and gain respect, which thus appears to be the main driving force (Agerfalk et al., 2008). Reputation refers to the overall quality or character of a person in a community, and the recognition by other members (Kwok & Gao, 2004). This motivator is also related to visibility; by contributing, a person feels that he can improve his visibility and influence others in the community (Hall, 2001a; Butler et al., 2002; Koper et al., 2004). Reputation building can be seen as a long-term effort and therefore it leads to better contributors. Reputation is a strong motivator for active participation (McLure-Wasko & Faraj, 2005), and members believe that participation in a community is an important resource to establish a reputation that will hopefully translate into a job enhancement (McLure-Wasko & Faraj, 2000).

Social motivation

Another intrinsic motivation to contribute in a virtual community is the development of social relationships (Butler et al., 2002; Scarbrough, 2003; Kwok & Gao, 2004; Chiu et al., 2006; Ardichvili, 2008). This is an interpersonal factor that is labeled with the metaphor web by Scarbrough (2003). Knowledge is shared as a means of establishing connections with others in the organization and it depends on the network of trust and friendship that develops between individuals. Building social relationships within a community provides a sense of belonging and identity to the members. On this intrinsic motivation can be anticipated by organizing offline meetings and events. Offline interaction increases the social presence of community members' interaction and stimulates posting activity (Bross et al., 2007; Koh et al., 2007). Therefore, leaders should strengthen the social identity of the community members by linking online activities to offline meetings. People participate in a virtual community not just for seeking information or knowledge; they also see it as a place to meet other people, and to seek friendship (Chiu et al., 2006). A community offers a place to build and maintain social relations with people already known and with those first met online. When strong social ties exist, members are more likely to engage in reading and posting (Butler et al., 2002)

Altruism

Members of a community also contribute based on altruism (McLure-Wasko & Faraj, 2000; Butler et al., 2002; Kwok & Gao, 2004; Jian & Jeffres, 2006). Although it is related to other people, altruism itself is an individual factor (Kwok & Gao, 2004) and indicates the selfless concern for the welfare of others (Kwok & Gao, 2004). People contribute in order to help a group or cause rather than themselves; and it also exist when thinking about others; when someone promotes a topic or another person; or when supporting a group or person (Kwok & Gao, 2004). Many people that identify with a group feel personally gratified when the group benefits (Butler et al., 2002). An altruistic motivation can be caused by strong identification with the community as well as the social connectedness with and liking of the people in the community.

Following leaders

A motivational factor that is less addressed in literature is by following leaders (Scarborough, 2003). This is a normative factor that is labeled with the metaphor torch by Scarborough (2003). This indicates that members of an organization contribute in communities by creating role models for knowledge sharing. Corporate leaders present participation in communities as a key value of the organization. It has a practical value of providing help and a symbolic value of following a respected leader.

Personal satisfaction

Finally, community members might participate because of personal satisfaction (Hall, 2001a; Hall, 2001b). This is an individual factor and it relates to the fact that some people simply gain pleasure as a result of demonstrating their own behavior. This motivator is more aware in non-work related communities where people gather for joyful reasons; community members enjoy the process of creating something jointly (Franke & Shah, 2003). The personal satisfaction is normally based on the possibility for someone to show his or her competence or knowledge fields (Wenger, 2004).

Appendix 3 – Rewards

Economic incentives

Possibly the most obvious rewards are economic incentives, such as increased pay, or bonuses in the form of cash or stock options (Hall, 2001a). Employees are motivated through commitment and are paid for this as a fair exchange. However, a monetary incentive is regarded as inefficient; people will expect a higher compensation for every effort. Especially with economic incentives it is important to keep in mind the crowding out effect, as discussed earlier. Economic incentives appeared to decrease the motivation to exchange knowledge while the motivation to obtain an economic reward increases (Fahey et al., 2007). Therefore when providing extrinsic motivators, the incentive should not adversely impact a member's perception of the task and should interfere negatively with intrinsic motivation. Then incentives are only weak reinforcers in the short run, and negative reinforcers in the long run (Benabou & Tirole, 2003).

