



Using service design tools to facilitate communities of practice in software development organizations

Ronan Mac Laverty

2021 Laurea



Laurea University of Applied Sciences

**Using service design tools to facilitate communities of practice
in software development organizations**

Ronan Mac Lavery

MBA in Service Innovation and Design

Master's Thesis

May, 2021

Ronan Mac Laverty

Using service design tools to facilitate communities of practice in software development organizations

Year	2021	Number of pages	132
------	------	-----------------	-----

Agile processes have increasingly been adopted in different organizations, replacing traditional water-fall processes. However, agile adoption is not a smooth process, because it involves changing a range of activities from sales to personal incentives. To fully adopt agile processes means to change an organization's mindset from centralized to decentralized control. One problem of decentralizing activities is the dilution of knowledge and expertise inside an organization across many individuals and teams. A proposed solution to this problem is the creation of communities of practice (CoPs, a loosely affiliated group of individuals who share a common interest. These communities should foster knowledge dissemination and creation, cover the key activities inside an organization, and promote organizational development. However, while attractive at many organizational levels, communities of practice (CoPs) are difficult to create for many reasons, including the lack of good tools for community organizers to structure and identify key community features.

This thesis investigates the problem of supporting the creation of CoPs inside an R&D organization using the tools of service design. The fundamental research concern is: how can service design approaches to communities of practice help organizers create successful communities? The goal is to provide a set of tools that organizers can use by themselves to build their communities.

The research consists of qualitative investigation into a software organization's communities of practice to understand the challenges in creating a community, the creation of a theoretical framework related to the findings, followed by the selection of various service design tools appropriate to address the challenges. The findings of this research are that the organization struggled with community engagement, community alignment to individual/organizational goals, and a successful community working model. The theoretical framework created combined community of practice theory, knowledge management theory, and service dominant logic to create a perspective of a community as a knowledge management service for members and organizations.

The concrete result of this research is a set of service design tools that can be used in the early phases of community of practice development to help community organizers within the case organization. These are based on the user story, idea portfolio, Value Proposition Canvas, community pitches, Business Model Canvas and Service Blueprint tools. A weak market validation showed that these tools could be used by a community organizer with little external guidance.

Keywords: Community of Practice, Service Design, Qualitative Analysis

Contents

1	Introduction.....	6
1.1	Knowledge management in agile software development.....	6
1.2	Research objectives	8
1.3	Research paradigm	9
1.4	Structure of the thesis	10
2	Theoretical background.....	11
2.1	Principles of communities of practice.....	11
2.2	Communities of practice in software development organizations	18
2.3	Knowledge management within software development organizations	20
2.4	A service perspective on communities of practice within organizations.....	25
2.5	Conceptual framework for communities of practice inside an R&D organization .	31
2.6	Practical implications of a service-based approach to CoPs	34
3	Research methodology	37
3.1	Relevant problem definition	41
3.2	Discover - investigating communities of practice.....	42
3.2.1	Theoretical background research.....	42
3.2.2	Empirical research: a qualitative approach.....	42
3.3	Define - Data analysis	46
3.4	Develop - Selecting service design tools	47
3.5	Deliver - Construct validation.....	47
3.6	Research contribution.....	48
4	Discover/Define - Defining the community of practice construct.....	49
4.1	Discover - Empirical data collection	50
4.2	Define - Data analysis	53
4.3	Define - Empirical findings	54
4.3.1	Community nature	56
4.3.2	Alignment	59
4.3.3	Working model.....	62
4.3.4	Interaction between community nature, alignment, and working model ...	65
4.3.5	Summary of the findings	67
4.4	Critical issues to be addressed in community of practice facilitation.....	68
5	Develop/Deliver - A design framework for communities within the case organization	68
5.1	Selection of service design tools for community organizers	70
5.1.1	Sources of service design tools.....	71
5.1.2	Selection of candidate service design tools.....	75
5.1.3	Tools for grouping according to attributes.....	76

5.1.4	Tools to communicate service model	77
5.1.5	Tools to capture value networks	79
5.1.6	Tools for capturing user perspective.....	80
5.1.7	Tools to capture the service value	84
5.1.8	Tools to capture a design challenge	85
5.2	Creating the community organizer’s toolbox.....	88
5.2.1	Facilitating community engagement.....	90
5.2.2	Capturing community value	91
5.2.3	Tools for capturing a working model for a community.....	93
5.3	Validation	95
5.3.1	Review of the community organizer toolbox	96
5.3.2	Validation Findings.....	98
5.4	Summary of research on facilitating CoPs with service design tools	99
6	Research contribution	100
6.1	Confirmation and exploration of earlier findings in a new context.....	100
6.2	Identification of new challenges relevant for organizing a CoP	101
6.2.1	Organizers’ lack of knowledge of CoP	101
6.2.2	Key problems when starting a CoP	103
6.3	Proposed set of tools to facilitate a CoP.....	104
6.4	Limitations of the research process.....	104
7	Conclusions.....	106
7.1	Challenges of creating successful communities of practice.....	106
7.2	Service design tools for facilitating communities of practice	107
7.3	Future research	108
	References.....	110
	Tables	116
	Appendices	117

1 Introduction

1.1 Knowledge management in agile software development

Agile software development has rapidly grown from its initial manifestation in 2001 and has been adopted by many software organizations in different fields of operation. This change has been driven by the needs of companies to respond to increasing speed of changes in their operating environment that traditional multi-year projects cannot cope with. It is now the preferred approach to software development in competition with the traditional waterfall method of software creation (Jeremiah 2021). There is a fundamental difference in the process methodologies and supporting philosophies, so organizations encounter many challenges when changing from a traditional to an agile process. Some of these challenges are obvious, such as process or requirements management changes, but others are more subtle with long-term consequences that need to be addressed - such as competence development, and knowledge management.

To appreciate the difference between the traditional waterfall approaches as depicted by Royce (1970) and agile software development processes, a good starting point is the Agile Manifesto (Manifesto for Agile Software Development 2021):

We are uncovering better ways of developing
software by doing it and helping others do it.
Through this work we have come to value:

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

That is, while there is value in the items on
the right, we value the items on the left more.

This manifesto captures both the essence of agile (on the left) and some key elements of traditional software development (on the right). Two statements are very challenging for traditional companies, “Individuals and interactions over processes and tools” and “Customer collaboration over contract negotiation”. These are challenging because companies reduce the level of documentation, or information capture, during the software development process. This has an impact to how companies manage knowledge during software development by reducing documentation and increasingly relying on knowledge stored in individuals’ minds. While seemingly minor, this changes a company’s knowledge management strategy, with longer term implications to a company’s performance.

An additional challenge is that agile software organizations are not structured according to functional areas where testers belong to a testing organization, designers belong to a design organization, developers belong to a development organization etc. Agile software development occurs in cross-functional teams combining testers, developers, designers, etc. focused on creating 1 product (Agile Teams n.d.). Because the expertise is spread across the organization, developers cannot rely on their team to provide guidance on how to improve their development skills; the same applies to other functional members within an agile team. To give an indication of the level of competence development required in the software industry Appendix 1 shows the evolution of the software engineering domain from 1950's to the present day (from Boehm (2006)), showing 17 major trends, with 1-4 major trends per decade.

In addition to knowledge management and competence challenges, there is another key difference between agile and traditional software development: an agile mindset, see Denning (2021). The reliance on individuals' knowledge and competence extends to how an agile developer needs to behave within an organization. They need to learn new skills as required by a development project and they need to concentrate on outcomes rather than following a well-defined process. This attitude, or mindset, is tacit within individuals and not easily transferred from one to another, so a challenge for companies going through an agile transformation is to foster and cultivate this agile mindset.

These three challenges are encountered in most organizations transforming from traditional software development and need to be addressed by an organizational mechanism. The solution suggested by agile proponents is to use communities of practice (CoPs). Within software development organizations, communities of practice are groups of people that operate across organizational boundaries to achieve a specific goal. They are also known as Chapters and Guilds in the Spotify Framework for agile organizational structure, see Kniberg and Ivarsson (2012) and can go by other names in other organizations. As a key element in driving a successful agile software development organization, communities of practice can be seen as critical to a software organization's success.

Another benefit of communities of practice within organizations is that they can improve employee satisfaction by improve employees' sense of belonging, see Cox (2005), Smite et al. (2020), and McMillan (1996). Frequently, in agile teams a functional expert might be the only one within the team, for example, many teams may have only one UX expert. This isolates the functional expert, who cannot share their experiences with fellow experts. By initiating communities of practice organizations can support functional experts by giving them a forum to discuss their experiences with fellow experts. A secondary benefit is that communities generally exist outside the organizational structure, so members do not feel isolated or lose

their sense of belonging when the underlying organization changes. This makes the organization more resilient to change and can help change management.

The primary focus of this research is communities of practice facilitation. Therefore, a good definition of a community of practice is needed. This is not a straightforward issue, and the term “community of practice” sounds familiar because it is made of familiar words with an intuitive meaning. However, the concept of a “community of practice” has no clear definition in literature, even the source of the concept, Wenger (1999), has changed their definition over time. This is illustrated by Cox (2005), who discusses how the definition has changed over time from a spontaneous creation of a community by people in similar situations to the inclusion of formally created communities driven by organizational needs. For the purpose of this Chapter we can use the following definition from Wenger, McDermott and Snyder (2002): “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, McDermott & Snyder 2002, 4) A more nuanced discussion of Communities of practice is given in the conceptual framework chapter below.

Communities of practice are the focus of this thesis. Their existence is dependent on two major participants: the individuals within the community of practice and the organization that hosts them. Any research on communities of practice needs to take these participants into account by understanding their perspectives and needs. For communities of practice to thrive they need to provide value for both community members and the hosting organization. Following service dominant logic, see Vargo and Lusch (2016), value is defined by the consumer of a service (like the community of practice), so it is important to understand the benefits accrued by community members, and the organization from their perspectives. This requires deep insights into their experiences to gain understanding of the impact of communities of practice to both participants.

1.2 Research objectives

The purpose of this research is to develop a framework for creating communities of practice in an agile software research and development organization using service design tools. The organizational need for competence creation, and the reliance of agile software development on communities of practice raise the question: how can organizations or individuals create or support successful communities of practice? There are many aspects to this question, such as, the definition of a successful community of practice, organizational roles in community of practice creation, the organizational blockers to communities of practice, and others.

This work is motivated by the need of agile software organizations to improve their practices in a decentralized manner, and the author’s own experience within a failing community of

practice inside his organization. On a broader scale, this topic is applicable to many other organizations having similar problems, as these too also rely on communities of practice to help drive agile software development. Based on existing literature, many of the issues encountered during this research could also apply to other situations, so the findings and solutions could guide others.

The main research questions are:

- What limits the creation of successful communities of practice in agile software organizations?
- What service design tools are appropriate for creating successful communities of practice in software development organizations?

The research combines service design and communities of practice to help organizations develop outside of the traditional organizational structure.

Given the essential need for communities of practice within agile software development organizations, the lack of tools for supporting community development is a problem. This thesis seeks to address this issue by taking an approach similar to Pyrko, Eden, Dörfler and Stierand (2017) where causal mapping is used as a method to help community organizers. For this work, a very specialized approach is taken because of the narrow nature of the community - an organization of software development professionals. Additionally, service design tools are used to facilitate community development because some are similar to those within the software community, and a service design approach has been shown to be successful in the past, see Grenville (2014). A key goal of this research is to use these tools to empower others within the software community make their own successful communities.

1.3 Research paradigm

As this is a research project, the method used to generate useful and practical knowledge needs to be defined. A quantitative approach normally used in the physical sciences would involve creating a falsifiable hypothesis and then generate data that would confirm or deny the hypothesis, see Auerbach and Silverstein (2003). However, communities of practice are a social phenomenon embedded within organizations and they continually change as people enter and leave the community. Additionally, communities are constructed in a manner similar to the *Social Construction of Reality* (Berger, Luckmann & Zifonun 1967). This would point to a different approach to investigate and analysis the communities of practice phenomenon. Therefore, the approach used to gain knowledge about communities of practice should be social in nature. The approach taken in this thesis is based on constructivism where the goal is to create a theory based on qualitative research data. This aligns with the qualitative and case-based approaches used to investigate and create the

communities of practice concept by other researchers such as Lave and Wenger (1991), Wenger (1999), Wenger et al. (2002), Brown and Duguid (1991), and Pyrko, Dörfler and Eden (2017).

For SME sized organizations the number of participants within any community of practice would be quite small, so quantitative approaches to research this topic would struggle to find statistically significant sample sizes. Additionally, as communities of practice are experienced rather than measured, approaches that capture individuals' experiences are more appropriate. In this case, qualitative research methods are appropriate, as they provide deep insights into the individuals' and organization leaders' experiences and views regarding communities of practice. As the goal of this research is quite specific, the creation of communities of practice within a software organization, a case study research approach would be suitable to combine the goals of the author's organization with the desire to produce valuable research. The goal is to generate theories regarding the nature of a community from the point of view of the community members and the organization in order to generate tools and interventions to improve community creation and operation.

1.4 Structure of the thesis

The structure of this thesis follows a standard layout moving from theory to practice to conclusions. Chapter 2 focuses on the theoretical aspects of communities of practice, their role in knowledge management, and how they can be viewed as a service to members and organizations. This validates a service-based approach to community of practice analysis and development from a theoretical point of view. While this theoretical analysis of communities is presented before the empirical research, the actual theoretical investigation occurred simultaneously, as is common in qualitative research approaches. The reason for presenting this first is to provide the necessary background needed to understand the overall research. Chapter 3 outlines the research process used within this thesis. This thesis follows a qualitative approach to doing research, using a constructive research method, see Kasanen, Lukka and Siitonen (1993) and Oyegoke (2011). The more detailed research process also includes elements of service design processes to help the development of the construct which is an output of this research project. A key part of the research process is the qualitative research needed to gain insight into communities of practice inside a software development organization. Chapter 4 describes the research data generated by the qualitative investigation and presents the key findings. These findings are combined with the theoretical framework to guide the creation of a set of service design tools that can be used to facilitate communities of practice. Chapter 5 describe how different service design tools were chosen and modified to guide their application to communities of practice. This chapter also describes how the service design tools were validated by community organizers. Chapter 6

discusses the contributions reported in this thesis and their limitations. This summarizes the key findings and outcomes of this work. Chapter 7 forms the thesis conclusion.

2 Theoretical background

The following chapter describes the key concepts related to this thesis and their interrelations. The goal of this activity is to create a framework for discussing and analysing communities of practice within a software development organization. The initial starting point is the concept of communities of practice. As the role of communities of practice inside a software R&D organization is to enhance knowledge sharing and creation, the topics of knowledge management need to be included. The linking of communities of practice and knowledge creation takes place at two fundamental levels: the individual and the organization. To achieve this linking, a value-based approach is created by using service dominant logic to analyse the value a community of practice provides to individuals and organizations. This value-based approach helps structure how service design can be used to help meet the goals of this research.

The framework created to support this research links together several practice-focused concepts: communities of practice, knowledge management, and service dominant logic. This allows a broad framework to be created that can help analyse the results of the qualitative research done as part of the initial discovery phase of this research. This chapter reviews research supporting the linking of communities of practice and knowledge management, communities of practice and software development, and service design and communities of practice. These are all combined within the conceptual framework used throughout this thesis.

2.1 Principles of communities of practice

To understand the concept of communities of practice it is important to understand its evolution from its initial formulation as a contribution to learning theory to its current use within software organizations. Although many researchers have investigated communities of practice, most community of practice theory comes from the original texts of Lave and Wenger (1991) and Wenger (1999). Therefore, the approach taken here is to review the seminal texts as identified by Cox (2005) to elaborate the theory of communities of practice. These texts serve as a guide to the development of this concept from an analytic unit to a social structure within an organization.

The initial formulation of communities of practice come from *Situated Learning* (Lave & Wenger 1991) which focused on the concept of legitimate peripheral participation as an analytical tool for analysing “learning by doing” in apprenticeships. Within this work,

communities of practice were conceptualized as analytical units to explore how legitimate peripheral participation can be used to explain how individuals learn and develop, growing from newcomers to old-timers within a given domain. In this case a community of practice is a social construct: “A community of practice is a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice.” (Lave & Wenger 1991, 98). A key feature of this work is that an individual’s practice is more than a personal action, it is also a social interaction taking place within a community. The review of 5 different communities of practice points to one community (contemporary supermarket butchers) that is less successful in supporting a learning trajectory for members, due to both physical and organizational boundaries. At this stage in its conceptual development a community of practice is an informally constructed social structure, useful for analysing learning in practice.

The relationship between communities of practice and learning is further explored by Duguid and Brown (1991). This work focuses on the communities of practice arising within technical support staff. The key observation is the way people are trained (explicit knowledge) and the way they work (internalized knowledge) are different. There is often a gap between instructions and how work takes place within a community of practice with its inherent social structure that is often ignored in training. The conclusion reached by Brown and Duguid is that “The central issue in learning is *becoming* a practitioner not learning *about* practices.” (Brown & Duguid 1991, 48) - this involves becoming part of the practitioners’ community of practice. At this state a community of practice is not truly elaborated, but in an informal social structure created by practitioners concentrating on applying knowledge in the field. This builds on the previous work by bringing organizational impacts and aspects into the community of practice framework.

The exploration of the concept of a community of practice raised in Lave and Wenger (1991) is thoroughly done by Wenger (1999). This work still puts communities of practice within the theory of social learning. This uses an ethnographic study of a particular community inside an insurance company to illustrate the concepts of a community of practice. This work uses an in-depth study of an insurance company’s claim processing department to dissect and analyse how a community functions, from two perspectives the community and individual. The starting point is the analysis of social practice, with a combination of two activities, participation and reification, as show in Figure 1.

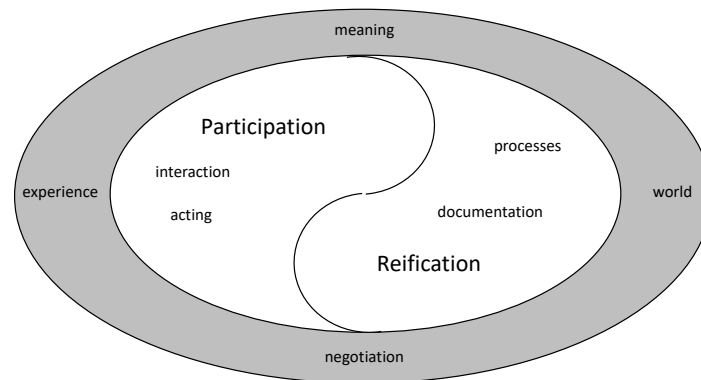


Figure 1: Participation and reification, modified from Wenger (1999, 63)

Individuals participate in communities through interacting with others in the community. These interactions tend to be transient, and intangible. Reification is the process of creating concrete artifacts based on community practices (this is related to the topic of externalization discussed later). A community evolves through the process of interacting and creating artifacts, leading to more interaction and more artifacts. Wenger (1999) is a more thorough analysis of how individuals interact within communities to generate knowledge.

