# Exploring networked innovation; Results of an exploration and the setup of an empirical study

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## Abstract

The growing complexity of societal problems and the increasing need to co-design contexts together with the service or product, force companies to collaborate in innovation. This networked innovation requires people to design together, who not only come from different disciplines, but also come from different organisations and companies. The collaboration in networked innovation therefore adds another level of complexity in addition to the (better known) collaboration in mono- and multidisciplinary teams and introduces new issues.

This paper describes a literature review of existing knowledge on networked innovation. It also describes a first explorative study in which we investigated in what way networked innovation differs from 'normal' innovation projects. Finally we describe the set up of an empirical study that we will execute in the near future.

KEYWORDS: networked service innovation, collaboration, knowledge sharing

## Introduction

Society is faced with a number of developments that can lead to serious problems. For example, the growing aging population requires an additional growth in health employees of 450.000 in the Netherlands in the coming 10 years. Also the shortage of traditional energy supplies needs new ways of energy exploitation and changing behaviour in energy consumption. These types of issues demand breakthrough innovations; not only creative solutions are needed for new products and services, but the systems and contexts also need to be re-designed at the same time (Green 2007, Valkenburg 2010). Finding real solutions for societal problems needs the combined knowledge and experience of various parties both hardware and services. Also profit and non-profit organisations need to collaborate in innovation to find solutions that go beyond the scope of their current activities (Den Ouden and Valkenburg 2010, Han 2009). It is expected that social innovation will further accelerate, which is a challenging development (Mulgan 2006).

Let us show some of the challenges for this by means of the development of electric vehicles. Electric mobility is a needed solution for several social issues, such as pollution and costs. It is also technologically possible because of the increasing availability of alternative energy sources. *BetterPlace* is a global provider of electric vehicle networks and services. They provide services for enabling confident adoption and use of electric vehicles in which they build and operate the infrastructure and systems to optimize energy access and use. To enable a successful and therefore compelling service in the end, *BetterPlace* needs to provide an integrated solution to electric transportation. *BetterPlace* works together with governments, businesses and utility companies, like A123 Systems, Renault and the Automotive Energy Supply Corporation to accelerate the transition to sustainable transportation (see Figure 1).



*Figure 1 BetterPlace is an example of a complex networked innovation project*

Not only is there a need to develop electric cars, also long-lasting batteries, charge spots, battery switch stations, driver services, additional electricity generation, and transmission or communication systems need to be designed (betterplace.com, June 2010). A complex network of stakeholders is needed: a car manufacturer, a battery developer, but also an operator for battery charge stations, and local government support. All members of the network need to work together, depend upon each other, need to be fully committed to develop a sustainable solution and, in the end successful implementation of electric mobility.

Hence, collaboration is an important condition to develop breakthrough and valuable social innovations. While collaborating, knowledge is shared and integrated and new knowledge is created. There is an understanding of the sharing, integration and creation of knowledge in multidisciplinary teams, but there is lack of knowledge about this process in networked innovation teams. Therefore, this paper aims to create knowledge on how to collaborate in innovation networks to create solutions larger than the sole product of service. The paper first describes how networked innovation differs from 'normal' innovation projects and it describes a literature review about collaboration challenges in multidisciplinary teams. We used the knowledge gained from these reviews, for setting up an empirical study in which we investigated what additional collaboration challenges actors faced while executing a networked innovation project for a product service system. Finally we describe the research questions that we formulated based upon this first study and the research set up for conducting future research.

## Towards Networked Innovation

This research addresses networks of companies that decide to open up to outside relationships to innovate together. The approach as such is not new, but it has recently been popularised under the label of 'open innovation' (Chesbrough 2003).