Social rewarding

Social rewards have a non-monetary basis and are, for example, peer reputation, friendship, and external feedback (Jeppesen & Frederiksen, 2006). They can be extremely powerful as long as they are public, infrequent, credible, and culturally meaningful (Tedjamulia et al., 2005). An effective method for given recognition to innovators is by hosting examples of the best innovations and give them credit openly; this in order to show that the company appreciates their innovative efforts. Regarding recognition different social rewarding techniques exist. First, a list that identifies the top contributors in a community can be published; also, the last posted articles and comments can be made visible on the frontpage of the community. Another recognition, performed by all other members, is by showing the most viewed posts or messages; or by rating a message based on members' opinions. Yet another social reward is based on credit points; community members can collect points by reading, posting and rating articles. These credit points could also be attached to an offline reward.

Career advancement

The intrinsic motivation reputation is closely related to the more extrinsic reward, career advancement and security (Hall, 2001a; Butler et al., 2002). This individual reward can be tied to various factors, including the extent to which individuals hoard or share their expertise. People are likely to be more devoted to a company because of a fear of job security (Hall, 2001a). Furthermore, when employees possess valuable knowledge, often, they will judge the knowledge sharing as a transaction; they expect something in return. Therefore, it is argued that career advancement or the guarantee of future work should become a reward. Job security motivates people to be more devoted and they are willing to contribute more.

Access to privileged data or domains

People that provide valuable contributions and knowledge can be provided privileged access to certain data or domain (Hall, 2001a). For an employee this can lead to getting better insight in more strategic concerns.

Appendix 4 – The Stage Gate Model

The different stages are:

0. *Discovery*: pre-work designed to discover and uncover opportunities and generate ideas. Discovery can be stimulated by fundamental technical research and working with lead users to uncover unarticulated needs.
1. *Scoping*: a quick, preliminary investigation of the project – largely desk research. This involves Internet search, library search, contacts with key users and internal scoping. The objective is to eliminate unsound concepts prior to devoting resources to them. Scoping is necessary because product development costs rise with each successive development stage (Kotler, 2003).
2. *Building the Business Case*: a much more detailed investigation involving primary research – both market and technical – is undertaken. This will determine the customer needs, wants, and preferences, but also the technical appraisal and ‘do-ability’ of the project. Also, projections of sales, cost, and profit need to be prepared to determine whether they satisfy company objectives. This will lead to a business case, including product and project definition, project justification, and a project plan. It is aimed at developing attractive ideas into testable product concepts.
3. *Development*: the actual detailed design and development of the new product, and the design of the operations or production process. The business case needs to be translated into a technically and commercially feasible product. The list of desired customer attributes generated by the market research needs to be turned into a list of engineering attributes (Kotler, 2003). For services, in this stage, standards for performance of the new service are established (Bowers, 1989). The R&D department will develop one or more versions or prototypes of the product that can be tested internally.
4. *Testing and Validation*: tests or trials in the marketplace, lab, and plant to verify and validate the proposed new product and its marketing and production/operations. Alpha testing is testing the prototype within the organization to see how it performs in different applications (Kotler, 2003). After that beta testing is executed; the prototype is provided to a set of customers in order to receive feedback.
5. *Launch*: commercialization – beginning of marketing and selling. For a service, people need to sell and promote the service to market; all its facilities and applications need to be known by these people.

(Cooper, 2001; p. 129-141)

Before each stage is a gate that serves as a go/kill decision point. Gates serve as quality-control checkpoints, and in each gate the company can decide to go on with the project or to stop it. Every gate has the same structure and consists of the following:

- *A set of required deliverables*;
- *Criteria against which the project is judged*: these include ‘must-meet’ and ‘should-meet’ criteria. It is just to prioritize the projects;
- *Defined outputs*: these include a decision, an approved action plan for the next stage, and a set of deliverables and date for the next gate.

(Cooper, 2001; p. 131-132)

Appendix 5 – Interviewees

Confidential

Appendix 6 - Company and community descriptions

Alliander

Alliander is an energy distributor and provides facilities for gas and electricity. 2.7 million people in Netherlands receive electricity or gas through Alliander. Alliander counts 5.500 employees. The mechanics work from home and the other employees are scattered over 18 locations throughout the Netherlands. Alliander has three main activities, distinguished in three business divisions: Liander, Liandon and Liandyn. Liander has the task to connect customers on energy networks, and they also fulfill the distribution of gas and electricity. Liandon provides advice, design and development of complex energy-infrastructure. Liandyn provides tailor-made work for lighting of public spaces and traffic control installations. Within Alliander there does not exist a knowledge sharing culture and also the average age is moderately high and thus not everybody is used to the community technology.