A key aspect of communities of practice from Wenger (1999) is the 3 dimensions that help differentiate a community from a generic social structure reflecting the early works, as show in Figure 2:

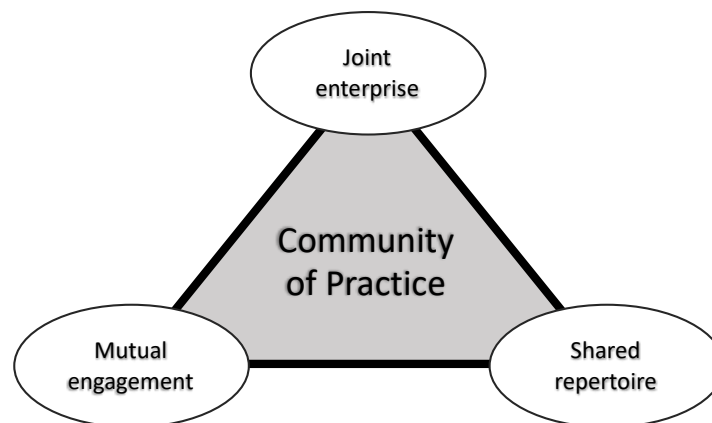


Figure 2: Dimensions of a community of practice, modified from Wenger (1999, 73)

The first is that there is a common goal or joint enterprise for the community, this can be implicitly formed or explicitly stated. A key element is that there needs to be mutual engagement, both to create a sense of community, see McMillan (1996), and to allow participation between members. Mutual engagement is critical to allow social learning, as described by Bandura (1971), to occur by allowing newcomers observe and model behaviour of more senior members of the community. A shared repertoire, or common corpus of terms

and stories is necessary to facilitate discussions related to practices - this echoes the earlier work of Duguid and Brown (1991). This analysis provides deeper insight into the definition of communities of practice, which is useful to identify these (still) informal structures.

The spontaneous nature of communities of practice means that people may exist within multiple communities at the same time. A good example is that a person may be involved in a professional organization while working inside a commercial enterprise - this means that the person interacts with at least two different communities. Wenger visualizes this process as show in Figure 3.

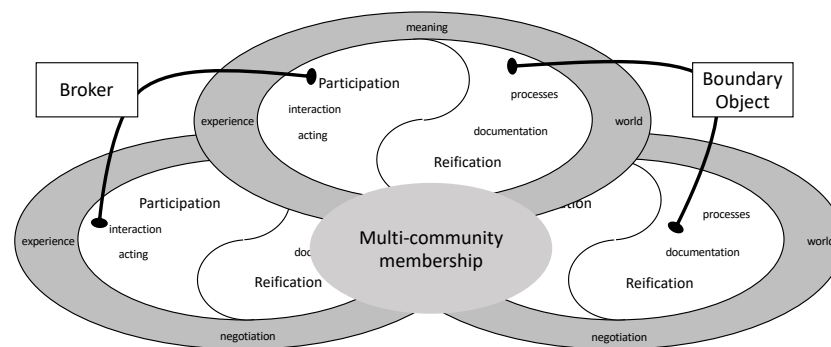


Figure 3: Multi-community interaction, modified from Wenger (1999, 105)

The communities of practice interact in two major ways, brokers and boundary objects. Brokers are individuals that translate information between communities by participation. Boundary objects are artifacts similar to the boundary objects in service design (see Leigh Star (2010)), these are shared between communities to align their operation. For constructing a community of practice, a key aspect of this multi-community membership is that any member will bring a set of practices, and boundary objects from their existing communities.

At this stage of its conceptual development, communities of practice are still informal, and organic in nature. However, given their importance in learning in social situations, Wenger discusses how the circumstances can be arranged to help communities of practice form. The observation is that “*Learning cannot be designed: it can only be designed for* - this is, facilitated or frustrated” (Wenger 1999, 229). This leads to the conclusion that the goal of a learning architecture is to facilitate learning. For this Wenger proposes a conceptual architecture for learning based on individual participation in a community of practice, which provides some guiding requirements for organizations, see Figure 4:

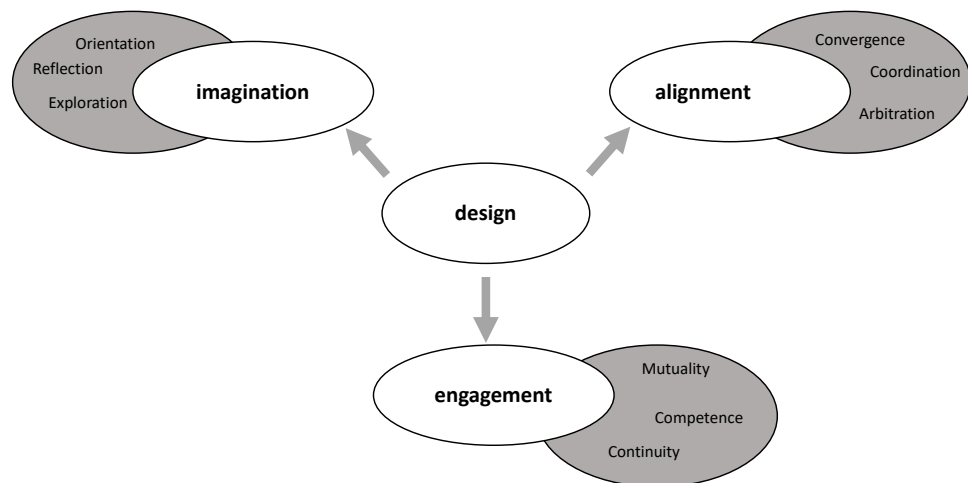


Figure 4: Design for learning, from Wenger (1999, 237)

To facilitate engagement a community needs spaces to meet, common tasks, and a variety of ways to participate in the community. The community's activities need to provide members opportunities to apply knowledge. The community needs to create a repository of information and possibilities to interact with senior members. To support imagination, a community should allow members to reflect on the domain of the community, as well as opportunities to explore new ideas. To help support alignment, a community needs to create processes, leaders, and clarity of the community's focus. These are guidelines for any community and help set the stage for practical application of this concept in organizations. (Wenger 1999).

In Wenger et al. (2002), the focus is on methods of cultivating communities of practice. This naturally requires shifting from an informal/organically forming community of practice to a formal/artificially created community design to fulfil an organizational need. This is facilitated by updating the definition of communities of practice: "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, McDermott & Snyder 2002, 4) The key thing is the accumulation of knowledge in the community of practice in the form of best practices or the members of the community, this forms the primary motivation for organizations to support communities of practice.

This work by Wenger et al. (2002) is based on a three element model of a community of practice: domain, practice and community:

- Domain - this defines the basis for the community of practice. The domain guides community member activities and evolves as members' understanding evolve. It should not be abstract but provide concrete value to the organization and the community's members.

- Community - this provides the environment for knowledge development and refinement. The community members need to regularly interact with each other over a period of time. This provides some continuity to the community and helps reach a shared understanding.
- Practice denotes common knowledge, and an explored set of socially defined way of doing things within a domain: “The practice is a set of frameworks, ideas, tools, information, styles, languages, stories, and documents that community members share.” (Wenger, McDermott & Snyder 2002, 29).

These three elements evolve over time as members enter and leave the community, as the domain expands or contracts, and as practices change based on experience and need.

Wenger et al. (2002) depict a 5-phase model of a community of practice’s lifecycle: potential phase, coalescing phase, maturing phase, stewardship phase, and transformation phase. Each phase has with different characteristics, and different needs. These phases match another 5 phase model based on a study of IBM Global service division by Gongla and Rizzuto (2001): Potential, Building, Engaging, Active, and Adaptive. Figure 5 provides an illustrative model of the combination of the community of practice lifecycle phases from Wenger et al (2002), and Gongla and Rizzuto (2001).

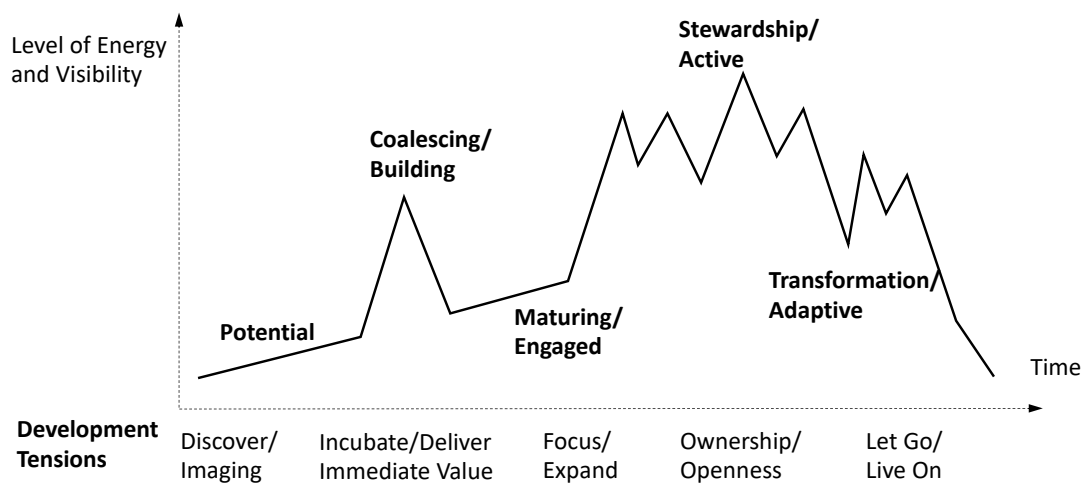


Figure 5: Stages of community development

These phases are not always linear, and a community may move to a previous phase so these phases can best be seen as a maturity model. The paper by Gongla and Rizzuto neatly summarizes the focus of each phase as show in Table 1.

Phase	Definition	Functions	Features	People	Processes	Technology
Potential	A community forming	Connection	A small nucleus	Not just roles, etc. but personal connection. Actively seek people.	Identify and locate people	Communication tech
Building	Community definition and formalization of operating principles	Memory and context creation	Building a common understanding, what, why and how	Learn about environment, form a core group.	Plan for growth and operation.	Knowledge repository.
Engaged	Execution and improvement	Access and learning	Sustained operation	Commitment, teaching, sharing tacit knowledge, organization recognition	Sharing of tacit knowledge	Electronic surveys, polling, measurements.
Active	Demonstration of benefits and collective work	Collaboration	Value focus	Collaboration, networking, teamwork, business focus	Team building, decision making, process integration	Collaborative tools.
Adaptive	Organizational competitive advantage	Innovation and generation	Sense and respond	Engaged in changing business, sponsor new communities, new org capability development	Sense and respond, need boundary definition system	Driven by community

Table 1: Table of Community Phases and activities based on Gongla and Rizzuto (2001)

It is not uncommon for a community to stop at an early stage and never reach the maturing/engaging phase. Gongla and Rizzuto identify the Building/Coalescing phase as the critical stage in a community of practice’s development, when the domain, practice and initial members have been defined. The following table lists the processes recommended at this stage of community development:

Coalescing (Wenger, McDermott & Snyder 2002)	Building (Gongla & Rizzuto 2001)
<ul style="list-style-type: none"> • Build a case for why members should participate • Organize a community kick-off, a big-bang or silent launch both can work depending on the organization and nature of the domain • Start organizing community events and areas for co-working between members • Legitimize community leaders by recognizing their value as catalysts • Form intra-community bonds between members • Identify topics and practice that are interesting for members to share • Capture key documents, practices and ideas, but do not try to capture everything • Seek possibilities to show value to the organization and to members • Engage managers and sponsors 	<ul style="list-style-type: none"> • Define the scope and membership of the community • Create roles for members, and norms for guiding behavior • Recruit members • Discover and categorize knowledge • Plan for tacit knowledge sharing and management • Choose enabling technologies and processes

Table 2: Key activities at Coalescing/Building stage of a community of practice

This table help define a high-level plan of action but needs elaboration to guide practitioners in the construction of a community of practice within a given context.

2.2 Communities of practice in software development organizations

In Wenger et al. (2002), many different communities of practice are described, coming from different organizations, especially those with intensive “knowledge work”. As maintaining and developing technological knowledge is important in software development organizations, the idea of communities of practice have been applied here - albeit under a range of different names. In these contexts the definition from Wenger et al. (2002) is frequently used.

In Paasivaara and Lassenius (2014) a range of communities of practice in an R&D organization are studied over a 3 year period. This study illustrates the need for an inter-team method of sharing knowledge within an agile software organization. The communities of practice studied extend the concept beyond learning to sharing other information, creating 4 different types of communities:

- Knowledge sharing communities of practice
- Coordination communities of practice
- Design communities of practice
- Organizational communities of practice

Within the studied organization people frequently participated in more than one community of practice, and so acted as brokers between different communities. As noted in Gongla and Rizzuto (2001) and Wenger et al. (2002) there are challenges to creating successful communities, however: “This case study showed that when implemented well and supported, the CoPs can be a very powerful practice in large-scale agile.” (Paasivaara & Lassenius 2014, 39). The issue remains how to support members in creating communities within the organization.

In Mestad, Myrdal, Dingsoyr and Dyba (2007) the study focused on how communities of practice evolved within a software organization. This work concentrated on the need for knowledge management within the company to improve the skills of its employees. The first phase was a series of lectures for sharing knowledge across a broad range of employees. The second phase was the creation of special interest groups, which are very similar to formal communities of practice - in this case participation was mandatory. This form of knowledge sharing was seen as beneficial but was inflexible. The third phase of the evolution was “skill circles”, which can be seen as informal communities of practice that improve flexibility with respect to special interest groups. A comparison between special interest groups and skill circles is given in Table 3.

Special Interest Group	Skill Circle
Obligatory	Voluntary
Participation in one	Participation in many
Static group/horizon	Dynamic group horizon
Little management support	Active Management Support

Table 3: Comparison of Special Interest Group and Skill Circle, from Mestad et al. (2007)

The findings of the study are that “employees are more motivated for participating in learning activities with a more flexible model for knowledge sharing, such as the skill circle model.”, and “are more motivated to try to start an activity if the threshold is low” (Mestad et al. 2007). This study highlights a trend in software development organizations to use alternate terms for a community of practice, in this case Special Interest Groups, and Skill Circles. This study also highlights the need to lower the threshold for community creation.

The use of alternate terms for community of practice is evident in Smite et al. (2020) which studies Guilds and Chapters within the company Spotify. The “Spotify Model” (Kniberg & Ivarsson 2012) has received attention for its explicit description of how an agile organization such as Spotify scales agile development and maintains coordination between different agile teams. There are 2 particular structures used that relate to communities of practice, guilds and chapters. Chapters are part of the organization structure of Spotify and apply across different scrum teams. Guilds also span multiple scrum teams but are more informal. From the perspective of the organization CoPs have many benefits, they “provide access to expertise and a forum for expanding skills and expertise, a strong sense of belonging, and fun of being with colleagues.” (Smite et al. 2020, 58). This highlights the 2 reported benefits of communities of practice: increased sense of community and knowledge sharing.

Until recently there has not been much guidance for the software development community, apart from brief pointers embedded in larger agile focused material: well-known frameworks for expanding agile beyond one team, such as LeSS (Less.works 2021) and Scaled Agile Framework (SAFe 5.0 Framework 2021), mention communities as a solution to competence, for example (Communities 2020). However, Webber (2016) provides a good overview of communities of practice for software development professionals, tying together the value of communities of practice, agile software development practices, and some community of practice theory. This work is based on the author’s experiences in supporting the development of communities of practice and provides numerous tips on how to achieve success. The author follows an agile approach to community development: “each situation is different; what works in one place, may not work in another, so always be open to changing

the approach if something does not work for you.” (Webber 2016, 5) Like other material on community of practice development such as Wenger et al. (2002) and Gongla and Rizzuto (2001), the author provides guidance on what organizers need to focus on during different phases of community development, but stops short of providing tools for organizers.

For most of its development the concept of a community of practice was tightly linked to social learning theory where a community of practice forms the social environment where learning by doing takes place. In the earlier work, it was spontaneous and organic in construction, in recent work focus has been in nurturing and designing communities of practice to achieve organizational goals. Within the software development industry communities of practice have been targeted towards enhancing cross-team learning and improving the sense of community. Another common theme when cultivating communities of practice is the need for support from the organization. To motivate organizations to give support, it is necessary to understand how communities of practice provide value to organizations by forming part of their knowledge management strategies.

2.3 Knowledge management within software development organizations

Communities of practice have been positioned with industry as a method of managing knowledge across organizational boundaries. In particular, within the agile software development, communities of practice have been suggested as a solution to managing specialized functional knowledge across cross-functional teams. Therefore, communities of practice must be placed within the knowledge management strategy of an organization.

From Alavi and Leidner (2001), knowledge management consists of four different activities: knowledge creation, knowledge transfer, knowledge storing/retrieval, and knowledge application. For organizations to support and benefit from these activities they need to support them using different strategies depending on the organization’s structure, history and field of operation. For example, in Hansen, Nohria and Tierney (1999) two major strategies are discussed related to knowledge management: codification, and personalization. The codification strategy involves storing knowledge in the form of guides, documents, etc. The personalization strategy focuses on dialogue between people in brainstorming and one-on-one conversations. These strategies and their implications to the business model, and IT systems are outlined in Table 4.

Competitive Strategy	Codification	Personalization
Overview	Provide high-quality, reliable and fast information systems implementation by reusing knowledge	Provide creative, analytical, rigorous advice on high-level strategic problems by channelling individual expertise
Knowledge Management Strategy	People to documents: <ul style="list-style-type: none"> Develop a document system that codifies, stores, disseminates, and allows reuse of knowledge 	Person to person: <ul style="list-style-type: none"> Develop networks for linking people so that tacit knowledge can be shared.
Business model	Reuse Economics: <ul style="list-style-type: none"> Invest once in a knowledge asset reuse it many times Use large teams with a high ration of associates to partners Focus on generating large overall revenues 	Expert Economics: <ul style="list-style-type: none"> Charge high fees for customized solutions to unique problems Use small teams with a low ratio of associates to partners Focus on maintaining high profit margins
IT	Invest heavily in IT; the goal is to connect people with reusable codified knowledge	Invest moderately in IT; the goal is to facilitate conversations and the exchange of tacit knowledge
Examples	Andersen Consulting, Ernst & Young	McKinsey & Company, Bain & Company

Table 4: Knowledge management strategies, based on Hansen et al. (1999)

The strategies used depend on the types of knowledge being used within an organization, for example a personalized knowledge management strategy makes sense when tacit knowledge is used. Generally, organizations need to have a combination of both strategies, but weigh heavily towards one depending on the operating environment. This requires a deeper definition of the different types of knowledge used within organizations - particularly the concept of tacit and explicit knowledge and their relationship to knowledge management activities.