Open innovation, as described by Chesbrough (2003), means that valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well. The societal changes described in the introduction are often the driver for these ideas. This approach places external ideas and external paths to market on the same level of importance as that reserved for internal ideas and paths to market during the closed innovation era (Chesbrough 2003). Open innovation is the use of the purposive inflows and outflows of knowledge to accelerate the internal innovation, and expand the markets for external use of innovation, respectively (Chesbrough et al 2006). However, new ideas are not always driven by the market. Therefore, a distinction should be made between inbound and outbound innovation (Chesbrough and Crowther 2006, Lichtenthaler 2009). Inbound open innovation refers to inward technology transfer. It describes the practice of leveraging the discoveries of others because firms need not rely exclusively on their own R&D. Outbound open innovation refers to outward technology transfer, and it suggests that firms can look for external organizations with business models that are suited to commercialize a technology exclusively or in addition to its internal application. In this context, Enkel e.o. (2009) describe three kinds of processes (see Figure 2)
» The outside-in process of open innovation: enriching the companies own knowledge base through the integration of suppliers, customers, and external knowledge sourcing.
» The inside-out process of open innovation: earning profits by bringing ideas to market, selling IP, and multiplying technology by transferring ideas to the outside environment. Companies that establish the inside-out process as key, focus on externalizing their

knowledge and innovation in order to bring ideas to market faster than they could through internal development.

» The coupled process: co-creation with (mainly) complementary partners through alliances, cooperation, and joint ventures during which give and take are crucial for success. Companies that establish the coupled process as key combine the outside-in process (to gain external knowledge) with the inside-out process (to bring ideas to market) and, in doing so, jointly develop and commercialize innovation.
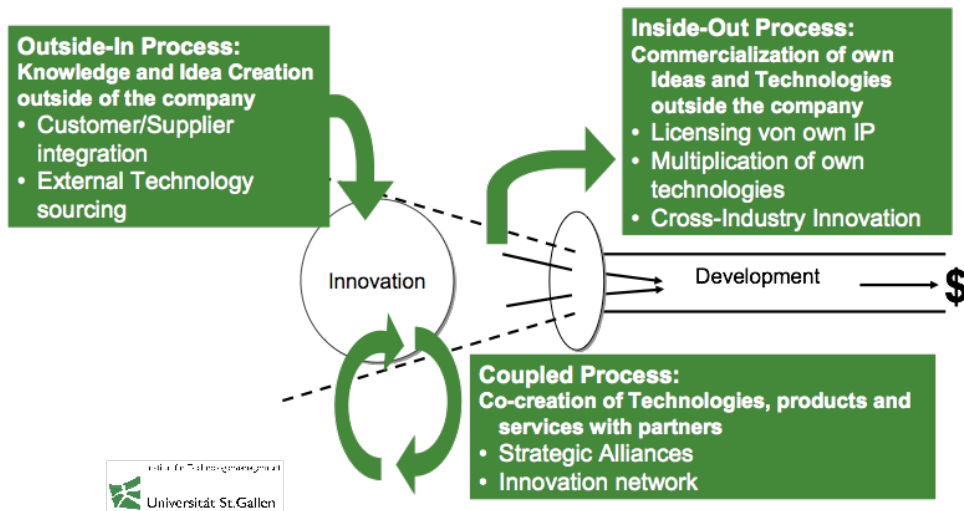