Virtual community

Within Alliander a community is running that is provided and moderated by Atos Origin, a large worldwide consulting company. The goal of the community is cooperation and knowledge sharing within Alliander and eventually it needs to become the corporate memory. This community is not specifically set up to stimulate innovation, but it serves merely to improve alignment and efficiency of knowledge sharing. Guidelines and protocols can be found that are related to daily activities people. Since the community contains a wiki, knowledge remains up-to-date and can be changed constantly by all employees. In the short future Alliander will become an independent organization and therefore it is important that knowledge is shared effectively. Currently, knowledge is spread over different departments and is difficult to obtain. But by using the community, cooperation will be stimulated.

Cap Gemini

Cap Gemini helps clients deal with changing business and technology issues. Relationships with clients are partnerships, and Cap Gemini provides experiences, best practices and tools to apply to clients' requirements. Cap Gemini focuses on four key areas: consulting, outsourcing, technology and local professional services. Cap Gemini is headquartered in Paris, France, and operates in more than 30 countries. Cap Gemini strives to hire people with functional diverse backgrounds that are motivated to cooperate with other people. Cap Gemini sees cooperation as the key to their success.

Virtual community

A new strategy within Cap Gemini is the Managed Innovation principle. The concept is that ideas that are posted in a virtual community can be picked up in order to lead it on a managed manner to something with which money can be earned. Initially this is internal, but eventually Cap Gemini wants to apply this externally as well. This will make the community the ecosystem of Cap Gemini. Currently, the community is trying to connect all employees in the Netherlands. The community is organized around problems of customers and is aiming at finding new opportunities. On the one hand it uses the strengths of the people within Cap Gemini, aimed at idea generation. And on the other hand they want to convert an idea into a new service in a controlled manner. The platform serves to post ideas, and when an idea will be picked up,

Managed Innovation facilitates people to develop the idea. Generally, it appeared that ideas are already developed for 80%, and for the rest people can refine their idea in the community. The Managed Innovation process structures the process from idea to success. Ideas receive feedback from the community, but also a counsel is monitoring for finding useful ideas. Ideas are brought by the members spontaneously, but also a result of a specific request by Cap Gemini. The former one is usually followed by a Dragon's Den. The Dragon's Den is a board of four people from the management that selects the best ideas. The community also enables employees to check ideas and how they progressed. Besides, people can provide feedback, but this is without obligations. Finally, it is possible that people present themselves to the project in order to join.

Deloitte

Deloitte is the brand under which tens of thousands of professionals in independent firms throughout the world collaborate to provide audits, consulting, financial advisory, risk management, and tax services to selected clients. These firms are members of Deloitte Touche Tohmatsu (DTT). Each member firm provides services in a particular geographic area and DTT helps coordinate the activities of these member firms. Deloitte Netherlands is multidisciplinary and has the following services: Accountancy, Taxes, Consulting and Financial Advisory Services. Traditionally, Deloitte is not seen as an innovative organization, and innovation was something that people did on their own. Therefore a new department has been set up: Deloitte Innovation. This department serves to stimulate innovation and to keep innovations that people come up with within Deloitte.

Virtual community

The Deloitte community is part of Deloitte Innovation and is an internal online community that stimulates and motivates employees to submit their business idea to Deloitte Innovation. They guide the full process from initiation to exit strategy (make it available for the customer). By doing this, money is earned for Deloitte, but also employees can become personally better off from this. The ideas will be presented to a counsel (which exists of external parties) and as a result a good idea will receive money and hours to develop and bring it to the market. The community can be seen as a centre for innovation. It is the platform where employees can present their ideas, receive feedback from the counsel and the progress made of ideas can be checked. An entrepreneurial culture needs to arise, and people will become enthusiastic for innovation. It is a platform that displays all innovation within Deloitte. The community creates higher transparency than normal innovation methods. The community is also created in order to change the culture within Deloitte. People can start discussions around certain themes, but it is also possible that people are asked to write a blog on their project. In the future it is likely that more interaction will be stimulated and that people can group around a business case, in the form of object centered sociality.