Within the work of Nonaka (2008), there is a clear distinction between tacit and external knowledge. Tacit knowledge is internal to an individual, and it may be something that cannot be easily explained like a skill. In the case of the bread making machined described, it was the dough kneading technique of a master bread maker. Explicit knowledge has been expressed in some form, either in words, presentations, or documents. In the case of the bread making machine, this was phrased as a “twisting-stretching” motion and captured in the design of the machine’s rotor. The concept of different types of knowledge and their impacts on organizational learning is well analysed by Cook and Brown (1999) who propose four different types of knowledge, and the concept of knowing (experience of putting knowledge into practice) as shown in Figure 6, adapted from the original paper.

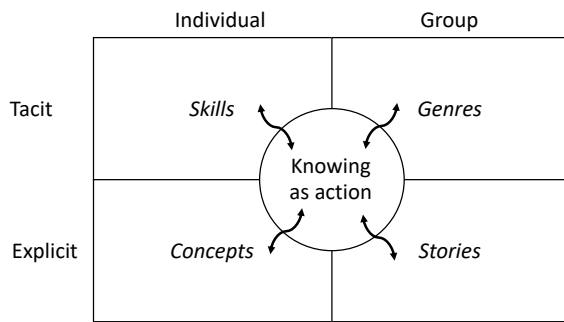


Figure 6: Knowing and different knowledge types, modified from Cook and Brown (1999, 391, 393)

The new type of knowledge not often encountered is “genres”: social practices and patterns of behaviour amongst members of a group—similar to literary genres. The Cook and Brown (1999) paper also discusses where knowledge comes from, and how it is generated. They describe a generative dance where different types of knowledge are used to generate new knowledge. Nonaka and Takeuchi (1995) describe a process of knowledge transition from tacit to explicit that creates a knowledge creation spiral. This spiral is used to drive knowledge creation throughout a company, through a combination of explicit and tacit knowledge. The process is illustrated in Figure 7.

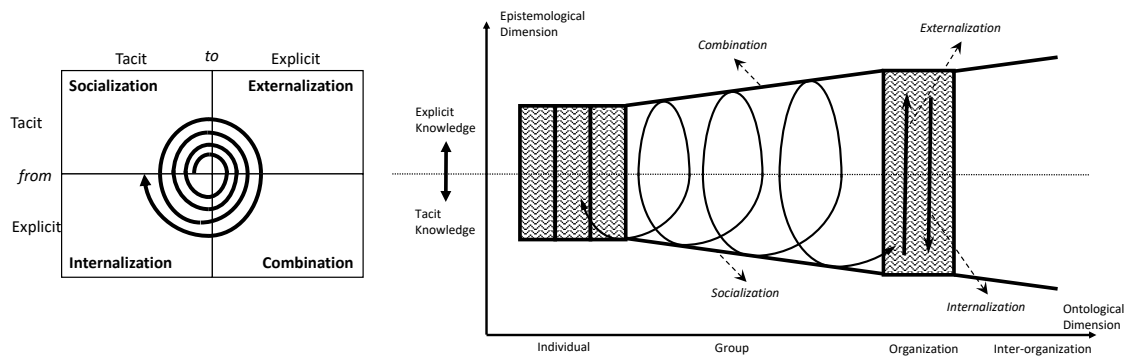


Figure 7: Knowledge spiral of knowledge creation, modified from Nonaka and Takeuchi (1995, 71, 73)

Socialization involves generating tacit knowledge from tacit knowledge internal to an individual—this can be facilitated through social learning, see Bandura (1971). Externalization involves generating explicit knowledge from tacit knowledge, through the use of metaphors, and analogies. Combination involves generating more explicit knowledge by combining explicit knowledge into a new form. Finally, internalization involves generating tacit information from explicit information, generally from using knowledge as a tool in practice. The knowledge spiral can be used to drive information from individuals’ tacit knowledge to explicit knowledge that can be shared across an organization. This matches a

combination of the personalization and codification strategies of knowledge management from Hansen et al. (1999). Additionally, communities of practice playing a role in the socialization, and combination activities while supporting internalization–externalization is a by-product of reification of a community’s knowledge base.

One element in related to knowledge management, especially knowledge creation is to link it to an organizational element - the place where knowledge is developed. Nonaka and Konno introduce the concept of *ba* as the place where knowledge gets manipulated. “For those unfamiliar with the concept, *ba* can be thought of as a shared place for emerging relationships.” (Nonaka & Konno 1998, 40) The idea is that the place can be used as an environment to support knowledge creation: “*Ba* provides a platform for advancing individual and/or collective knowledge.” (Nonaka & Konno 1998, 40) Nonaka and Konno describe 4 different types of *ba* related to the knowledge spiral, as shown in Figure 8.

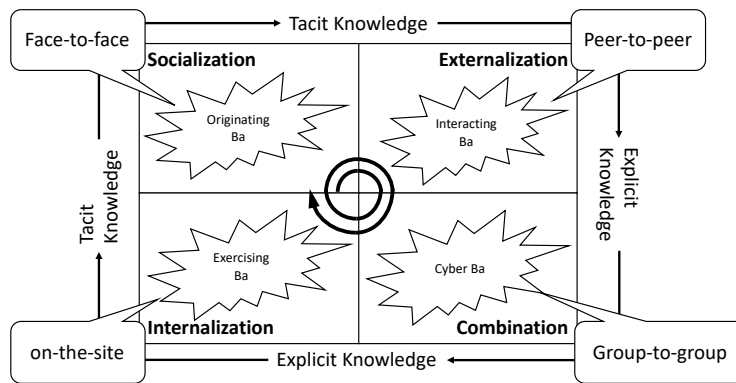


Figure 8: The four types of *Ba*, modified from Nonaka and Konno (1998, 46)

Originating *Ba* is the place where the knowledge creation begins normally through physical, face-to-face interaction. Interacting *ba* is more constructed, with the selection of people (a team, a taskforce, or a community), it involves peer-to-peer communication. Interacting *ba* is the place where explicit knowledge is generated from tacit knowledge through dialogue. Cyber *ba* is the place of interaction in a virtual world where explicit information is combined with other explicit information. Finally, exercising *ba* is the place where knowledge is exercised in practice generating tacit knowledge in individuals. Different *Ba* should be generated by organizations to facilitate knowledge creation and application. (Nonaka & Konno 1998).

As software development is a knowledge intensive field, knowledge management has a key role to play in successful software companies. Indeed, “Software development is a quickly changing, knowledge intensive business...” (Rus & Lindvall 2002, 27). Therefore, there has been interest in how software companies can maintain and develop their knowledge base. In

particular Rus and Lindvall (2002) note that knowledge management in software engineering focuses on:

- Acquiring knowledge about new technologies and methods
- Accessing domain knowledge
- Sharing knowledge about local policies and practices
- Capturing knowledge and knowing who knows what
- Collaborating and sharing knowledge

These can be related to different activities in the knowledge creation of Nonaka and Takeuchi (1995), the different strategies given by Hansen et al. (1999), and the different places, or *ba*, where knowledge is generated by Nonaka and Konno (1998).

According to Rus and Lindvall (2002), software engineering knowledge management activities can be split according to purpose of their output, scope of their input, and effort of level required to process the input to serve software engineering practices. This leads to core 3 main areas: core software engineering activities; product and project memory; and, learning and improvement. Core software engineering activities are supported by document management, competence management and expert identification, and software reuse. Project and product memory are supported by document tracking, version repositories etc. Learning from projects can be capture in retrospective documents. Within software engineering, knowledge management can be seen as a risk reduction strategy as: “If individuals own knowledge that is not explicitly captured, the organization can leverage that knowledge only if can identify and access these individuals.” (Rus & Lindvall 2002, 30).

There are several different schools of approach to knowledge management in software as outlined by Bjørnson and Dingsøyr (2008): technocratic, economic, and behavioural schools. The technocratic school is systems and engineering focused, involving technology and processes to manage knowledge. The economic school is concerned with linking knowledge to income. An interesting school from the perspective of communities of practice is the behavioural school, which has three different elements: organizational (knowledge networks), spatial (office layout) and strategic (linking knowledge management to strategy). Of particular importance to software engineering is the relationship between the schools of knowledge management and software development processes: “the technocratic schools are closely related to traditional software development while the behavioral schools are more related to agile software development.” (Bjørnson & Dingsøyr 2008). This review also highlights the different types of knowledge used by different software development processes, agile software focuses on the use of tacit knowledge, where more formal traditional software development focuses on explicit knowledge (Bjørnson & Dingsøyr 2008). This is agreement with the more traditional approaches to knowledge as individualized and

explicit (Nonaka & Takeuchi 1995; Cook & Brown 1999). One finding from research on knowledge management in software engineering is that it is often neglected, and companies often do not reflect on their knowledge management strategies, see Dingsøy, Bjørnson and Shull (2009).

The need for sharing tacit knowledge and to externalize it so that it can be shared throughout an organization would indicate that an *interacting ba* would be needed. This matches the concept of a community of practice. For these to have a long-term effect to a company, they would need to be self-sustaining. Therefore, organizations would need to find ways of nurturing the environment so that these can be created and maintained. To enable this, a clearer model of how communities, individuals, and organizations interact for mutual benefit is needed.

2.4 A service perspective on communities of practice within organizations

To construct a model for communities of practice inside organizations a framework highlighting the benefits of communities of practice, both for individuals and organizations, is needed. One approach is to use an exchange system approach to analyse the interaction between the active elements in this scenario. An individual exchanges time and knowledge with a community in exchange for personal benefit. An organization exchanges support, resources, and maybe funding with a community in exchange for organizational learning, employee development, and organizational improvement. Fortunately, there is an approach that is very actor focused that can be used analyse this complex exchange, Service Dominant Logic (S-D logic): “S-D logic provides a lens to look at complex exchange systems in a different light.” (Lusch & Vargo 2014, 203)

Service Dominant logic, as captured by Greer, Lusch and Vargo (2016), Lusch and Vargo (2014) and Vargo and Lusch (2016) initially started from the point of marketing, when it was realized that the current marketing approaches based on goods and services was inadequate for the modern economy. While motivated by the needs of services marketing, it has expanded as a viewpoint to analyse entire economies based on the concept that all economies are “service” economies. In this case, a logic is a set of concepts, premises, and assumptions that motive a ‘worldview’ used to analyse situations to drive behaviours. S-D logic is based on 5 essential concepts, from Lusch and Vargo (2014) and Vargo and Lusch (2016):

- **Actors:** these are entities that have agency, the ability to act purposefully. An actor can be an individual, or an organization, such as a firm or community.
- **Service:** this is defined as the application of resources for the benefit of another actor or oneself.

- **Resources:** these are anything that an actor can draw on for support. There are 2 essential types: operand resources, like natural resources, and operant resources, such as knowledge and skills
- **Value:** this is defined as benefit, an increase in the system viability of a particular actor. System viability contains many different factors, including well-being. Normally an actor defines its own system viability and determines value from a subjective point of view.
- **Institutions (added in 2016):** from Scott and North, reported in Vargo and Lusch (2016), these are humanly devised rules, norms, and beliefs that enable and constrain action and make social life predictable and meaningful. They facilitate interactions between actors.

All these concepts are useful to analyse how communities of practice work inside organizations.

These concepts interact and are used to frame the axioms and foundational premises of S-D logic shown in Figure 9.

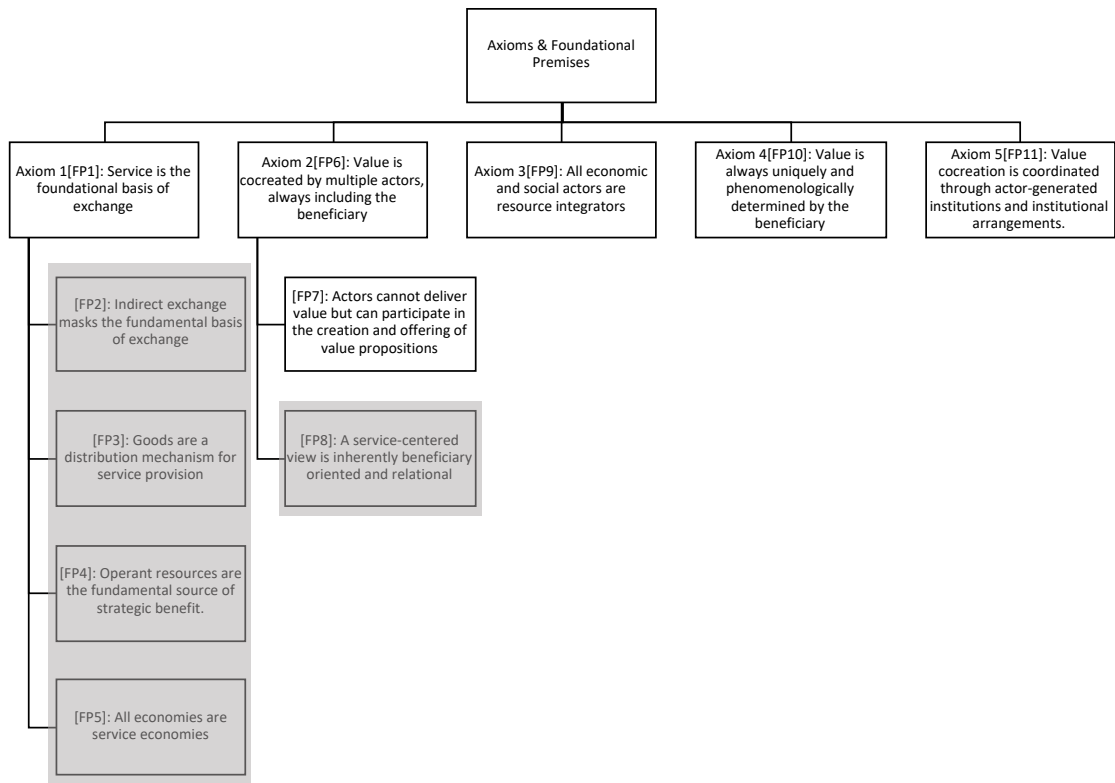


Figure 9: Axioms and Premises of S-D Logic, combined from Lusch and Vargo (2014) and Vargo and Lusch (2016)

Of the foundational premises, some are related to how S-D logic works within existing economies and markets - they provide guidance on how to align theory with current practice - and are not too relevant to this work. In particular, premises FP2, FP3, and FP8, are used to differentiate S-D logic from existing manufacturing approaches to exchange. FP5 is tangentially relevant because it emphasizes the important of operant resources (knowledge and skills) in economic activity, which is important for commercial R&D organizations. Similarly, FP4 emphasizes the importance of operant resources, such as knowledge, skills, and people, that are critical for organizations. The fact that most S-D logic premises provide value to this analysis of communities of practice, indicate a good theoretical match between S-D logic and the framework needed for communities of practice.

The first axiom, focusing on service is the fundamental basis of exchange, provides a starting point for describing the interaction between a community of practice, organizations, and individuals. An individual shares their knowledge, skills, and time to improve the community, while benefiting by increased knowledge through social learning, and a sense of belonging (Lave & Wenger 1991; Bandura 1971; McMillan 1996). This exchange is supported by the “mutual engagement” of individuals within a community. An organization shares their operant resources (employees), and operand resources (meeting rooms, infrastructure) to the community, while benefiting by employee development, improved practices, knowledge generation/sharing, and innovation by cross community sharing (Ropes 2010; Millen & Fontaine 2003). An additional interaction occurs between an individual and an organization, where an individual applies their knowledge for the benefit of the organization - participation in a community of practice should enhance and improve this exchange for their mutual benefit, this is captured in Figure 10.



Figure 10: Exchange between community of practice actors: an illustrative simple model.

The second axiom, emphasizing value is cocreated, is linked closely to how communities provide value. A key observation from Nonaka and Konno is, “Knowledge, however, is intangible, boundaryless, and dynamic, and if it is not used at a specific time in a specific

place, it is of no value.” (Nonaka & Konno 1998, 41) - this links knowledge to value. In the case of communities, knowledge is cocreated by the interaction of individuals in the “interacting ba” of the community. Within organizations, knowledge is combined and created by interaction of communities, either through brokers, or boundary objects, within the “cyber ba” supported by the organization. A related premise, FP7, highlights the point that communities can create value for individuals and organizations (it is cocreated), it can also create compelling value propositions.

The third axiom, related to resource integrators points to how individuals, communities, and organization operate. An individual integrates a combination of resources to service the organization, this includes knowledge obtained by participation in one or more communities. Most community of practice members operate in a formal management-led community in addition to one or more other communities. This allows them to gain knowledge that enhances the level of service they can provide. A community integrates the resources of its members, and, for an organizationally supported community, the resources provided by the organization. Finally, an organization integrates the resources provided by its communities and individuals to provide service to its consumers (or beneficiaries in S-D logic terminology). This is illustrated in Figure 11. A key facet of this integration chain is operant resources (knowledge and skill) that are key to providing service and a compelling value proposition.