*Figure 2 Three kinds of processes (Enkel, 2009)*

We are interested in this coupled process. With the upcoming stream of service design and social design as described in the introduction the knowledge in such a process could be extended with other aspects needed in the development, for example user insights, market data etc. In the development of services and social innovation the different partners have the knowledge to come to innovation together, where all partner have values to give and take. They jointly develop innovations. In literature the term open innovation often focuses on the innovation project itself, whereas we are focusing on the collaboration. To emphasize the collaboration networks that we investigate, we decided to use the term networked innovation. Figure 3 shows the types of networks that we investigated and will investigate in the future.
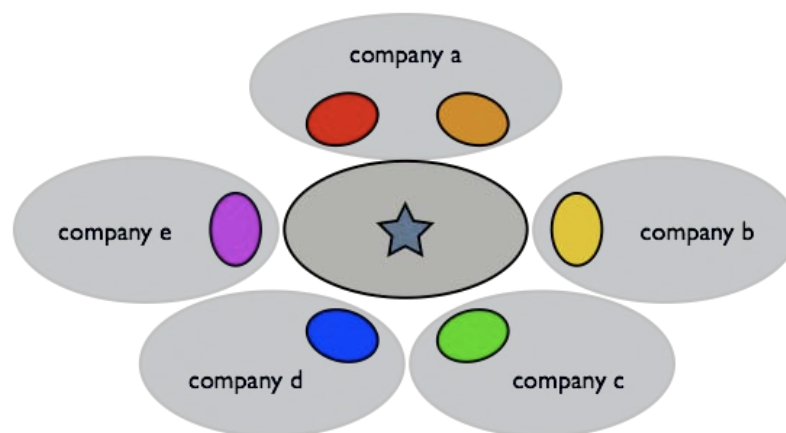


*Figure 3 A networked innovation team*

# Factors that influence collaboration in multidisciplinary teams

In order to get a first grip on factors that influence collaboration between people in networked innovation projects, we did a literature review on multidisciplinary innovation. Badke-Schaub (1999) researched what factors influence teamwork within a company in engineering practice. The most important factors they found are: (the lack of) experience, the communication, the demand for quality, the availability of information, the coordination of duties, the novelty of the task, the group climate, time pressure and power.

A lot can be learned taking collaboration more specific and looking at the barriers and enablers for integrating knowledge between actors in multidiscplinary design teams. For integrating knowledge, a design team needs a shared understanding (Kleinsmann, 2007) and common knowledge (Grant 1996, Hoopes and Postrel 1999). Similarity in languages (Bucciarelli 2002, Kleinsmann 2007), the commonality of vocabulary and the effectiveness of (design) communication (Grant 1996) influence the creation of this shared understanding. Design communication is often jargon laden and is therefore difficult to understand for outsiders. It is different from speaking a foreign language, since the actors are familiar with the words. Even so, the meaning of the same words may differ when used by actors from different disciplines. During design communication, these differences have consequences for tuning processes between the actors, for appointments about which tasks they have to do, for the view actors have of the status of the project etc, etc (Kleinsmann e.o. 2007). Since design communication is about an object that does not exist yet, it is about representing possible future realities. Representing reality inherently means that reality is abstracted. In service design this is mostly done by drawings. Whether drawings represent a spatial configuration, a static topology, or the dynamics of a flow process, they are symbolizing only the essential features of whatever they try to convey. Actors from different disciplines need different forms of abstraction in order to transfer their domain knowledge properly (Bucciarelli 1996) (Saad and Maher 1996). The correct reading of drawings requires both knowledge of the jargon that the drawer uses as well and an understanding of the context and the moment in use. This could be difficult since actors may have different mental models. Badke-Schaub e.o. (2007) show that there exist five different types of mental models; on the task, the process, the team, the competences and the context. Different mental models will hamper the creation of a shared understanding because each team member refers to his/her own background. They are unwaware of doing that and they are unaware of each other's backgrounds. Other personal characteristics that influence knowledge integration are: variation in routines (Grant 1996), shared behavioural norms (Grant 1996), the styles in which people organize their thinking and action (Dougherty 1992) and negotiation skills (Chiu 2002).

Also aspects within the team can influence the integration of knowledge, such as the active approach and involvement of subteams (Kleinsmann 2007), group sizes (Grant 1996, Chiu 2002), multiple groups (Hoopes 1999), the active use of minutes of meetings and efficient data management systems (Kleinsmann 2007). Also the quality of project documentation, the division of labour, the rigor of project planning, the controllability of product quality (all Kleinsmann 2007), as well as, IP management (Enkel e.o. 2009) influences knowledge integration.