Innovation Factory

Innovation Factory is a small consultancy company that implements methods that make organizations more innovative. Innovation Factory specializes in organizing for successful innovation, and provides methods and tools that enable a company to become more innovative. They help defining innovation strategy, manage innovation, and execute innovation. Besides, Innovation Factory is an expert in developing communities for organizations and helps their clients to implement the vision and tools of a virtual employee community. Innovation Factory

has both people with a consultancy background as well as people with web-design and –tools capabilities.

Virtual community

Innovation has experience with several internal communities. Innovation Factory currently runs two internal communities: 1Power within Achmea and an idea challenge within UPC. The first one is already described in the introduction and is analyzed into more detail as a case study. The second one is an internal idea challenge that is running within UPC Europe. Recently UPC has developed a new service. But UPC did not know what opportunities exist in this field. Therefore, Innovation Factory is asked to set up an idea challenge among employees in the various countries. Employees are asked to come up with ideas or opportunities concerning applications for the new service. Submitted ideas will be screened first and later on employees can vote on the best ideas. Besides this initiative, currently a lot of new customers are emerging that are interested in setting up an internal community within their companies.

Winkwaves

Winkwaves is a small consultancy company that provides social media and knowledge management tools in a business environment. The social needs of people are central in their strategy and therefore they investigate what people drive to unite online and to share knowledge. Besides advice they also develop and exploit social media concepts. They offer products like Winkwaves Stage, which is a business social knowledge management environment. But they also provide Winkwaves Kenniscafé, which is an environment for social networking and knowledge sharing within organizations, departments and associations.

Virtual community

The aim of the social media they provide is improving cooperation, communication and knowledge sharing. However, the goal is dependent on the specific client. Every organization can set another goal for implementing a community. Clients include D66, Deloitte and Robeco.

Appendix 7 – Table with data from interviews

Domain

	Purpose	Knowledge						
		General	Discovery	Scoping	Business case	Development	Testing	Launch
Interview 1	discovery, scoping	diversity, explicit, tacit	ideas, experiences, feedback	ideas, tacit, feedback	tacit		feedback	ideas
Interview 2	discovery, scoping, business case	diversity, explicit, tacit, specific	ideas, experiences, feedback, problems, inspiring news	experiences, explicit	explicit, specific	specialist, specific, feedback, monitor	specific, feedback monitor	specific, feedback
Interview 3	discovery, scoping, business case	diversity, explicit, tacit, feedback	ideas, tacit, feedback, old propositions	ideas, explicit, experiences	specific, feedback, old business cases	specific, feedback, monitor	feedback	feedback monitor
Interview 4	discovery, scoping, business case, testing	diversity, explicit, tacit	ideas, tacit, experiences	ideas, explicit, experiences, information	explicit, specific, information, old business cases	monitor	explicit, tacit, monitor	monitor
Interview 5	scoping, business case	diversity, explicit, tacit, specific	ideas, tacit, problems, inspiring news	explicit, tacit, information	explicit, specific, information	specific, feedback, monitor	specific, feedback monitor	feedback monitor
Interview 6	discovery, scoping, business case, testing	diversity, explicit, tacit	ideas, experiences, feedback, inspiring news	explicit, feedback, information	explicit, specific, information, old business cases	Specific, monitor	explicit, feedback monitor	feedback monitor
Interview 7	knowledge sharing, networking	diversity, explicit, specific	ideas, specific	specific	specific	specific	specific	specific
Interview 8	scoping, business case	diversity, explicit, tacit, feedback	ideas, inspiring news, feedback	ideas, experiences, explicit, specific, information	explicit, specific, information, old business cases, feedback	specific, feedback,	explicit, specialist, specific, feedback	specific, feedback
Interview 9	Possible in all stages	diversity, explicit, tacit, specific	ideas	specific	specific	specific, monitor	specific, monitor	specific monitor
Interview 10	(discovery) scoping, business case, knowledge sharing	diversity, explicit, tacit, specific	ideas, tacit, experiences	ideas, experiences, specific	explicit, specific, information	experiences, feedback, specific, monitor	explicit, tacit, feedback, monitor	feedback monitor
Interview 11	(discovery) scoping, business case	diversity,	Ideas, experiences, inspiring news	Ideas, explicit, tacit information, experiences	Experiences, specific, feedback	specialist, specific, feedba	specific, feedback, monitor	Feedback, monitor