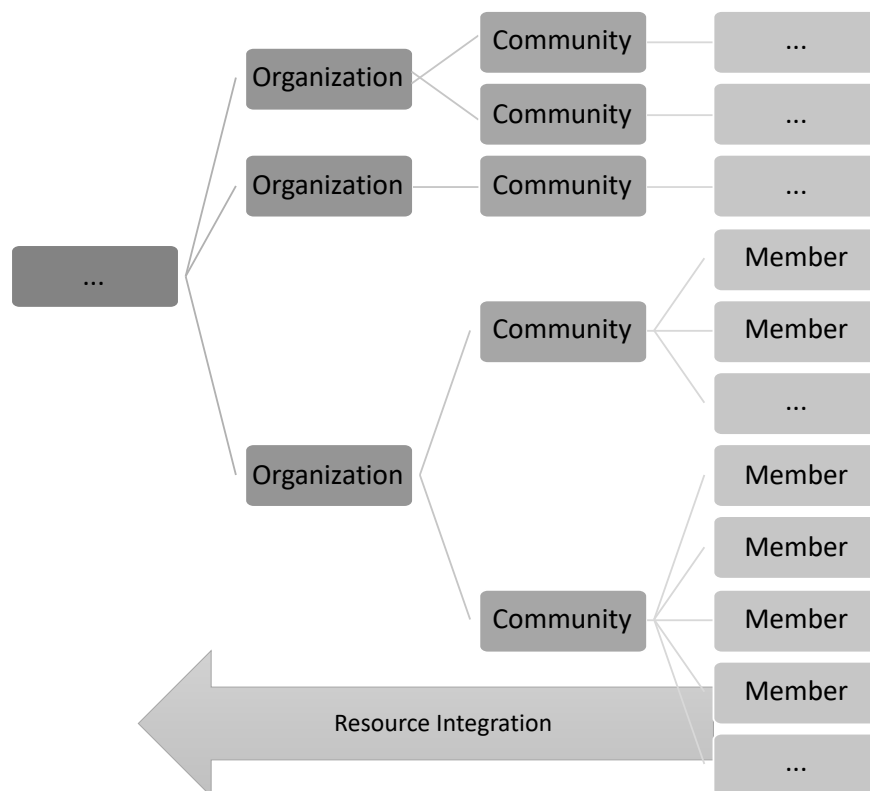


Figure 11: Operant resource integration in organizations and communities of practice: an illustrative model

The fourth axiom focuses on an actor specific view of value which helps understand a key factor of successful communities. When viewed by an individual, this would imply communities of practice need to be considered valuable by their members. From the community's perspective each member needs to be viewed as valuable and contributing to the community's goals. This is captured by a community's "joint enterprise". When viewed by an organization, a community needs to help forward an organization's objectives. In some cases, a community may decide that its goals and an organization's goals diverge, leading to a case where the community leaves the organization, or changes the organization's objectives (Gongla & Rizzuto 2001; Wenger, McDermott & Snyder 2002).

The last axiom relates service exchange to the environment where it happens. This requires a bit more analysis to relate to communities of practice, because the term institution has multiple meanings. In this case, an institution is more of a behavioural ruleset than an organization and can be considered to be a practice. Indeed, Vargo and Lusch make this link: "*practices—routinized activities—are institutions.*" (Vargo & Lusch 2016, 19). This links communities of practice to improved value cocreation by improving practices within a community and its beneficiaries. A community supports this by providing a "shared repertoire" of concepts and practices (Wenger 1999). Seen this way, it can be seen that communities supported by an organization benefit and suffer from the practices of the organization. Additionally, members both benefit and suffer from both the practices of the organization and the community.

When applying S-D logic to the analysis of economies and exchange systems, Lusch and Vargo, build on the idea of a value cocreation environment by introducing the concept of a service ecosystem. "*A service ecosystem is a relatively self-contained, self-adjusting system of resource-integrating actors that are connected by shared institutional logics and mutual value creation through service exchange.*" (Lusch & Vargo 2014, 161) This approach allows zooming out from an individual-to-individual exchange to individual-to-firm exchange, or a firm-to-firm exchange. This completes the value cocreation cycle show in Figure 12.

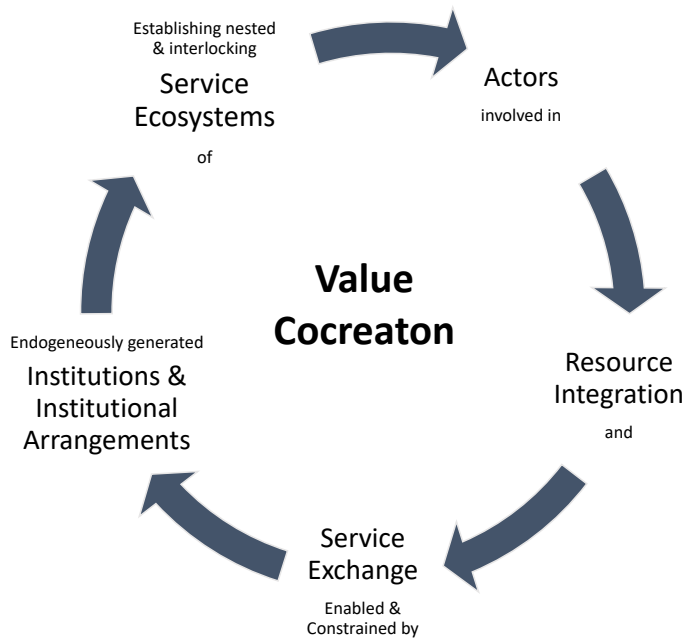


Figure 12: Value cocreation cycle, based on Vargo and Lusch (2016, 7)

This can also be applied in the case of communities of practice: a community mediates exchange between members, an organization mediates exchange between communities, and so forth, as depicted in Figure 13.

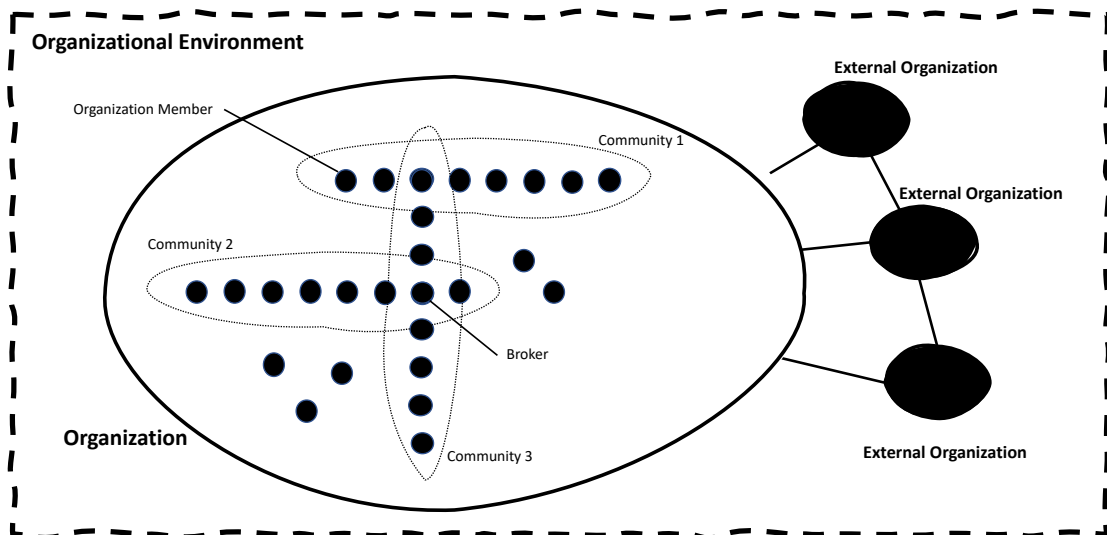


Figure 13: Community of practice ecosystem: an illustrative model.

This forms an ecosystem that provides an underlying environment that supports individuals, communities, and organizations.

2.5 Conceptual framework for communities of practice inside an R&D organization

The framework used here builds on the S-D logic approach discussed above. The foundation is the realization *knowledge improves an actor's system viability by improving the ability of the actor to provide service to others*. In this case, actors are organizations, communities and individuals. The primary goal of these actors is to improve their viability by improving their value propositions, leading to more beneficial service exchanges. In the case of R&D organizations, this involves increasing the available operant resources (skills and knowledge) allowing more effective and efficient service delivery.

From the work of Cook and Brown (1999), there are 4 different types of knowledge: skills, genres, stories, concepts. While knowledge cannot be generated, it can be cocreated by different parties in communities of practice and between communities of practice using brokers and boundary objects. This parallels the cocreation of value in that the beneficiary of the cocreation controls the level of knowledge created—one actor can educate, but it is up to the recipient to learn. Similarly, at a larger scale it is up to communities and organizations to capture knowledge where possible, to promote organizational learning.

Based on the review of the literature, it is possible to *construct and propose a conceptual framework for community supported knowledge interactions inside an organization*. This approach is similar to the work by Alavi and Leidner (2001), who build a similar framework based on knowledge management, starting from individual-to-individual interactions, scaling up to group-based knowledge management. In the framework below, the community of practice concept plays a major role in facilitating knowledge creation by supporting the personalization and codification knowledge management strategies. The framework is captured in Figure 16 and Figure 17, which brings in the concept of a knowledge ecosystem.

To construct this framework, the starting point is the individual actor, i.e., the community of practice member. When they start engaging with a community, they have existing knowledge, which may increase the knowledge available to the community. During engagement new knowledge will be created, either insights (new knowledge) or through increasing the knowledge of community members. For example, a software technology may be known by a community member, who shows how this technology could be used to improve the practices of the community. Another member may replicate this knowledge, increasing the knowledge level of the community. When this member applies this knowledge, recounting the outcome to the community can provide increased insight and knowledge. In these cases, members integrate their knowledge to provide a “knowledge proposition” for other members. Furthermore, this member may combine this knowledge with other technological knowledge to form an insight into how the community can improve its practices. Members of a community also have the option of documenting their practices and

knowledge, this can work effectively for explicit knowledge, but will have limitations of expression for tacit knowledge. Naturally, if members do not engage, or shared some common repertoire, knowledge sharing will not occur. The member-to-member interaction is shown in Figure 14.

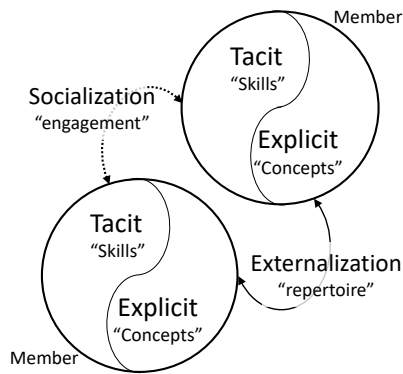


Figure 14: Member-to-member knowledge cocreation, based on cf. Alavi and Leidner (2001, 117).

The knowledge interaction model applies to many individual-to-individual interactions. The community also has a “joint enterprise”, a practice, and a domain, which defines the community. Because a community has a common repertoire, member-to-member communication can use a richer set of concepts to communicate more effectively—this applies both to socialization and externalization. Furthermore, by facilitating engagement through meetings and other events, communities enable socialization of knowledge between members. Thus, the community services its member by provide the “interacting *ba*” that allows this exchange to occur. This creates a model for community-member exchange show in Figure 15.

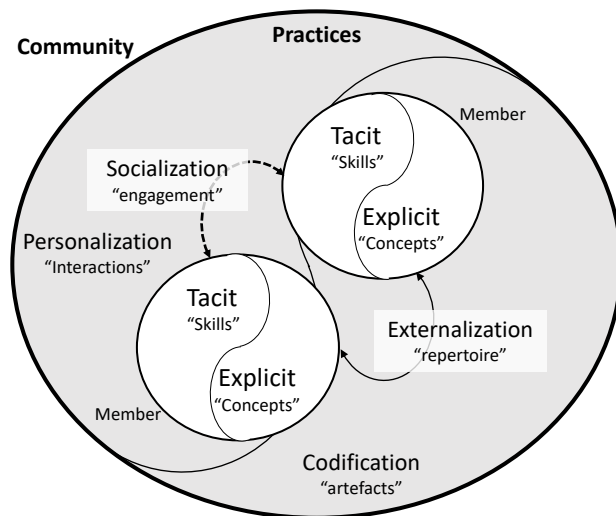


Figure 15: Community supported interactions

Naturally, if a community does not meet, interactions will not occur, members will not know of each other, and socialization will not be improved. Similarly, if a community does not have a way to organize its artefacts, they will not be available for exchange between different members of the community.

Finally, communities overlap with other communities in most organizations, this allows additional level of knowledge sharing between communities. This allows the completion of a conceptual framework . This can happen either through brokers or boundary objects (Wenger 1999). This proposed framework is captured in Figure 16.

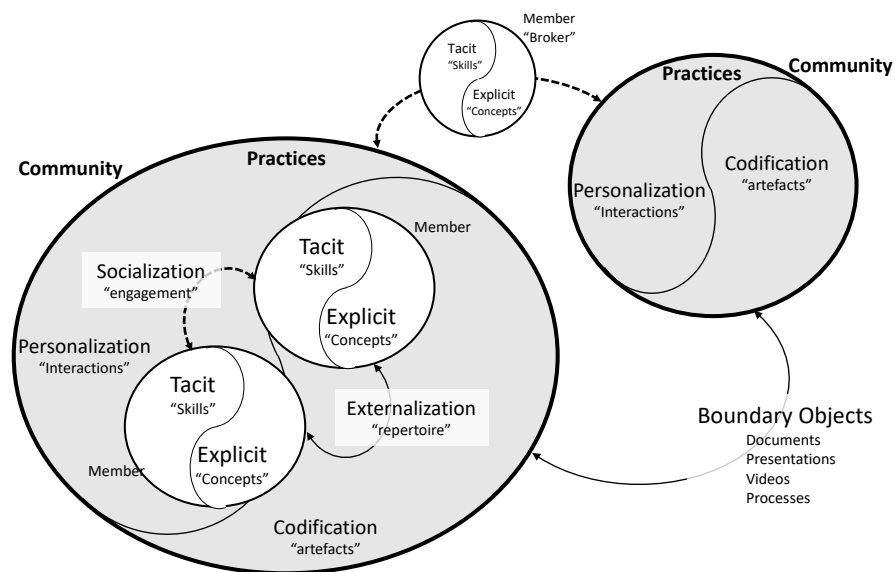


Figure 16: Conceptual framework for community supported knowledge interactions inside an organization

If organizations or communities hinder artefact sharing, explicit knowledge will not flow through the organization. Similarly, organizations can easily hinder brokers by putting limits on how they use their time or other constraining policies.

It is further possible to zoom out of the organizational perspective to see how organizations form similar structures, with their own rules of interaction, and methods of knowledge exchange—either direct or through intermediary communities of practice. This creates a multi-level knowledge ecosystem, where lower levels provide knowledge to higher levels, and higher levels provide structure to lower levels. These layers interact in a form of structuration, where their interaction is constantly changing as the layers interact. This is illustrated in Figure 17, based on ideas of Vargo and Lusch's service ecosystem, see Lusch and Vargo (2014). This diagram depicts how knowledge is combined at different levels to enhance an organization's capabilities, while organizations and communities provide environments for knowledge exchange. It also captures the concept, that not all organization members will

participate in a community and therefore do not contribute to an organization's development.

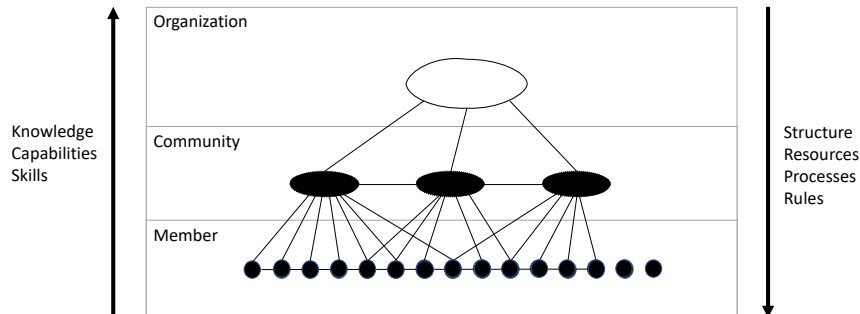


Figure 17: Organizational knowledge ecosystem: an illustrative model

This conceptual framework combines the ideas of communities of practice, knowledge management, and S-D logic. It can be used to understand how communities of practice function within a knowledge-based organization, like an agile software development division of a company.

2.6 Practical implications of a service-based approach to CoPs

Once the insight has been achieved that communities of practice provide service to members and organizations, implications of this approach can be realized. For the purpose of this report a key implication is the use of service marketing approaches to “selling” communities of practice to stakeholders—critical in the early phases of a community of practice. In particular the Gap service marketing model from Wilson, Zeithaml, Bitner and Gremler (2016), shown in Figure 18, can be adapted to understand how expectations and service delivery impact how members and organizations view communities of practices, especially in the early “potential” and “building phases.

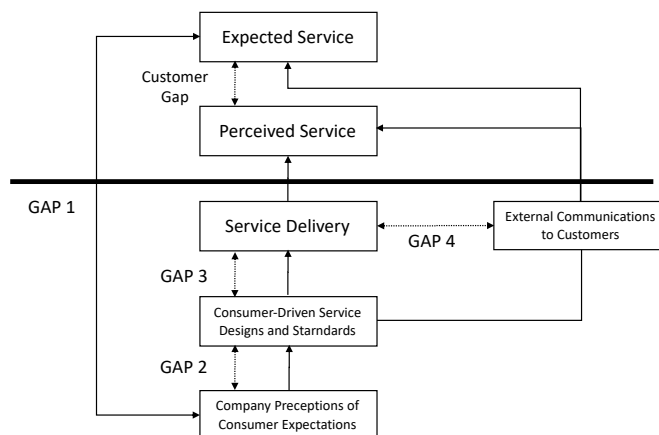


Figure 18: Service Marketing Gap Model, from Wilson et al. (2016, 100)

The model has 4 activities and 5 potential gaps that could be sources of problems with service provision to customers/beneficiaries. Service Delivery is the action of delivering a service to a beneficiary according to some guidelines, designs, and standards (Wilson et al. 2016). Based on the proposed framework (Figure 16), *if a community is a service, the community organizers are responsible for service delivery, and the beneficiaries are members and the hosting organization*. Within the Gaps model, consumer-driven designs and standards are guidelines to the people who provide the service (Wilson et al. 2016). In the case of communities of practice, these would be community routines, and tools, i.e., community facilitator guidance identified by Harvey, Cohendet, Simon and Dubois (2013) and Wenger et al. (2002). An example guideline for a community of practice would be to organize regular meetings, and to store documents, etc. in a common database. The company perceptions of consumer expectations in the Gaps model refers to how the organization sees the needs of a consumer (Wilson et al. 2016). For communities of practice, this would involve the community's goals and how they are aligned with the members' and organization's needs (a success factor identified by Probst and Borzillo (2008)). A final activity is the communication to consumers, for communities of practice this would involve communication to members and organizational stakeholders.

The Gaps model is useful because it highlights potential issues in service delivery from the perspective of the beneficiary. The primary gap, "the customer gap", is based on the differences in viewpoint between beneficiaries' expectations and the service organization (Wilson et al. 2016). This would mean the expectations of the members participating in a community and the results they perceive, as point out by Mestad et al. (2007) and Pryko, Dörfler and Eden (2017). From the work on communities, when this gap becomes too large, members will stop participating in the community (Pyrko, Dörfler & Eden 2017). A similar process occurs when an organization's expectation of community value is not sufficiently met, the organization will cease to support member participation or the community itself, as suggested by Smite et al. (2020).