Finally literature shows that also organizational aspects have an impact on the sharing and integration of knowledge. They are the organizational culture (Grant, 1996), company hierarchies (Grant 1996, Hoopes 1999), organizational routines (Enkel e.o. 2009, Grant 1996) bureaucracy (Grant 1996), organization context (Dougherty 1992), the organization of resources and the allocation of tasks and responsibilities (Kleinsmann 2007), horizontal or vertical subdivisions (Chiu 2007) and environmental circumstances (Grant 1996).

This section showed a condensed summary of the literature review executed on factors that influence collaboration in multidisciplinary teams. Most research focussed on teams that operate within one company. We expect that a lot of these aspects also have an influence on the sharing and integration knowledge in teams with members from different companies with different backgrounds, goals and perspectives. Next to these, we expect other factors will occur in networked innovation teams due to the growing complexity in organisation of the network as well as the content to be designed. This knowledge, however, cannot yet be found in literature. Therefore we conducted an explorative study in practice. We interviewed practitioners that executed networked innovation projects in practice recently, to identify the issues and differences in practice.

## Empirical exploration

In this project we explored how networked innovation is practiced and what factors are added to this way of working compared to the known ways of innovation. The goal of the study is the validation of the existing knowledge from literature and the further definition of the research questions. The main focus of this study lies on: What is the starting point for innovation and how does the collaboration manifest itself?

On the network level we also would like to know what kind of people join the team. Is this still a multidisciplinary team or is it a coherent group of for example designers, engineers or marketers. It is not a marketing manager collaborating with an engineer, but a marketing manager of company A, with the marketing manager of company B. People with the same function (in the name, according to the content it can be questioned again).

We expect that teams experience similar barriers and enablers for collaboration and the sharing and integration of knowledge as in multidisciplinary teams, but it can be expected there are other barriers and enablers as well.

To see how similar networked innovation teams are compared to multidisciplinary teams and to define research questions for future research, a series of exploratory interviews have been conducted with ten senior practitioners from different networked innovation projects in industry, representing various key disciplines. Three of the projects are about the collaboration between a consumer electronic brand and a fast moving consumer goods brand. Together they developed a hardware product that can be used with the help of a fast moving consumer good. One of the interviewees was the program director of an organization facilitating networked innovation. They facilitated several networked innovation projects the last years. Another interviewee was the founder of an innovation agency, responsible for a range of strategic programs and new business development. They set up a collaboration with different partners to develop innovations.

In these semi-structured interviews we asked them about their experience with networked innovation, knowledge integration, the knowledge they shared and the performance of the teams. These interviews lasted between ninety minutes and two hours and were transcribed for further analysis.

## Collaboration issues in networked innovation

The interviews gave a lot of interesting insights. A few examples will be given.

The first examples are from different people working on the development and the introduction of a product developed by a consumer electronic brand (EB) and a fast moving consumer goods brand (FMCGB);

> *"EB is hierarchical, very structured. I am not sure if I can say, but I have got the impression, that they work less process oriented than the hardware companies. For sure EB was more process oriented than FMCGB was in this project."*

The different companies had different orientations during the development process. The fast moving consumer good brand was experienced less process oriented as the electronic brand.

> *"What I learned from this collaboration is that you can agree on the interests in the beginning, but in the end they will often differ. At a certain moment the EB wants to profit from the hardware while the FMCGB will make money with the FMCG."*

In this project the different partners agreed on the interest in the beginning and during, but at the end of the process it became clear that they had different interests;

> *"From the beginning we had, well not really distrust, but there was an enormous prudence to reveal what we really knew."*

In the beginning of the process the partners did not really trust each other and were not willing to share everything with each other.