Community

	Members	Moderator	Motivation	Identification	Trust
Interview 1	all, functional diverse, motivated, self selection	Stimulate, attract people	usefulness, show competence, personal satisfaction	relate to daily work	fear for wrong information
Interview 2	all, functional diverse, self selection	no need	usefulness, show competence, social motivation, present idea	specific themes for specific groups, invite certain persons	
Interview 3	all, functional diverse, self selection	No big role, connect people, interesting content	usefulness, show competence, personal satisfaction, present idea, opens doors	show activity in community, people support ideas	choose private/public sharing
Interview 4	functional diverse, motivated, active, self selection	stimulate, connect people, interesting content	usefulness, show competence	offline events, build status	offline events
Interview 5	functional diverse, active, self selection, critical mass	stimulate, connect people, structure, interesting content, structure	usefulness, show competence	usefulness	trust is important for success
Interview 6	functional diverse, motivated, active, self selection, critical mass	stimulate, connect people, interesting content	usefulness, show competence, social motivation	relate to daily work, offline events	
Interview 7	functional diverse, motivated, self selection, special talents	Members do this themselves, stimulate, show usefulness for people	social motivation, personal satisfaction, passion for work,	create group process, usefulness, passion for topic	offline events
Interview 8	all, motivated, active, self selection	stimulate, connect people	usefulness, show competence, social motivation	relate to daily work, usefulness	subcommunities, internal competition, fear to share
Interview 9	all, functional diverse, motivated, self selection	stimulate, editing of stories	usefulness	relate to daily work, create group process, fun	internal competition, fear to share
Interview 10	all, functional diverse, motivated, active, self selection	stimulate, connect people, interesting content	usefulness, social motivation, personal satisfaction	relate to daily work, offline events, people create own content, fun	subcommunities, internal competition, fear to share, white label to overcome internal competition
Interview 11	all, functional diverse, motivated, self selection	stimulate, connect people, structure	usefulness, passion for innovation, passion for work	relate to daily work, passion for topic	subcommunities, internal competition, fear to share

Practice

	Type of activity						
	General	Discovery	Scoping	Business case	Development	Testing	Launch
Interview 1	ask question	Post idea, idea selection, refine idea	continuous, ask input, around database	continuous, punctual, around database	community can slow down process	testing, review	new idea
Interview 2	monitor, discussion	continuous, post idea, idea selection, refine idea, dragons den, idea challenge, provide enthusiasm	continuous, ask input, team formation, voting, provide enthusiasm	continuous, punctual, monitor, team formation, pitch with customers,	punctual, monitor, search specialists	punctual, monitor	punctual, monitor, new idea
Interview 3	monitor, discussion	continuous, post idea, refine idea, idea challenge, provide enthusiasm	continuous, ask input, voting, provide enthusiasm, around database, object centered sociality	monitor, object centered sociality, provide enthusiasm around database, object centered sociality	punctual, monitor, toolkit	punctual, monitor	punctual, monitor
Interview 4	monitor, ask questions, discussion	continuous, post idea, refine idea, idea selection, idea challenge	continuous, ask input, team formation, voting, around database	continuous, punctual, monitor, around database	punctual, monitor	punctual, monitor, testing	punctual, monitor
Interview 5	monitor, ask questions, discussion	continuous, post idea, refine idea, idea selection, dragons den, idea challenge, provide enthusiasm	continuous, ask input, team formation, offline event, provide enthusiasm, toolkit	continuous, punctual, monitor, team formation, toolkit	punctual, monitor	punctual, monitor, review	punctual, monitor
Interview 6	monitor, ask questions, discussion	continuous, post idea, refine idea, idea selection, idea challenge	continuous, ask input, team formation, toolkit	continuous, punctual, monitor, team formation, toolkit	punctual, monitor, review, design, toolkit, search specialist	punctual, monitor	punctual, monitor, learning
Interview 7	ask questions, discussion	continuous, post idea, refine idea	continuous, team formation, toolkit	continuous	continuous	continuous	continuous
Interview 8	monitor, ask questions, discussion	post idea, refine idea, provide enthusiasm	continuous, ask input, offline event, provide enthusiasm, team formation, toolkit	continuous, punctual, monitor, team formation, toolkit	punctual, monitor, review	punctual, monitor	punctual, monitor
Interview 9	ask questions	post idea	punctual	punctual	punctual	punctual,	punctual
Interview 10	monitor, ask questions	continuous, post idea, refine idea, idea selection, provide enthusiasm	continuous, ask input, provide enthusiasm, around database	continuous, punctual, monitor	punctual, monitor, search specialist	punctual, monitor, testing	punctual, monitor, learning, sales
Interview 11	monitor, ask question	continuous, post idea, refine idea, provide enthusiasm	continuous, ask input, team formation, toolkit	continuous, punctual, monitor, team formation, toolkit	punctual, monitor	punctual, monitor	punctual, monitor