Gap 1 is the difference between a beneficiary's expectations and the viewpoint of the service organization (Wilson et al. 2016). In this case, the members and organizational stakeholders may have a different goal than community organizers. This is a particular risk when there is a lone organizer but can be mitigated by forming a core group, as suggested by Probst and Borzillo (2008). A key feature of communities of practice is that members can gain more influence by engaging more, eventually becoming a community leader (Wenger, McDermott & Snyder 2002). A different risk occurs when the community's goals and the organizations goals diverge (Wenger, McDermott & Snyder 2002). Because the community exists within an organization, community leaders can gain access organization goals and objectives - this may help to mitigate this gap. Another way of bridging this gap is by incorporating the community into the organization, as suggested by Gongla and Rizzuto (2001) for adaptive communities.

Gap 2 refers to a gap between a community leader and the practices of organizing a community (Wilson et al. 2016). This is partly related to the organizational skills of the community leaders, but there is a key requirement to organize “mutual engagement” between community members. There is also a need to show value to the hosting organization, through concrete artefacts - the “codification of practice” to capture value as suggested by Iaquinto, Ison and Faggian (2011), Probst and Borzillo (2008) and Wenger et al. (2002). This gap requires educating community leaders on how to organize communities within an organization, balancing member and organization expectations, as mentioned by Wenger et al. (2002). This would involve guidelines for organizing community meetings, coordinating community leaders, methods for codification of community knowledge, and how to present outputs to the organizational stakeholders, as suggested by Harvey et al. (2013).

Gap 3 refers to the differences between the guidelines and the actual organization of a community of practice (Wilson et al. 2016). This is more of a skill-based gap between the skills of the organizers (facilitation, presentation, etc.) and the skills needed to provide an adequate service. For example, organizers will need to put effort into facilitating communities to increase engagement and to ensure wide participation across the membership, there are a range of issues related to competent practices within a community identified by Wenger et al. (2002).

Gap 4 is a communication gap between what a community delivers and how it advertises itself (Wilson et al. 2016). This is an important gap to fill, as it steers expectations of the organization and members. It also provides community leaders the opportunity to communicate the needs of the community in terms of member participation and organizational support. Clear communication is important to ensure that members and organizations provide feedback about a community’s goals and activities. The role of a community organizer as a community promoter has been identified by Probst and Borzillo (2008)

Based on the proposed models in Figure 16 and Figure 17, *a community is a service with two major customers, the members and the organization*. This allows the creation of a community of practice specific Gaps model that explicitly mentions the customers, as shown in Figure 19. This model can be used to help analyse problems with the service delivered by a community of practice.

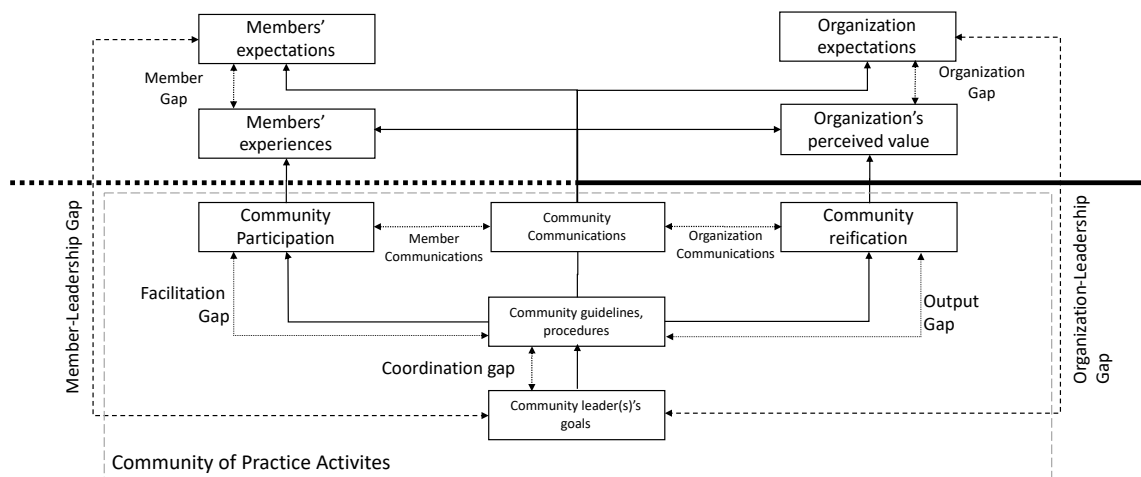


Figure 19: Community of practice Gaps model: an illustrative hypothetical model

This model highlights the beneficiaries of a community of practice, and how a community's leadership can market its value proposition to both members and organizations. It also indicates potential troublesome areas where a community may fail to deliver on its value proposition, its terminology is used Chapter 4 when discussing the empirical findings from this research. The goal for community leaders becomes reducing and eliminating the gaps in the framework, by more participation and reification enabled by better community communication.

3 Research methodology

The research methods used in this work need to be chosen to enable the goals of the research. The purpose of this research is to develop a framework for building and maintaining communities of practice in an agile software research and development organization, using service design tools. Therefore, the research methods need to be appropriate for researching communities of practice, and business organizations.

Communities of practice consist of a number of people with a shared goal, and therefore they are socially constructed by the people within the community. This would indicate that a constructivist approach to knowledge such as Berger, Luckmann and Zifonun (1967) could form a suitable framework for this research. This framework would imply that members of a community have different experiences based on their participation, history and role. To investigate this crucial aspect, an approach that is qualitative would be suitable because it will be necessary to understand how community members and organizational members relate to communities of practice.

The need for a deep insight into the relationships between people and communities of practice would indicate that a qualitative research method would be appropriate. This would require methods for gaining information about how people perceive communities of practice. This is similar to the research done previously on communities of practice. The original work done by Wenger and Lave consisted of studies on butchers, and apprentices (Lave & Wenger 1991). Wenger (1999) continued this work, where he analysed insurance claims processors. Later work by Wenger et al. (2002), cites example communities from different organizations. Other researchers, such as Harvey et al. (2013), Millen and Fontaine (2003), Gongla and Rizzuto (2001), and Schenkel and Teigland (2008), also use a qualitative approach to investigating communities of practice.

In addition to the need to investigate communities of practice this work also includes aspects of organizational research. The key aspect is how an organization supports a community of practice. Therefore, a research method that supports investigation into the operation of an organization is needed. Fortunately, Eisenhardt (1989) has illustrated how theories can be created from case studies, and Coughlan and Coghlan (2002) have used action research specifically for research in to the practice of management. It would be appropriate to use a similar method in this case. Additionally, many researchers investigating communities of practice in other organizations also have used case studies (Millen & Fontaine 2003; Brown & Duguid 1991; Lave & Wenger 1991). As this work also involves the creation of an intervention, an action research method similar to those described in Kasanen et al. (1993), or a constructive approach would also be appropriate.

The process used in this thesis is based on the approach described by Oyegoke (2011) for constructive research in project management. Project management research is quite practical in nature and has 3 major areas: planning, human management, and performance. These topics match the interests of this research because the goal is to plan communities of practice. Communities are made of employees and need human-oriented management approach. Additionally, the goal of communities is to improve the performance of employees. A high-level overview of the approach described by Oyegoke (2011) is shown in Figure 20.

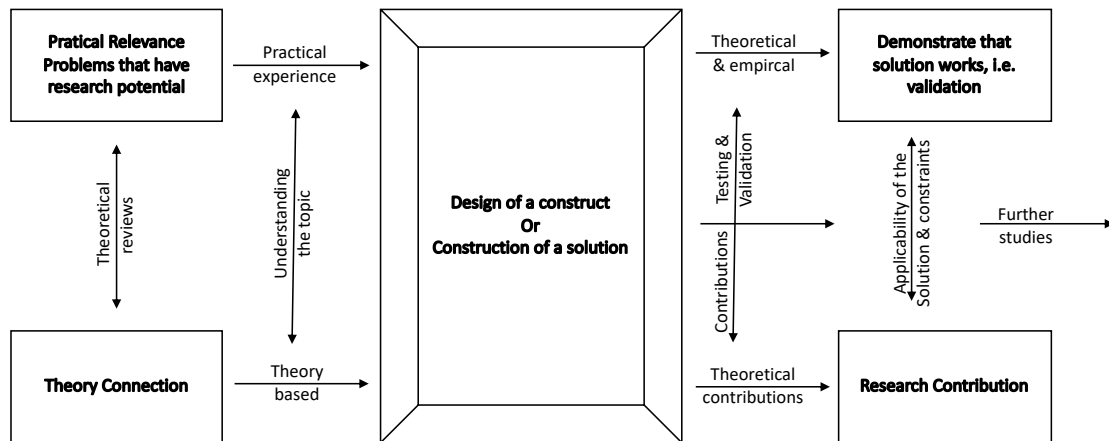


Figure 20: High-level overview of the constructive research process, from Oyegoke (2011, 580)

There are many different activities in the constructive research process: problem identification, theoretical connection, understanding the problem, designing a construct, demonstration of solution, and identifying the research contribution.

A key activity in the process is the design of the construct. For this design, a design process would be needed to match the construct with an understanding of the problem. In communities of practice, this needs to be focused on the members of the community, and how the community relates to the organization. It has been reported that service design can be used for creating communities of practice, with one case study on one community of practice (see Grenville (2014)), this would indicate that this approach would be appropriate for creating a community of practice framework. Within the service design process (Design Council 2015; Stickdorn, Hormess, Lawrence & Schneider 2018; Stickdorn, Schneider, Andrews & Lawrence 2011; IDEO (Firm) 2015) a key activity is understanding the problem a design must address. Therefore, it overlaps with the part of the process related to understanding the problem - the qualitative research.

A classic design process highlighting the use of qualitative methods is the double-diamond process show in Figure 21.

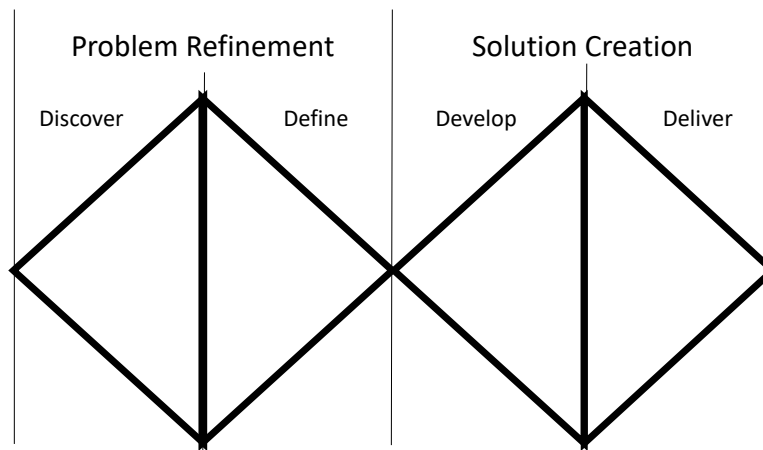


Figure 21: Double diamond design process from (Design Council 2015)

While there have been variations of this approach such as Brar (2020), the fundamental structure consists of 2 major phases: a problem refinement phase, and a solution creation phase. The problem refinement phase involves activities related to understanding the issues and analysing what is needed to resolve the problem: discover/define. The solution creation phase involves creating a range of possible solutions and then validating solutions set to identifying the best one: develop/deliver.

When the double-diamond process is merged with the constructive process the following process is formed, shown in Figure 22.

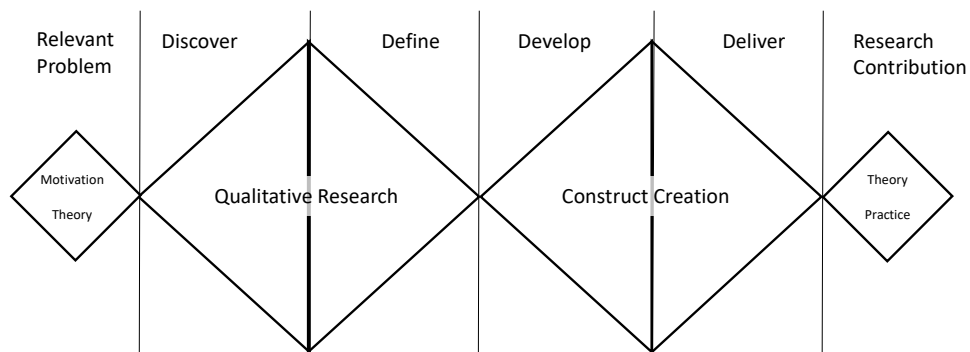


Figure 22: The research process of this thesis: combined service design/constructive research process

This research followed the process shown in Figure 22, with the following phases:

- **Relevant problem definition:** this requires a motivating problem, and a set of background theory
- **Discover:** build a rich set of material to understand the problem through qualitative data collection, and literature reviews

- **Define:** analyse the qualitative data, and relate to existing literature to identify the construct/solution needed - this ties theory to practical experience
- **Develop:** create a construct/solution, or set of constructs/solution that correspond to the problem
- **Deliver:** validate the construct, or test the solution - this corresponds to the demonstration of the value of the construct
- **Research contribution:** report on the findings and the results of the construct

The phases of the research process are elaborated below.

There are some constraints on this process: it has to be suitable for a lone researcher within a fixed time period. Additionally, it has to allow for researcher bias, because the researcher works in the industry and has prior experience of communities of practice. As the target of this research project is the researcher's organization there are some benefits, easy access to people and location, knowledge of the internal working of the organization, and knowledge of the terms and language used within the organization. The goal of this research is two-fold, support the researcher's organization and provide input to the wider software development community, therefore, while the focus of the research is specific, generalization of result is persistent throughout the work.

3.1 Relevant problem definition

The introduction gave some background to the motivation for this research study: the need for a framework to support the creation and maintenance of communities of practice within a software organization. This is particularly important for agile software organizations, because there is a risk of "leaking" expertise over time within cross-functional teams. The relevancy of this problem increases with the adoption of agile software development processes. The adoption of communities of practice have been suggested as a response to this challenge, but there is no clear guidance on how to create communities in practice. For the researcher the problem is more specific, it is how to support communities of practice within the researcher's organization. While this is a unique context, the results of this work may be generalizable to other software organizations.

A key aspect of a relevant problem is the existence of some related theory to help analyse the problem and put it in a wider context. There are several related theories as given in Chapter 2: community of practice theory, for understanding how communities work; knowledge management theory, for understanding how communities contribute to expertise maintenance; and service-design logic for understanding the interaction between communities, individuals, and organizations. Additionally, research into communities of practice has also be done within R&D organizations, for example Paasivaara and Lassenius

(2014) and Mestad et al. (2007), however while they identify factors of successful communities, the desired toolset for community organizers and organizations seems lacking.

3.2 Discover - investigating communities of practice

3.2.1 Theoretical background research

In the initial stages of the discovery phase, it is critical to do some investigation on the theory behind the phenomenon being studied - in this case communities of practice. This steers subsequent activities and avenues of research. Once an initial understanding of the background theory has been achieved, it is possible to start empirical studies of the phenomenon. The seminal text for this study is “Communities of Practice” (Wenger 1999), this forms an extensive analysis of how communities work, how individuals interact within a community of practice, and how they can be encouraged. A further seminal text is “Cultivating communities of practice” (Wenger, McDermott & Snyder 2002), which provides background on community lifecycles and their characteristics. Another relevant text, studied prior to starting empirical research, is “Why communities of practice succeed and why they fail.” (Probst & Borzillo 2008), which is used to identify key areas of research. These texts show sufficient theoretical background on this topic exists and guide the empirical research process.

A key risk to any study, especially done by a lone researcher, is becoming biased by previous work on a topic. In particular, in social contexts, work done in one social environment may not translate to another. For example, work done on insurance workers might not be relevant to software professionals. The guidance from qualitative researchers is to avoid too much theory prior to studying a phenomenon to avoid confirmation bias. However, once the initial empirical research has been completed, it is possible to expand the theoretical research to relate findings to existing theory. In this research project, further research into communities of practice, and initial knowledge management occurred during empirical research, prompted by initial findings. The theoretical background of S-D logic existed prior to starting this research project.

3.2.2 Empirical research: a qualitative approach

As mentioned above, communities of practice are frequently investigated using qualitative methods, such as semi-structured interviews, and observations. These methods provide insight into the nature of people’s relationship to a community of practice, their motivations, and their experiences. This has proven valuable in the research of communities of practice in the UK NHS (Pyrko, Dörfler & Eden 2017), Swedish construction (Schenkel & Teigland 2008) and IBM (Gongla & Rizzuto 2001). In this study a similar approach has been taken to

understand how communities of practice are experienced inside a specific software organization.

In planning a qualitative research project the following aspects need to be clarified when gaining information on a phenomenon, from Taylor, Bogdan and DeVault (2015):

- Qualitative research method - interviews, observations etc.
- Access to a relevant research setting - does it meet the needs of the research
- Access to informants - can they provide the right insights
- Data collection methods - how qualitative data is recorded and stored

The aspects of the qualitative research phase need to be appropriate to the topic being studied, and the tools being used to study the phenomenon. A key element in qualitative research is that the researcher is an active element in the research process. In comparison to traditional experiments, the researcher is the apparatus used to conduct the research, with limitations and characteristics that cannot be ignored when analysing results.

3.2.2.1 *Qualitative research method: semi-structured interviews*

Communities of practice are a social construct, and therefore the experience of the people involved in communities is critical to understanding their operation. This has been reflected by the use of qualitative methods such as case study analysis (Lave & Wenger 1991; Brown & Duguid 1991), anthropological approaches (Wenger 1999), semi-structured interviews/observations (Paasivaara & Lassenius 2014), and mixed methods (Gongla & Rizzuto 2001). In all cases, it is important to understand the motivations and experiences of community members and leaders - therefore the semi-structure interview approach was chosen for this study.

The interview method is appropriate based on the criteria outlined in Taylor et al. (2015), summarized here. The topic of the research is reasonably well defined: the informant experiences of communities of practice within a single organization. Observations, and surveys could also be used to study the externals of the topic but would not provide insights to how informants think about communities of practice. There is also a need to get multiple viewpoints on the topic of communities to capture the perspectives of the organization, and community participants. An additional driver to getting different perspectives is to challenge the researcher's preconceived opinions by seeking novel and new views on the topic. This approach also improves the generalizability of the research as, "Interviewing multiple informants lends itself to building general theories about the nature of social phenomena." (Taylor, Bogdan & DeVault 2015). Finally, it is important to understanding failed communities

that are no longer active, these cannot be observed or surveyed but can be studied by interviewing participants that were active in the community.