Another example of a professional working in different function at an electronic company about sharing knowledge in collaborations between team member coming from different companies;

> *"We are speaking a different languages, we were all speaking English, but if we are talking about positioning you need to keep on asking what they actually mean by positioning. It can easily happen we all leaving the room with different ideas. You need to come to the same level of communication. Giving the same content to a term."*

As in multidisciplinary teams the different team members speak different languages. Shared understanding is necessary in this process.

From these examples we can learn that the people working in a networked innovation project experience issues while collaborating and sharing knowledge. Comparable with issues experienced in multidisciplinary teams, but other issues as well. More extensive studies are needed to elaborate on the issues they experience.

The founder of an innovation agency, responsible for a range of strategic programs and new business development, said:

> *"A big and a small company or three big and two small companies will not work. The relation is very disparate. They all need to be big or all need to be small. Otherwise the cultures are too different to match."*

In her opinion companies need to be of the same size to innovate in networks successfully. He also said:

> *"We really believe in multi-disciplinary teams, but then within a company. If you are collaborating with other companies the team has to be mono disciplinary. Sales, marketing, product management, market research and communication can work together, but those are related fields."*

Within a team the different team members (from different companies) need to have similar backgrounds to function.

An employee from an electronic consumer good company working in a project with a fast moving consumer goods company explained:

*"Well, I think the project with FMCGC was a good project although it did not lead to worldwide introduction. We learned that the innovation was not the right one and we learned a lot from the fast moving consumer goods market. Yes, we learned a lot."*

This example explains that the measurements for success used in the literature are not convincing in all situations.

To conclude the insights from the interviews the program director of an organization facilitating networked innovation said:

*"This way of working is relatively new and it is still experimental. There is no knowledge."*

From these interviews we gained additional factors influencing the collaboration and the communication on the company and team level in networked innovation projects. From the interviews the following question appeared that needs further elaboration. On the organization level:

» What is the effect of the different orientations of the organizations?
» What is the effect of the different interests for success between the organizations?
» What is the effect of difficulties with trust and knowledge sharing between organizations?
» What is the effect of differences in company sizes in collaboration?

Within the team these different backgrounds also influence the communication:

» What are the effects of different languages and the level of communication?
» May multi-organisational teams better be mono-disciplinary?
» Is learning an important success factor in open innovation?

In the interviews issues at the actor level were not mentioned. Therefore the focus will be on the organization and team level.

## Conclusion and future research

From the exploration it became clear that additional issues are experienced in networked innovation projects related to collaboration. With the input from this exploration, we can define research questions for our next study;

» How do networked innovation projects start, how is the network formed, who is the initiator and what is their reasoning to start an innovation project?
» Who are the team members and organization collaborating, what are their backgrounds, expertise and experience?
» How do the team members collaborate, what barriers and enabler do they experience in sharing, integrating and creating knowledge on team and organization level?

To answer these questions we are setting up case study research. We are researching this in networked innovation teams working in the fuzzy front end to realize breakthrough innovations (products and/or services).

The following selection criteria for the selection of the cases were formulated:
» It has to be a networked innovation team where all kinds of knowledge is exchanged to jointly develop innovations.
» The team is developing a product, a service or the combination of a product and service.
» The team is starting or has just started to gain insight in their motivation of starting the team and thereby still in the fuzzy front end of the project.

To gain insight in the possible differences between teams we would like to have:
» Two teams originating from multinationals with projects starting from a corporate view,
» Two teams originating from intermediaries with projects focusing on social innovation,
» Two teams originating from knowledge or technology institutes to develop shared knowledge.

With six teams fulfilling the criteria mentioned above we would like to observe the teams over an extended period of time without participating in the projects. During this period we will conduct several interviews with the team members to get their input and triangulate the data. Having access to the documents of the team the observations can be validated with a third method.

During the observation the learnings from the literature with respect to networks, knowledge integration in multidisciplinary will be taken as a basis to find similar and additional barriers and enablers to networked innovation teams.

With this research we would like to gain a better understanding of the interesting field of networked innovation.


## Acknowledgements

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