Organization

	Culture	Support			
		Time	Technology	Promotion	Rewards
Interview 1	improve cooperation, improve knowledge sharing, improve coordination, culture must support knowledge sharing, changes culture	offline events	easy, find colleagues	stimulate participation, participate, communicate management support, community official role, keep bottom-up	reputation, small reward
Interview 2	improve cooperation, culture must support knowledge sharing	own time	easy	promote usefulness, stimulate participation, participate, communicate management support, make top of mind for employees, community official role	no reward, realization of idea, visibility
Interview 3	improve cooperation, culture must support knowledge sharing, changes culture	offline events, own time	easy, find colleagues	promote usefulness, participate, communicate management support, community part of strategy	recognition, realization of idea, work related reward
Interview 4	improve cooperation, improve knowledge sharing	offline events, own time	easy, find colleagues, private parts	promote usefulness. stimulate participation, participate, communicate management support	small reward
Interview 5	improve cooperation, improve knowledge sharing, culture must support knowledge sharing, changes culture	offline events, own time	easy, find colleagues, private parts	participate, communicate management support	reputation, small reward
Interview 6	improve cooperation, improve knowledge sharing, culture must support knowledge sharing, equality	offline events, own time	easy, find colleagues, private parts	stimulate participation, participate, communicate management support	no money, social reward, recognition, small reward
Interview 7	improve cooperation, improve knowledge sharing, improve coordination, equality	offline events	easy, find colleagues	translate needs of employees to community goal, stimulate participation, no high intervention in discussions	no money, reputation, visibility
Interview 8	improve cooperation, improve knowledge sharing, improve coordination, changes culture, internal rivalry is problem	own time, gain time	easy, find colleagues, capture social dynamics, private parts	stimulate participation, participate, communicate management support, community official role, support at Achmea is good	no reward
Interview 9	improve knowledge sharing, culture must support knowledge sharing, internal rivalry is problem	offline events	easy, find colleagues	stimulate participation, participate, communicate management support	no reward
Interview 10	improve cooperation, improve knowledge sharing, improve coordination, equality, internal rivalry is problem	offline events, own time, not possible to provide time, gain time	easy, find colleagues	stimulate participation, communicate management support	no money, small reward
Interview 11	improve cooperation, improve knowledge sharing, internal rivalry is problem	own time	easy, find colleagues	stimulate participation, participate, communicate management support, community official role, support at Achmea not good	no reward

Appendix 8 – Survey

This appendix shows the survey and its questions that are used in this research. Since all participants of the survey were Dutch, the survey is in Dutch as well. The survey was sent using an online survey website. This website provided the design for the survey and included the scaling for every statement. All items had a Likert scale of 1 – 7, except for item 2 and 10, which used a fixed sum scale. Behind every item, the label is given that is used in appendix 9.

Belang van community in het innovatie proces

1. Een medewerker community verhoogt de innovatiecapaciteit van een bedrijf [geninno]
2. Een medewerker community verhoogt de innovatiecapaciteit van een bedrijf in de verschillende fasen van het innovatieproces. Verdeel 120 punten over de verschillende fasen.
 - a. Idea discovery fase [ideadisc]
 - b. Scoping fase [scop]
 - c. Building the business case fase [buscase]
 - d. Development fase [develop]
 - e. Test en valideer fase [test]
 - f. Launch fase [launch]
3. Een medewerker community verbetert de efficiëntie in de verschillende fasen van het innovatieproces. Waardeer elke fase op een schaal van 1 -7.
 - a. Idea discovery fase [ideadisceff]
 - b. Scoping fase [scopeff]
 - c. Building the business case fase [buscaseeff]
 - d. Development fase [developeff]
 - e. Test en valideer fase [testeff]
 - f. Launch fase [launcheff]