A semi-structured interview method was chosen to direct the interaction between the researcher and informants. The questions chosen were based on the initial theoretical investigation and are included in Appendix 2. This approach was chosen because the topic of the research was known in advance, and it focuses the interview on the topic - this reduces the time needed to gain insights. This decreases the time required from informants, which increases their accessibility.

3.2.2.2 *The research setting: case organization*

The choice of the case organization as the research environment is appropriate because it can provide specific information relevant to the researcher's research problem. In particular, a researcher seeking to investigate communities of practice within an agile software organization would need an organization with the following criteria:

- An agile software development organization
- An existing set of communities of practice
- Accessible to the researcher(s)

The case organization fulfils both these criteria, as it is undergoing an agile transformation, and has 1 or more communities of practice known to the researcher. While the case organization is multi-national, to narrow the scope of this investigation it was decided to focus only on local communities of practice. This narrowed the organization to the approximately 200 local employees of the host organization working in Helsinki. Of these 200 employees, not all participated in communities of practice. In this manner, a reasonable sample size of informants would capture a significant percentage of potential community of practice members.

As the researcher is working in this organization, he has access to the offices of informants, and places where communities of practice would meet. He is also aware on ongoing projects that may be confidential to organizational outsiders, so informants can speak freely. The researcher has access to members of the organization through a range of professional and social ties. Additionally, as the researcher has been working within this organization for several years, he is aware of the jargon, social setting, etc. which would allow rich interpretation of findings.

3.2.2.3 *Access to informants: snowball sampling*

As the researcher is collocated with informants, arranging meetings is only limited by time-constraint of the informant. A snowballing approach (Shull, Singer & Sjøberg 2007) to sampling informants was chosen, starting an original contact who participated and led an “agile community of practice”, where the researcher also participated. From this one contact, other participants of other communities could be identified and interviewed, using previous informants as brokers. This approach helps find additional informants previously unfamiliar to the researcher. Additionally, part of the research interest is in how the organization views community of practice, so managers were identified and interviewed to gain their perspective. This was considered important due from the initial theoretical review which identified organizational support as a key to community success.

3.2.2.4 *Data collection and recording*

The goal was to conduct a series of semi-structured interviews following an interview guide consisting of a set of questions targeted towards the interviewee’s experience with communities of practice. The questions included in the interview guide were based on Probst and Borzillo (2008), which highlighted some key aspects of communities of practice linked to their success or failure - these are related to the 4 of the 6 research questions. The interview guide is given in Appendix 2. During the interviews some questions were skipped or more added based on the interviewee’s experience and time constraints. Specifying questions were frequently asked during the interview to clarify issues, and reasons for findings. The COVID-19 pandemic influenced the nature of this research because the organization’s (and Finland’s) policies inhibited face-to-face interviews. All the interviews were recorded with the permission of the interviewee.

Because the researcher worked in the same location scheduling interviews was straightforward. As all the interviewees were busy with their current work, the researcher only scheduled 30-minute interviews, but many interviews overran this time allocation. All the interviews were recorded, and in the video interviews the video of the interview was also recorded. The sample size for these interviews was 10 based on Saldaña (2021). Given the size of the organization in Helsinki, 10 informants correspond to about 5% of the overall organization. As not all the organization is involved in research and development the actual percentage of appropriate organizational members is higher. There was also the need to balance both members and managers input to the research, so 5 of each were chosen.

All the interviews were transcribed by the researcher. In the video interviews an automated transcription service is used to do an initial transcription. However, to overcome strong

accents, and technical jargon the researcher needed to review and correct the automated transcription. The transcriptions were altered to remove references to internal project names and to anonymize the transcript (both informants and other people mentioned), in reports only the business title of the interviewee is used.

3.3 Define - Data analysis

To extract meaningful insights, it is necessary to analyse the many pages of transcribed interviews. As with normal qualitative research, analysis starts before all the interviews were completed, and was done in iterations. One potential issue with a lone researcher might be the neglect of analysis until the interviews are all completed, which would stop analysis from early interviews affecting the later interviews. To avoid this “trap”, 3 analysis milestones were identified prior to starting the interview process. All the transcriptions of the interviews were imported to a qualitative analysis software tool, NVivo (Qualitative Data Analysis Software | NVivo 2021), and coded within the software. The 3 phases were:

- Open coding of 4 interviews, followed by an analysis and refinement of the codes
- Coding of 4 interviews, followed by further analysis and refinement
- Coding of 2 interviews, with additional refinement

This approach schedules early analysis, and helps the researcher improve the semi-structured interview process during data collection. The goal of the open coding phase is to generate a large number of codes to challenge preconceptions of the researcher. As each interview is coded by the researcher the question is always whether the text being coded fits an existing code or demands a new code. By this process of questioning the number of codes increases, subsequently, a schedule of process of code refinement is needed to maintain a manageable number of codes.

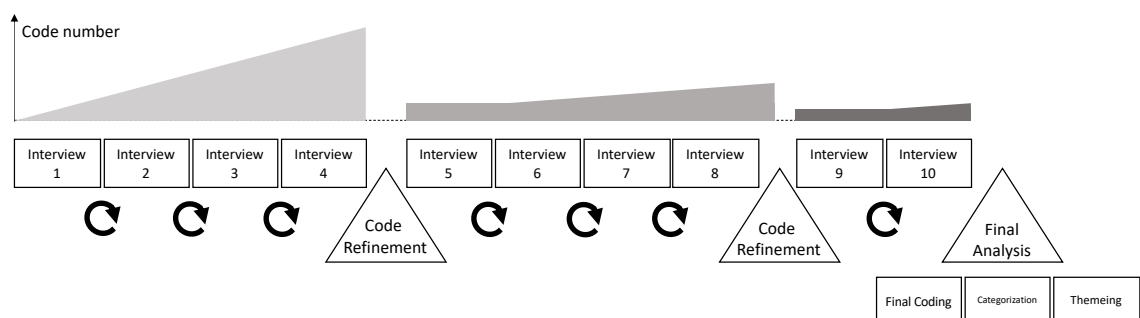


Figure 23: Data Analysis process

Once the qualitative data has been coded, and the codes refined, the next steps according to Gioia at al (2013) is to identify categories and themes. This is where the researcher’s creativity and intuition have to be used to identify those categories and themes that clarify

the research phenomenon. Within this study, the goal of the Define stage is to help specify the construct needed to help communities of practice.

A final stage of the Define phase of this research project is to identify area where informants' experiences align or diverge with the relevant theory. By combining the theoretical studies and the empirical data, a tailored construct can be specified that would achieve the goals of this study.

3.4 Develop - Selecting service design tools

Once the theoretical and empirical phase is complete the next task is to select one or more service design tools that could enable community of practice organizers create and sustain a community of practice. There is existing evidence that service design tools can help communities of practice when applied by a service designer (Grenville 2014), so the goal here is to provide organizers with a toolset they can use independently.

One issue that arises in this phase is the source of service design tools. There are many service-design companies, and many have modified existing tools based on their experience. For examples the Double-Diamond design process has been modified by Brar. To constrain the search space for service design tools a selection of source needs to be made by the researcher. There are some key sources of service design tools, such as Kumar (2012), Stickdorn et al. (2011), Ogilvie and Liedtka (2011), and IDEO (2015).

One guide in source selection is the organizational aspect of this research. The goal is to allow community organizers structure their community for success, so the focus on service design tools will be on tools applicable to the problem and well-known tools, such as the Business Model Canvas, and Service Blueprint.

3.5 Deliver - Construct validation

The validation of the construct(s) created in the develop phase can be achieved using a weak-market validation concept where a key participant or more from the original study are used to evaluate the construct. Ideally, given a longer research project it would be possible to analyse the outcome of the use of the construct. This is similar to the challenges of management accounting research, and can build on the work of Kasanen et al. (1993) Any successful construct needs to be applied in practice over time and incorporated into an organization's procedures. Similarly, in this case, the outcome of the develop phase needs to be applied, and the results measured over a considerable time period.

Kasanen et al. (1993) provide several different ways to validate a construct: a weak market test, a semi-strong market test, and a strong market test. The tests form a sliding scale of validation of a construct from initial use to clear evidence of benefit. During this process, it

can be expected that the construct would change as experience in its use is gained. This would create a series of iterations similar to the action research process described by French (2009) shown in Figure 24.

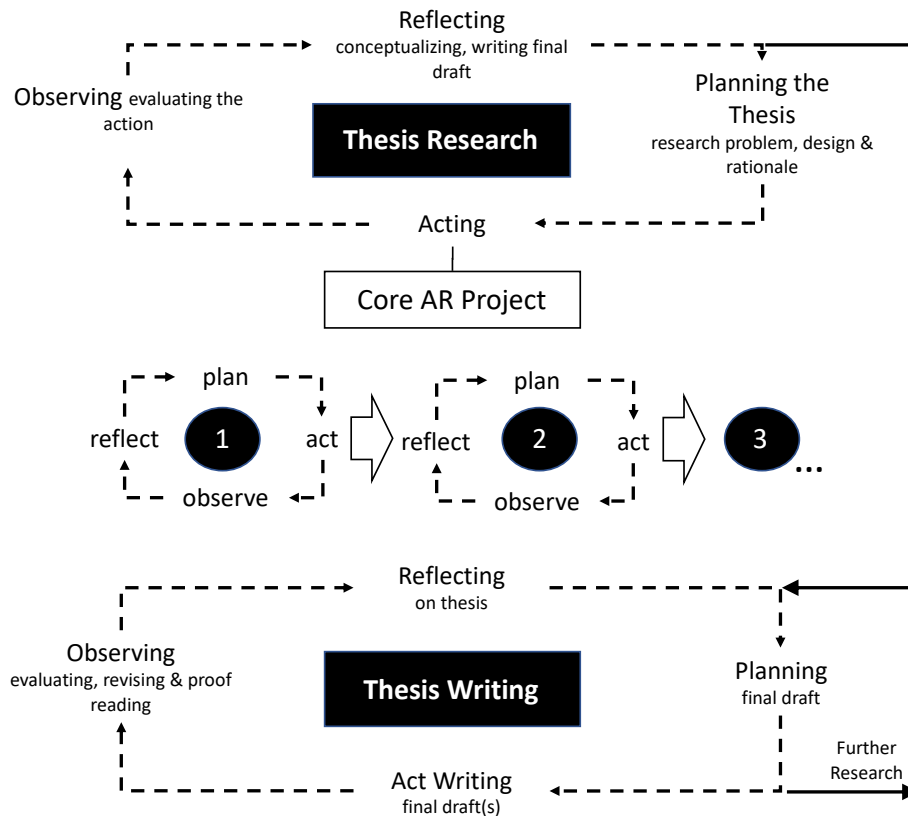


Figure 24: Action research process modified from French (2009, 193)

3.6 Research contribution

When evaluating the research contribution of a qualitative research process there are several criteria that can be used to measure the results, from Zuber-Skerritt and Fletcher (2007):

- practice-oriented (improving practice);
- participative (including in their research all stakeholders and others who will be affected by results of the research);
- focused on significant issues relevant not only to themselves but also to their community/organization or fellow human beings in the wider world;
- using multiple perspectives of knowing, triangulation of appropriate methods and theories, and connecting their own judgements to discussion in the current literature;
- rigor in their action research methodology and creative, innovative, contributing something new to knowledge in theory and practice within and across systems;

- explicit about their assumptions so that readers and examiners may use appropriate criteria for judging the quality of their work; and
- reflective, critical, self-critical and ethical.

This research fulfils all the criteria above. The topic is definitely practice oriented, and the research process involves multiple stakeholders who will be affected by the research. As mentioned above practical methods to stimulate communities of practice a useful for a wide audience of software developers. The research uses a combination of theory and empirical research to connect the practice issue to existing literature. The research process is rigorous in its analysis and evaluation of the constructs. The assumptions of the researcher and the basis of the approach are clear, and the work is self-critical.

One final point related to the impact of the research as measured against the different types of action research: technical, practical and emancipatory (French 2009; Perry & Zuber-Skerritt 1992). Technical action research aims to test a pre-determined intervention based on theory. Practical research involves a team of researchers and practitioners identifying problems and solutions, requiring a deeper understanding from researchers. Finally, Emancipatory, treats practitioners and researchers equally, where the researcher attempts to embed themselves in the practice, and elicit reflection on the topic by practitioners with the goal of freeing practitioners from limits of existing practice. This research project attempts to enable communities to thrive independently of the researcher, free them from dependence on a consultant to achieve success. This research can be understood as emancipatory research because it aims to free community organizers from needing outside help in creating successful communities of practice.

4 Discover/Define - Defining the community of practice construct

The goal of this analysis is to extract meaningful insights from qualitative data obtained using the empirical research method described in Chapter 3, and link these to relevant theory. The goal of this phase of the research project is to specify an intervention that could help the researcher's organization create and sustain communities of practice. A key factor in success of this project is identifying the correct problem to solve. For example, a naïve approach could focus on the tools used by communities, but if the problem is that people do not have permission to participate in a community, no tool will impact the community positively. This section reviews the outcomes of this research process.

The analysis is guided by the need to understand how the organization's members view key issues:

1. What is their understanding of a community of practice?

2. How do they define a successful community of practice?
3. What support a community of practice can expect?
4. What support does a community of practice need based on experience?
5. How does the organization benefit from a community of practice?

The analysis needs to provide information that allows the researcher to differentiate between the operation of communities of practice and theoretical examples of communities reported in other literature. Additionally, the analysis should also provide information regarding additional aspects of CoPs within the case organization, especially how they align to models existing in research literature. By extracting meaningful information about communities of practice and structuring the findings it should be possible to define actions or areas where the researcher can improve the operation of communities. In particular, the analysis should identify concrete dimensions where existing communities of practice can be assessed in order to create specific interventions. Additionally, the analysis should highlight any major lack within the organization amenable to intervention. The goal is to create a set of “how might we” questions to guide construct creation.

4.1 Discover - Empirical data collection

The primary data source for this analysis is a set of 10 interviews conducted by the researcher with members inside the organization. The following table captures some of the features of the interviews.

Informant ID	Organizational Role	Interview Type	Recording	Transcription	Community Role
Informant_1	Software Engineer	Face-to-face	Audio	Manual Transcription	CoP Leader
Informant_2	Software Engineer	Face-to-face	Audio	Manual Transcription	CoP Member
Informant_3	Project Manager	Videoconference	Video and Audio	Revised Automated Transcription	Manager, CoP Member
Informant_4	Line Manager	Videoconference	Video and Audio	Revised Automated Transcription	Manager of CoP Leader
Informant_5	Line Manager	Videoconference	Video and Audio	Revised Automated Transcription	Manager, CoP Leader
Informant_6	Software Validation Specialist	Videoconference	Video and Audio	Revised Automated Transcription	CoP Leader
Informant_7	Line Manager	Videoconference	Video and Audio	Revised Automated Transcription	Manager
Informant_8	Software Engineer	Videoconference	Video and Audio	Revised Automated Transcription	CoP Leader

Informant ID	Organizational Role	Interview Type	Recording	Transcription	Community Role
Informant_9	Line Manager	Videoconference	Video and Audio	Revised Automated Transcription	Manager of CoP Leader
Informant_10	Software Engineer	Videoconference	Video and Audio	Revised Automated Transcription	CoP Member

Table 5: Overview of the interview data

Of the interviewees, 2 were CoP leaders, and 1 was a former CoP leader, the remainder were participants or managers of participants. Most of the interviewees were known to the researcher prior to the interview, and all of the terminology, jargon, and internal organizational information was known to the researcher. All of the informants were employed by the researcher's organization at the time of interview. The company works through English, which was the language of the interviews - this might impact some expression of feelings on the part of informants, because only the researcher and one informant were native English speakers (3 were Spanish, and 5 were Finnish native speakers). While the researcher is male, there were 4 female informants - 1 community leader, 1 participant, and 2 managers. One consequence of the non-native English informants was that In vivo coding becomes difficult as the informants would lack the necessary nuanced language to express feelings, describe emotions, and situations, even though they use technical English on a daily basis.

The interviews took between the 7th of February 2020 and the 28th of October 2020 and consisted of 2 face-to-face interviews and 8 video interviews. The reason for the long interview period was the availability of interviewees, which had 2 influencing factors, the summer vacation period and individuals' response to COVID-19 procedures. The company's response to COVID-19 involved changing work practices so employees could work from home. This reduced the possibility for face-to-face interviews and required each employee to spend time to adjust their working practices. This transition period extended to the start of the summer vacation period, which further reduced the availability of informants. An additional delay was caused by the need to transcribe and code the interviews according to the schedule described in the research methods section. This had the advantage of starting the analysis early in the process but delayed the second and third rounds of interviews.

While each interview was different, all the interviews followed the same format, taken from Portugal (2013, 39):

1. Permission to record
2. Introduction to the research topic
3. Initial personal information

4. Questions related to community of practice
5. Questions about the future
6. Wrap up - including information about potential informants

All the informants gave permission to record their interviews, given anonymity. This was followed by a brief introduction to the research topic, and encouragement to present their own opinions. The questions about personal information were useful to help build rapport between the researcher and the informant, this is an essential part of qualitative interviewing (Taylor, Bogdan & DeVault 2015, 58). Additionally, it was foreseen that family, hobbies, and outside of work pursuits might impact how a person relates to the concept of community - these did not seem to be a factor. Given only 30 minutes of allotted time, there was a limit to the number of questions an informant could answer, therefore only the most relevant questions, based on the informant's community of practice experience were raised. The number of questions normally exceed the 6 questions recommended by Auerbach and Silverstein (2003). In any case, most interviews overran the allocated time, which impacted the closing sections on additional informants, and wrap-up.

All the interviews were recorded and transcribed by the researcher. The first two interviews were face-to-face, and so only an Audio recording was used to capture the interview. This could lead to informants being reluctant to share information but in all cases communication outside of the recording time matched the contents of the recording. Additionally, all the interviews took place in a quiet, professional setting with little background noise, leading to high-quality recording from an unobtrusive mobile phone. The latter 8 interviews were done using video conferencing software that both recorded and transcribed the interview. The recording mechanism within the conferencing software was also unobtrusive, especially since it has become commonplace within the researcher's organization. The automated transcription was not completely successful, as it had to deal with a range of accents, both non-native and native, as well as jargon, terminology, and normal vocal punctuations. All the transcripts were carefully reviewed by the researcher to remove identifying information, and internal project information, prior to being loaded into NVivo (Qualitative Data Analysis Software | NVivo 2021) for further analysis, this process is illustrated in Appendix 3.

The first interviewee was known to the researcher prior to this project, having been interviewed in an unrelated service design project earlier. Additionally, the researcher had worked with the first interviewee in a community of practice. The first interviewee was a leader of a dormant community of practice that reached a passive state after an initial active period. The manager of this informant was also interviewed to gain their perspective on communities of practice. The first informant thus led to several informants, their manager, and other informants active in communities of practice. During the interview process 3

communities of practice were identified: an agile development community of practice, a testing “guild” and a clinical training community.

4.2 Define - Data analysis

As mentioned in the research methods section, the analysis of the interview data took place in stages. The goal of this process was to capture a wide range of topics before narrowing down on the novel aspects of the data. A key goal here was to overcome confirmation bias based on the researcher’s knowledge of the subject and background reading by creating a large number of potential codes.

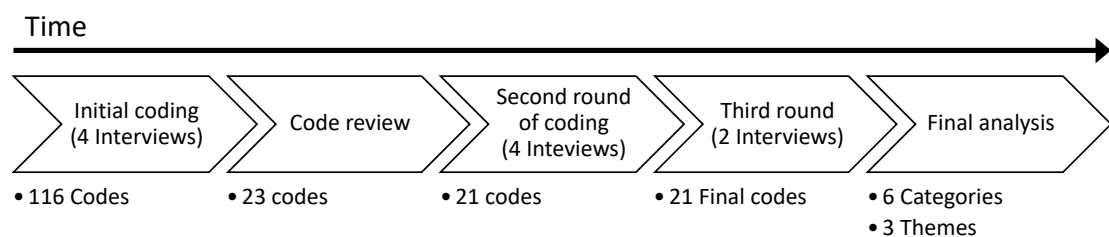


Figure 25: Data analysis process

The first four interviews were accompanied by a form of open coding, akin to the tagging of relevant text suggested by Auerbach and Silverstein (2003). This approach generates a large number of codes from a small number of interviews. In this case, the first four interviews consisting of 3 community organizers and 1 manager led to 161 codes. Many of these initial codes only existed in one file or one informant’s interview, even though they may capture similar concepts. The number of codes was reviewed to combine many of the 161 codes into larger coherent codes shared across interviews, this reduced the number of codes to 23. After the first refinement, an additional 4 interviews were taken and coded. During the process attention was paid to whether the existing codes matched the interview data, or whether new codes would be required, this mainly resulted in the coded data moving to more appropriate codes. Again, the codes were refined to improve their clarity - this reduced the number of codes to 21. The final 2 interviews confirmed the relevance of the previously generated codes and enriched the codes with more data from the informants’ experiences. In this way, the coding of the qualitative data evolved from a loose, vague set of codes to increasingly clearer and richer codes.

According to Gioia et al. (2013) coding creates a 1st level analysis of the qualitative data. Similarly, Auerbach and Silverstein (2003) could categorize the codes attained from the above process as repeating ideas. The next stage of the analysis process is to further combine these codes into more abstract theoretical concepts, “Themes” in Auerbach and Silverstein (2003) and “Categories” in Gioia et al. (2013). This relies on the intuition and creativity of the

researcher. However, there are some criteria that can guide this process. The researcher is looking for two different things, confirmation of existing theory, and divergence from theory, or novelty. If there is a major divergence from theory, then the researcher has to doubt the theoretical background, or their understanding of it. If there is no divergence, then the researcher has to doubt their sensitivity to the unique experiences of the informants. An additional factor when reviewing categories and qualitative data are those with a point of view that challenge the researcher's viewpoint - this occurred early on in the study with regard to the amount of time needed by community organizers.

The final stage of the analysis is to create a set of high-level topics that can be used to gain understanding of the phenomenon. In Gioia et al. (2013) these are called themes, in Auerbach and Silverstein these are theoretical constructs. For this research project, these themes should be used to guide the design of a construct to help the organization's communities of practice.

4.3 Define - Empirical findings

The findings of this research are based on the recurrent topics that emerged from analysing the interview transcripts. The 1st level analysis created 21 codes, 2 of the 21 codes created during the coding phase were related to background information useful for creating personas, and for identifying other members of CoPs. These were also analysed to check if there was any pattern amongst community leaders or participants, but there were no patterns recognized by the researcher. Once these are removed from the list of codes there are 19 codes identified to be relevant to this research, these are shown in Table 6.

Code	Description	Interview No.	Count
Advice	Refers to advice from the participants to future organisers of CoPs.	8	30
Challenges	Challenges facing CoP organizers	8	55
CoP as information sharing forum	Using a CoP as a communication channel, place to share information and gain shared understanding	9	38
CoP as side job	References to CoP as a secondary role and a low priority against project and other work.	9	25
CoP as work	Refers to CoP as part of people's work, as a role-related or as an objective.	6	10
CoP Experience	Refers to CoP Experience inside and outside of the case organization.	9	26
CoP Future	The vision of the CoP	5	12
CoP Knowledge	References to knowledge of what a CoP is, either by confusion with the MS Teams channel, or the structure of CoP.	8	16

Code	Description	Interview No.	Count
CoP leadership	Reference to leadership of a CoP, the steering group etc.	7	11
CoP Management Support	Refers to support a CoP has received from management.	8	18
CoP Objective	Refers to the objective of the CoP (or lack of objective)	9	28
CoP Practices	Refers to current CoP Practices within the organisation	7	28
CoP Start	Refers to the origins of a CoP or a member's participation.	5	8
Current state	The current state of the CoP	6	26
Expectations	Expectations of the interviewee from the CoP	8	17
Future managerial support	Management support for future.	5	13
Manager Viewpoint	Refers to a Manager's viewpoint	4	22
Success criteria	Refers to success measure for the CoP (could also be an objective).	10	18
Tools	This refers to the use of tools inside CoPs.	8	15

Table 6: Code table from empirical research

These codes are related to 3 broad themes: community of practice nature, alignment, and working model. These themes are derived from the categories and codes, as illustrated below in Figure 26.

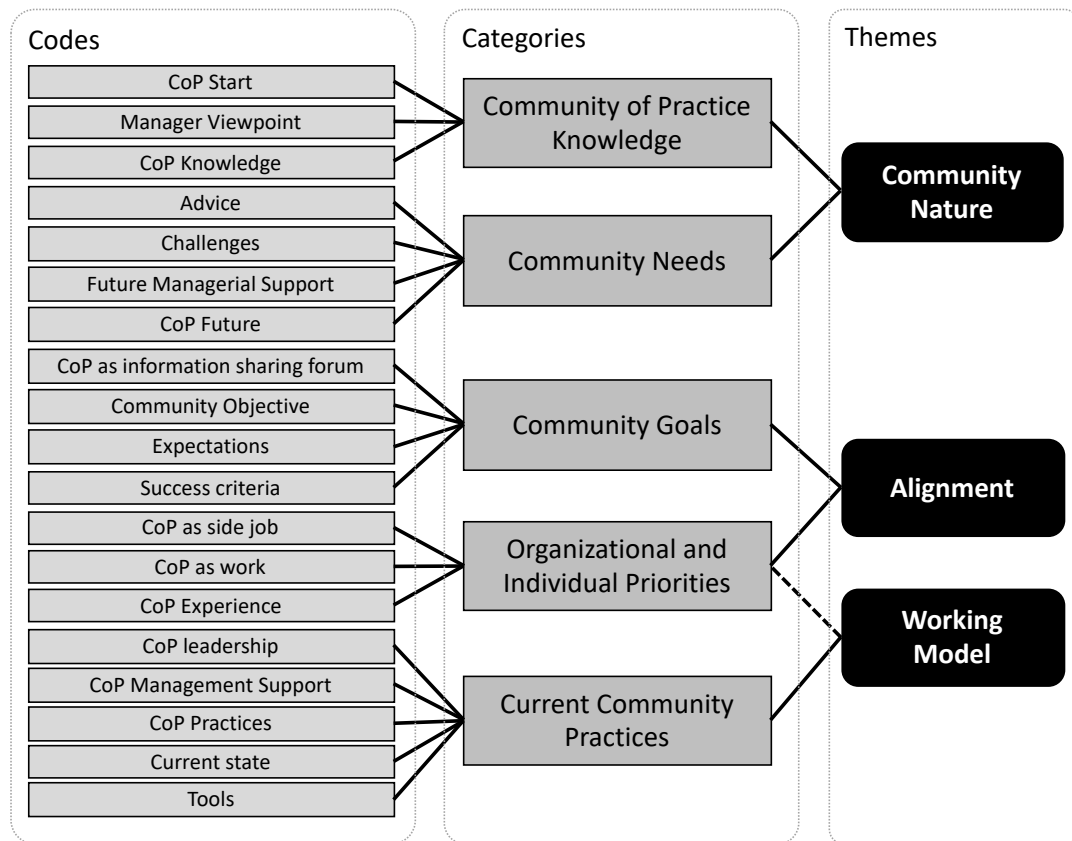


Figure 26: Codes, Categories, and Themes from empirical research

From the codes, 6 categories have been derived leading to 3 themes (community nature, alignment, and working model) that can be used to analyse communities of practice within the case organization. Each of these themes, and their related categories are discussed in the following sections. Additionally, the interaction between these themes is analysed abductively. Finally, the critical issues needed to be addressed by the research construct as identified by the analysis are given.

4.3.1 Community nature

The first set of findings related to the informants view of the nature of a community of practice. This is a critical issue because without clear understanding of what a community is, and what it needs it is difficult for people to drive or appreciate a community. Most researchers on the topic of communities of practice have a clear understanding based on one of the definitions from Lave and Wenger (1991), Wenger (1999), and Wenger et al. (2002). Additionally, most researchers have an understanding of how a community operates and what it needs, even if there is still a debate on the spontaneous versus managed nature of a community. Within the informants there seem to be 3 different levels of knowledge of a community of practice: academic knowledge, superficial knowledge, and practical knowledge.

One clear issue is that there is a lack of knowledge of what a community of practice is. Most of the knowledge comes, not from the classic Communities of Practice texts but from Agile coaches, as exemplified by the following quote:

“Craig Larman actually mentioned the community of practice champion or the person that is chairman of it would spend like 50% of his time on it”[Informant_2]

This refers to Craig Larman, who is well-known in the LeSS community (Less.works 2021), and the author of several books on large-scale agile software development (Larman & Vodde 2016, 2009). Another informant’s definition captures a general idea of the community of practice within the organization:

“I’m not quite sure what is the correct or the formal definition of a community of practice, but my understanding is that is people that share an interest and share a craft.”[Informant_10]

Another informant commented on the idea of a community of practice as a forum for ideas more than for driving practice improvement:

“I think that the communities of practice goals should be to share information or ideas, new ideas that could be valuable for doing something better or trying to apply ideas so having this common understanding of different like things.”[Informant_3]

These approaches to a community of practice tend to miss one of the 3 characteristics: mutual engagement, shared repertoire or joint enterprise. The lack of a clear understanding of the elements of a community of practice and how they interrelated can lead to failure, because each element is necessary in a successful community.

The problem becomes more relevant when more vague views are taken. One informant echoed a finding from Pyrko et al. (2017) where a community member confuses a communication channel labelled as a community of practice with a community. In this case it occurred when informants confuse an MS Teams channel “Communities of Practice” with the concept, an example comment:

“Are you now talking about the Teams group?”[Informant_6].

The confusion of the label with an actual community creates problems because at a superficial level it seems that there are many communities of practice, when in actuality there are very few or none. This is different from another problem where communities of practice are described using other terms like “guild” or “coffee” events - which have the

elements of a community of practice. The lack of a clear understanding of what constitutes a community of practice means that existing communities are overlooked, and non-communities are considered communities of practice.

The unclarity related to a community of practice leads to problems when trying to address the challenges of forming a community. An example is the equating communities with the tools used to support them. One informant described the challenges of following multiple channels of communication:

“It’s question about the general challenge in [case organization] that nowadays when we have been opening these channels to come to communicate more widely and more easily. So, so we have so much information and discussion going on and they are not, actually not very well formulated”[Informant_4].

Other informants refer to how information is structured within the various communities of practice - relegating the communities to something more like a knowledge repository instead of an active knowledge creation organization. This is similar to the focus on codification of knowledge within the Software Engineering community (Rus & Lindvall 2002), which while acknowledging that tooling is not by itself sufficient - concentrates on formal processes, and tooling as concrete actions for knowledge management. The lack of agency on the part of the organization is summed up by the following informant:

“And I think in some cases we just establish a guild call a group of people to join it, and then expect or assume that everyone starts to share and this way we get like discussions and share somehow the knowledge.”[Informant_9]

For several of the leaders of a community the issue is more related to engagement. This is best summed up by one leader’s experience:

“my perception is that since now I am a manager a lot of people expect me to lead it strongly. I’m like wait! Hold on, this is, this is a community.”[Informant_5]

The need for a more community-based approach is also captured by the advice given by the same informant to others:

“I would get together three or four people as an official core team so that we could actually be co-leaders from the start”[Informant_5].

This lack of co-ownership is reported by other leaders, who are challenged to find participants and people to actively drive a community. The reliance on one person to lead a community follows a standard team/team-lead structure common in the organization, and

follows the single leader approach from Webber (2016, 28). This makes a community fragile to the availability of a leader as noted when one leader was temporarily posted to another site, the associated community collapsed. This is in line with the advice from Probst and Borzillo (2008), who mentioned that communities need a core group, and people to identify with the community.

To sum up, the informants felt that more guidance would be necessary to help start and run communities:

"But I think at least at the beginning, there needs to be some kind of guidance from somewhere ... otherwise it will turn up like a regular meeting where someone is leading"[Informant_9]

The key finding here is that the organization is suffering from a problem of lack of expertise in communities across the organization, especially its core nature and how it differs from standard organizational structures. This manifests itself in two major ways:

- confusion over what defines a community of practice, and
- confusion over the issues in creating and sustaining a community.

Both these issues would have to be overcome to create successful communities of practice.

4.3.2 Alignment

The novelty of the community of practice concept within the organization means there is difficulty in merging this idea within the existing organizational structure. This can be viewed as a form of alignment between a community of practice, the organization, and the members of the community. In comparison to the section on the nature of a community, where the challenges seem to be mutual engagement, the challenges here are forming a joint enterprise that can unite the community and contribute to organizational goals. There is a variety of opinions as to what a community of practice's goals should be, and in most cases, these are never fully captured:

"I would say that they were never formally stated, so you never laid out a list and said, hey, here are our objectives."[Informant_5].

In most cases informants point to information sharing as the primary objective:

"I mean it's a forum for discussion about agile things of course a place to exchange ideas"[Informant_2], or

“I think that the communities of practice goals should be to share information or ideas, new ideas that could be valuable for doing something better or trying to apply ideas”[Informant_3].

The openness of a community is also seen as a useful way to get information from others without going through more formal channels:

“Well, for me, it is like making it easier for me to do the trainings and hopefully get some feedback for the trainings.”[Informant_6].

This would align with the idea of a community of a study group, like an evening seminar described by Mestad et al. (2007), rather than a place where practice could evolve and develop.

For some of the informants, the goals, while not explicitly stated, are related to improving the operation of the organization. For example, communities help by removing obstacles:

“the added value also of some of the communities of practice to remove blockers that they could be within our own circle of influence”[Informant_3].

Another informant comments:

“we would be hitting the same changes, most of us, so then, at least get a shared understanding of how we can learn and fix those.”[Informant_1].

Both these point to practical outcomes of a community’s actions. Interestingly, one point of tension in Informant_1’s community was that other members did not share their practical focus, using the community to drive a different agenda related to the adoption of LeSS practices within the organization.

Managers seem to take a pragmatic approach to communities, focusing on a clear benefit for the member’s organizational team. There is an expectation from managers that the member contributes to their team’s knowledge:

“I would expect that if somebody is participating and spending time say some, some, something for something like that that that person would in a way bring some would bring some dialogue to the team.”[Informant_4].

Another benefit perceived is in increasing the competence of employee’s:

“I would have a very experienced Scrum master, who is completely able to do his job already now and he says that, oh, it would be so nice to spend one day

per week with my colleagues in order to get new ideas. So, in that case, I would ask that why you need to have one day for that.”[Informant_4].

This would imply that once the benefit has been realized, participation in a community should be stopped even though a member would be assisting others within the organization.

While on the surface, the practical focus of a community would seem to align with the practical focus of managers, the issue arises of the novelty of the practices being discussed within a community. In many cases, the practices are being cocreated by the community members outside of the control of the organization’s traditional structure - this means managers cannot appreciate the issues without participating in the community itself. In fact, in one successful community of practice, the manager actively participated in the community when possible.

Organizational support can also come from the alignment of individual’s objectives with participation in a community, this occurs in at least 2 cases within this study. In one case the manager suggested participation, and encouraged it,

“I guess it was my managers idea that communities of practice could be a good place for that because you like everyone has access to it”[Informant_6].

In another case it appeared that the organizational objectives for the community leader almost demanded a community of practice, in this case a member’s work was so tied to the community it was difficult to differentiate between the two:

“when he is working on the guild and when he is actually doing is daily work because they were so much integrated nothing in that case it’s natural.”[Informant_9].

These cases are in stark contrast to the situations where there is a conflict, or misalignment between individual and organizational goals:

“So it’s kind of something that yes, you can be a part, but as long as doesn’t harm your day job”[Informant_9].

From the manager’s perspective the value of the community needs to be clear:

“I’m thinking that if one person is spending one day in every week to something else what is not directly related his work role for example. I’m not sure why we do that thing.”[Informant_4].

These findings are similar to ones found in the literature. For example, the guidance around aligning community goals his would align with the guidance from Probst & Borzillo (2008), where they suggest a committee of organizational and community leaders to be formed to help align the two. There is also an inherent cultural barrier to communities, identified by Harvey et al. (2013), where the bureaucratic nature of the organization diverges from the more fluid structure of a community. This could apply to the research here, because the organization’s industry is heavily regulated, with a resulting emphasis on following detailed processes for most tasks. In fact, one informant mentions a similar level of engagement:

"Most people are happy to come to the meetings when they're not conflicting with something else they're doing but they're not really very active contributors"[Informant_5].

The key findings related to alignment are:

- Internal alignment can help drive the community,
- organizational alignment is important to gain access to resources, and
- alignment is challenging when creating novel practices.

The findings indicate that one issue is legitimizing participation in a community by relating the activity to one’s work.