Medewerker community als middel voor innovatie

Vanuit de literatuur is gebleken dat een innovatie methodiek dient te voldoen aan vijf functies. De functies zijn: Efficiency, Communication, Coordination, Learning, en Alignment. In hoeverre voldoet een medewerker community hieraan? (schaal 1-7)

4. Een medewerker community verbetert de efficiëntie van het innovatieproces [effic]
5. Een medewerker community verbetert de kennisuitwisseling tussen de afdelingen in een bedrijf [comm]
6. Een medewerker community verbetert de coördinatie van de verschillende innovatieprojecten in een bedrijf [coor]
7. Een medewerker community zorgt er voor dat men beter gebruik maakt van lessen en prestaties van innovaties uit het verleden [learn]
8. Een medewerker community verbetert de afstemming tussen de strategie van een organisatie en de dagelijkse activiteiten van medewerkers [align]

Ledensamenstelling

9. Voor het verhogen van de innovatie capaciteit door middel van een medewerker community zijn de geschikte typen medewerkers een belangrijk punt. Welke eigenschappen zijn het meeste van belang? Waardeer elk op een schaal van 1 -7.

- a. Functionele diversiteit (mensen van verschillende afdelingen) [funcdiv]
- b. Medewerkers die bezig zijn met innovatie [inno]
- c. Algemene medewerkers [gen]
- d. Gemotiveerde/Actief participerende medewerkers [motiv]

Kennis

10. Voor het verhogen van de innovatie capaciteit door middel van een medewerker community is de gedeelde kennis een belangrijk punt. Welke kennis is het meeste van belang? Verdeel 90 punten naar belangrijkheid.

- a. Vakinhoudelijke (expliciete) kennis [expl]
- b. “Tacit” kennis (inzichten, overtuigingen en waarden) [tacit]
- c. Onderzoeksinformatie (bijvoorbeeld marktonderzoeken, cijfers en concurrentie) [info]

Faciliterende elementen

11. Als het management participeert in de community leidt dit tot een hoger gebruik onder de medewerkers [manpart]

12. Als het management constant de activiteit in de community monitort leidt dit tot een hoger gebruik onder de medewerkers [manmon]

13. Een officiële status of bevoegdheid van een medewerker community in het innovatie proces verbetert de innovativiteit van de community [status]

14. De aanwezigheid van een community moderator in een medewerker community verbetert de innovativiteit van de community [moderator]

15. Het belonen van medewerkers die actief bijdragen aan een medewerker community verbetert de innovativiteit van de community [reward]

Appendix 9 – Mean, range and standard deviation

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
geninno	9	5	7	6,00	,707	,500
ideadisc	9	30	60	44,44	11,024	121,528
scop	9	20	50	32,78	10,929	119,444
buscase	9	0	30	13,33	11,990	143,750
develop	9	0	20	12,22	7,120	50,694
test	9	0	20	10,56	7,265	52,778
launch	9	0	20	6,67	7,500	56,250
ideadisceff	9	3	7	6,00	1,323	1,750
scopeff	9	4	7	5,78	,972	,944
buscaseeff	9	2	6	4,67	1,323	1,750
developeff	9	2	6	4,22	1,202	1,444
testeff	9	3	7	4,89	1,167	1,361
launcheff	9	2	6	3,89	1,364	1,861
effic	9	5	7	5,67	,707	,500
comm	9	5	7	6,33	,707	,500
coor	9	4	7	5,78	1,202	1,444
learn	9	4	7	5,78	,972	,944
align	9	2	6	4,56	1,236	1,528
funcdiv	9	6	7	6,89	,333	,111
inno	9	3	6	4,78	,972	,944
gen	9	3	6	4,89	1,054	1,111
motiv	9	4	7	6,33	1,000	1,000
expl	9	10	30	21,11	8,207	67,361
tacit	9	30	70	48,89	13,642	186,111
info	9	10	30	21,11	6,509	42,361
manpart	9	5	7	6,56	,726	,528
manmon	9	3	7	4,67	1,225	1,500
status	9	3	6	5,11	1,054	1,111
moderator	9	5	7	6,22	,833	,694
reward	9	4	7	5,11	1,054	1,111