4.3.3 Working model

One of the challenges with introducing communities of practice inside an organization is finding a good working model for the community. A good example is Mestad et al. (2007), where the organization tried three different approaches for knowledge sharing before settling on a “skill circle” version of a community of practice. Within the case organization there seems to be several different communities that have been launched, floundered, and relaunched, as well as those that have succeeded. Other findings point to convergence on the use of tools, and certain practices that could help others create and run communities.

For those community members whose organizational objectives align with a community participation is straightforward. For example, in the “Testing Guild” run by one informant, testers collaborate to work on issues that are mutually beneficial. In this way, a community based on a functional role replaces the traditional functional organization:

“I guess now we have some good proportion of people representing test automation from I guess each feature team”[Informant_8]

This community seemingly replaces the former test automation team. By forming a community around a pre-existing role, the community is able to leverage existing tools for organizing itself. For example, the community meetings are synchronized to internal project schedules (*“every three weeks”*[Informant_8]), and they use a standard tool for managing community’s activities: ‘

“There were stories in the backlog, and they were refined, they were prioritized, and implemented like anything else”[Informant_8].

Building on existing structures reduces the workload for the organizer who spends,

“a few hours in a month or something like that, less than a day definitely.”[Informant_8].

Having a common focus also helps drive the community, as stated in this case:

“we have been kind of driven by the needs for automation”[Informant_8].

It seems that a combination of pre-existing roles, common goal, and common way of working helps both the community and the community organizer sustain this community of practice. A key finding here, is that it does not take too much time to organize and run a such a community, the organizer commented that there is little activity outside of the regular community meetings. This differs from a stated need that a community coordinator should spend considerable effort in behind the scenes networking as advised by Wenger et al. (2002, 58).

When the community cannot build on pre-existing roles the organizers struggle to find the time to organize the community. In these cases, communities were considered a “good idea” but never formally recognized:

“I had assumed it would be something that would be in addition to my regular work, not necessarily for instance, something that are going to set aside a specific amount of time each week”[Informant_5].

Or another comment,

“It would be nice if it was really recognized somewhere like black and white, that that you do this work, that you may had like a half a day in a month, maybe to develop this this thing”[Informant_6].

The lack of official support makes the community harder to keep running when time and project pressure arises, for example,

“then the Christmas holidays hit and then it kind of lost steam, so it's not dead, but it's been struggling a little bit”[Informant_5].

When there is a lack of community then the results are clear,

“there was no traction so then I stopped organizing”[Informant_1].

This confirms a recommendation from the literature that organizers should seek existing networks to start a community of practice (Iaquinto, Ison & Faggian 2011; Harvey et al. 2013)

One finding from this empirical research is that all the communities used similar tools to manage their operation. All the communities used:

- a MS Teams channel for regular communication,
- OneNote to capture meeting notes and other information,
- PowerPoint etc. for creating presentations, and
- Outlook for scheduling meetings.

There were additional suggestions from informants about how to improve practices, such as Open Space Technology (Owen 2008) for organizing meetings. The findings point to unused benefits of these tools, for example, OneNote was

“a good tool that search functionality is rather advanced”[Informant_7].

This research did not find that tooling was an issue for the communities in the organization. This could stem from the fact that all the informants have worked in the software industry for several years, and all the tools used were in daily use for the organization's activities.

In order to create a community of practice within the organization a valid working model is needed to guide others. This is the idea of positive deviance from Brown and Wyatt (2010), where a positive example serves as a model for success. In this case, the testing guild shows it is possible to have a running community of practice, overcoming the bureaucratic issues reported in Harvey et al. (2013). There still remains to solve the challenge of creating a community when there is no clear alignment with existing structures or organizational goals.

To summarize, when creating a community, the organizers:

- leverage existing tools, practices, and community when building on former teams or pre-existing roles, this essentially builds the community working model on a previous organizational team model,
- struggled to find a model for communities associated with novel practices (without a pre-existing working model), and

- technology and tooling were not a factor in community success - there are readily available tools with adequate support.

4.3.4 Interaction between community nature, alignment, and working model

The themes of community nature, alignment and working model are interrelated. This is most obvious in the case of the working model, where alignment of individual and community goals enables or inhibits a working community. The other themes also interact to improve or reduce the likelihood of a success community. These interactions are shown in Figure 27.

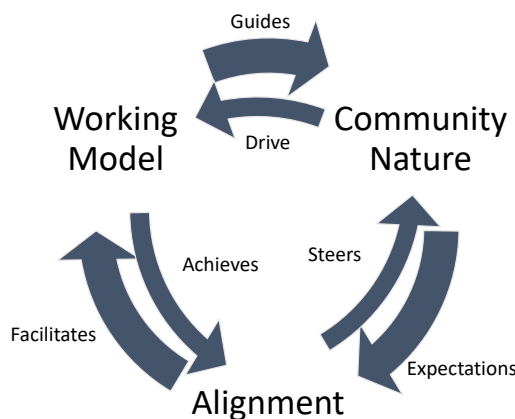


Figure 27: Interactions between empirical themes

Knowledge of a working model of a community, highlighting the key aspects of a community of practice (joint enterprise, mutual engagement, and shared repertoire) creates knowledge of the true nature of a community. For example, creating a rhythm for a community is suggested by Wenger et al. (2002), but a study participant commented:

“I guess we don't have regular meetings at all”[Informant_6]

A working model guides a community member in how to interact with the community, so the members can align the expectations of their managers and achieve some degree of organizational alignment. For example, one informant highlights the use of a core team to help generate ideas, a key element in a community:

“I think that working with other people who get more ideas of things that would be useful to the group as a whole”[Informant_5]

A working model helps the organization understand how a community should function within the organization. This helps overcome the coordination gap, the organization-leadership gap, and the organization gap of the proposed community of practice gap model in Figure 19.

For community organizers, a clear picture of the nature of a community (with mutual engagement, joint enterprise, and shared repertoire) emphasizes the need for meeting and regular interaction, as studied by Pyrko, Dörfler and Eden (2017). This helps achieve alignment of community members and helps create a working model for the community. An example of this development is the evolution observed within this study of the “Testing Guild” from an informal group to an active virtual team within the organization, complete with backlogs etc. Given the nature of a community, alignment with an organization helps gain sponsorship (a success factor from Probst and Borzillo (2008), which influences the nature of a community to become an integrated part of the organization. In some cases, this can lead to merging with the organization (Grenville 2014), or a new organization as in the Adaptive stage of the Gongla and Rizzuto (2001). A clear picture of a community of practice helps drive the working model to ensure that all the elements of a community are captured in the model. This helps overcome the member gap, the member-leadership gap, and the coordination gap, from Figure 19.

The lack of meaningful participation has been identified as contributing to community failure by Probst and Borzillo (2008) and Pyrko, Dörfler and Eden (2017). Consequently, achieving alignment between organization, individual, and community objectives facilitates mutual engagement to form a successful community of practice. From the study, when alignment occurs the organization supports organizers by permitting them to use working hours to run a community:

“I’m doing it like during my working hours.”[Informant_6]

This helps drive a community by giving organizers time to work within the community with one-to-one interactions, suggested by Wenger et al. (2002). Otherwise, organizers will have to find other times to interact, as suggest by a study participant:

“Well usually having lunch together and coffee’s, just very lightweight”[Informant_1]

Therefore, alignment helps overcome the outcome gap, member-leadership gap, and the organization-leadership gap from the proposed community of practice gap model in Figure 19.

The key takeaways from this analysis are:

- the findings of the study are inter-related,
- improvement in working model, alignment, or community nature knowledge can improve the success of a community, and
- it should be possible to combine actions to benefit 2 areas simultaneously.

4.3.5 Summary of the findings

Prior to doing the empirical research, the researcher's views of communities of practice were limited to the same community as Informant_1. The researcher considered time allocation to be a fundamental problem to community formation and maintenance. Additionally, the researcher assumed that the lack of transparency in the value of a community to be a problem to gaining access to resources for community maintenance. During the course of interviews, coding, and analysis this changed to focus on other factors related to communities within the case organization.

The major finding is the level of knowledge of communities of practice within the organization is low. This has major consequences to gaining support and providing guidance for community organizers. In particular, the need for more member participation, suggested by Informant_1 and Informant_5, to create a more robust community - this challenges the traditional team structure within the organization. The lack of clarity could maybe have been predicted by the lack of a clear definition in current community literature, see Cox (2005). It also mirrors the evolution of the community of practice concept described by Li et al. (2009) from an intuitive concept in Lave and Wenger (1991) to a more specialized one in Wenger et al. (2002). The research literature does not normally discuss how community organizers see a community, leading to the idea that the concept of a community of practice is clear. Additionally, although the successful community of practice evolved as it matured, no informant understood the different stages of a community's development and the need to change behaviour as the community matures, as suggested by Gongla and Rizzuto (2001) and Wenger et al. (2002).

The significance of alignment is also a key finding of the empirical research, which takes 2 forms: internal alignment between core team members, and organizational alignment. None of the communities had or have explicit objectives, which is a successful from . The success of the "Testing Guild", which aligned with organizational needs and history, against the challenges facing communities with novel practice, point to the need to spend more effort on alignment. This reaffirms the suggestions by Harvey et al. (2013) and Wenger et al. (2002) to leverage existing social networks when establishing communities.

To run and maintain a successful community it is necessary to have an operational model of what a community organizer needs to do. This is suggested by Harvey et al. (2013), laquinto et al. (2011), and Wenger et al. (2002) which highlight aspects such as meeting cadence, public and private interactions, and forming a core group (10-15% of the community). The findings above show that by aligning with current roles and practices, the organizer can integrate the community into their own work, so they can run the community with minimal effort. This contrasts strongly with the organizer of a novel community (Informant_1)

involving new roles and practices, who had difficulty finding the time to run their community. A key finding here is that technology and tooling is not an issue, and all organizers felt they had sufficient technical support for their community.

These findings help define the critical issues that need to be addressed by this research.

4.4 Critical issues to be addressed in community of practice facilitation

The empirical findings point to several key gaps from the theoretical model from Chapter 2 in the organization's adoption of communities of practice (Figure 19). Of primary importance is the organization gap which drives engagement of the organization, which will help support community members participation. Another key of gap is the member gap, where expectations on a community are not aligned with the nature of a community. There were few findings related to the Facilitation gap, but the lack of a clear model points to the coordination gap. This means that the constructs used to improve communities of practice should answer the following questions:

- *Community engagement*: How might we facilitate member engagement so that they both contribute to and benefit from a community?
- *Community value*: How might we help community leaders align the value of community to the organization?
- *Working model*: How might we help community organizers define a working model of a successful community of practice as it evolves?

The next step in the research process is to review existing service design tools to find ways to address these questions. These topics are the focus of service design tool selection in Chapter 5, which identifies Service Design Tools that can be used to assist community organizers.

5 Develop/Deliver - A design framework for communities within the case organization

To achieve the goals of this research it is necessary to provide a set of tools to community of practice organizers within the organization to help them create successful communities. As stated at the start of this work, these tools should be based on existing service design tools or methods. A key requirement is to create a toolbox that can be used by organizers without too much training or theory, so well tried and well-known tools are to be favoured over less well-known methods. Additionally, as the organizers are all software professionals, tools that are similar to software tools, or used in the software industry are preferable to other tools.

A key reason for choosing service design tools and methods is that they have been used by service designers to create a successful community of practice. Grenville (2014) used a

service design perspective to engage business people in the design of a community of practice. To ground the community, 112 people participated in focus groups across multiple sites, and they ranked identified 6 scenarios that are critical in the first year, these were further refined into three things expected from a community: identify what we should do to be impactful; answer the question: “How do I get started?”; and address the discipline of process adoption. The focus groups concentrated on the value given to participants, and the services needed to meet the participant’s needs. The services created were:

- A digital site with technical tips for experts and novices
- A monthly bulletin
- Recording of sessions and posting online
- Cross-organizational workshops
- A social media site.

The event notices and the bulletin were forwarded to people outside the community, which led to community growth. This piqued the interest of managers, who encouraged participation. Community members became involved in workshops, and in event organization. The community created, was impacted by the “politics of participation”. As the community grew it required more organizational resources, “Several attempts were made to establish sponsorship at the corporate level.” (Grenville 2014). Sponsorship was achieved once senior members of the organization became involved in the community, speaking at events, etc. This changed to community to match more traditional leadership structures, so after a period of time the community was discontinued as a community of practice. This experience points to the power of service design methods to facilitate a community of practice; however, these methods were applied by a service designer, and not the community organizers independently. An additional drawback to this approach is that it is rather sophisticated, requiring considerable amount of investment to provide the community services listed. This would fail in the case study organization, where a limited amount of time can be spent per week:

“because 20% of the time is quite much”[Informant_4].

Another similar approach using causal maps has also been suggested to facilitate community of practice creation by Pyrko et al. (2017). The technique “is aimed at help the CoP members to understand better the possibilities of ‘making most’ of their community’s potential, as well as identify and address the possible problems and challenges which the community may be facing.” (Pyrko et al. 2017, 1966) The authors identify need for “formalized and practical approaches that appreciate the complexity of the CoP concept and the contextual sensitivity required for cultivating CoPs in practice.” (Pyrko et al. 2017, 1967) - the authors address this need by the design of a CoP workshop based on causal mapping.

The paper provides a structure for a workshop that focuses on the structural elements of communities of practice (mutual engagement, joint enterprise, and shared repertoire), or on the community as a whole. The authors suggest a causal mapping workshop because, “it supports people in structuring, communicating, and negotiating their thinking about problems which they care about.” (Pyrko et al. 2017, 1970) This work is very similar to the work done in this thesis, both focus on enabling community organizers, but use different tools - causal mapping versus service design.

Service Design processes have a natural pattern used to help create innovative solutions consisting of a divergent phase followed by a convergent phase, as described by Brown (2009):

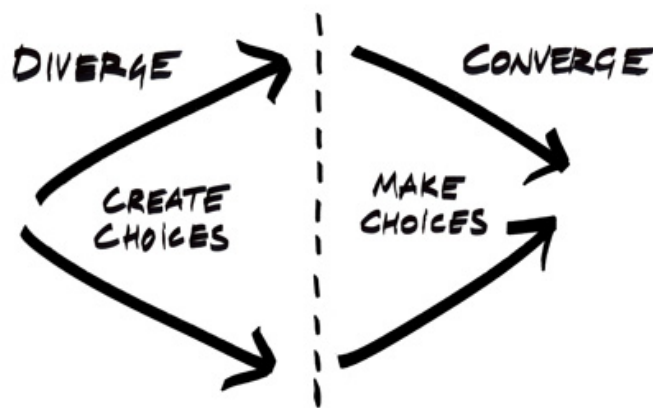


Figure 28: Divergent and convergent processes in Service Design, from Brown (2009, 67)

A service design process requires a combination of divergent and convergent methods/tools, as captured in the diamonds of the “Double-Diamond” (Design Council 2015). Divergence focuses on creating a range of options, convergence focuses on selecting candidate options. This chapter emphasizes convergence because this is the output of the design process, and forms boundary objects used to facilitate communication between organizers and other parts of the organization.

5.1 Selection of service design tools for community organizers

A goal of this research is to provide organizers with tools they can use within the software organization context. Fortunately, service design tools have frequently been adapted to new contexts. For example, a common tool is the Service Blueprint (Bitner, Ostrom & Morgan 2008; Design Council 2015; Stickdorn et al. 2018; Løvlie, Polaine & Reason 2013) which builds on a customer journey to analyse service delivery. For example, this tool has been adapted to support multiple customers, in the case of a car park service (Wreiner et al. 2012). Another example is the business model canvas (Osterwalder & Pigneur 2010), this captures

the key elements in a business model. This service design tool has been adapted to embrace service logic (Ojasalo & Ojasalo 2015), and has been altered within the SaFE framework to capture the value delivered by a software portfolio (Portfolio Canvas - Scaled Agile Framework n.d.).

5.1.1 Sources of service design tools

There are many different service design or design thinking toolkits available, with much repetition between them. Therefore, a key decision will be to choose the sources of the service design methods. Many design methods or tools are known by different names by different designers; this complicates the choice of design methods within this project. A further complication is that a lot of design methods such as, interviewing, brainstorming, and experience simulation are used in the divergent mode of service design to create options. To constrain the survey of service design tools, while having a wide variety, this researcher chose several sources:

- *Visible Thinking* (Bryson, Ackermann, Eden & Finn 2004)
- The Design Council (Design Council 2015)
- *The field guide to human-centered design* (IDEO (Firm) 2015)
- *This is Service Design Doing* (Stickdorn et al. 2018)
- *Design for growth* (Ogilvie & Liedtka 2011)
- *101 Design methods* (Kumar 2012)
- *Business Model Generation* (Osterwalder & Pigneur 2010)
- *Value Proposition Design* (Osterwalder, Pigneur, Bernarda & Smith 2014)
- *Open Space Technologies* (Owen 2008)

These sources cover a wide range of perspectives of service design and contain many different tools for service designers to use. There are other potential sources of methods and tools, such as “D-Thinking” (Tschimmel et al. 2015), or *Service design: from insight to implementation* (Løvlie, Polaine & Reason 2013), however, the above set is quite comprehensive in its coverage and was considered sufficient in breadth and depth by the researcher.

In *Visible Thinking*, the authors go through the practice of causal mapping in detail through a series of case studies, ranging from domestic issues to company strategy. The parallel with design, is that the goal is to externalize thinking in a format that shows how ideas interact. The process is similar to a mixture of brainwriting followed by clusters, however, it extends the clustering to investigate the relationships between ideas or statements. The method transparently raises issues and relationships in otherwise complex and difficult topics. As this method has been used to facilitate communities by Pyrko, Dörfler and Eden (2017), and has

been proposed as a solution in Pyrko et al. (2017), it has been included in this study, even though it is not normally listed as a service design tool.

The Design Council UK (Design Council 2015), is the source of the double-diamond process, and a key institution in the adoption of service design. In addition to defining a process, the Design Council also suggests different tools to use at different stages in the process. The design methods are very user focused, for example they suggest 4 methods in the Discover phase of the process all related to understanding users better. The Define phase of the process has 3 different methods focused on creating a Design definition. The Develop phase of the process also has 3 methods related to solution design, the Business Model Canvas, Service Blueprint, and Prototyping. The final stage of the process, Deliver only has one method suggested, Design Scenarios, this reflects the fact that solutions are normally innovative, and the actual method used depends heavily on the solution.

Another pioneer in the area of service design and design thinking is IDEO, who have produced *The field guide to human-centered design* (IDEO (Firm) 2015) to provide guidance and tools for designers. The fundamental driver for this book is the idea that “the people who face those problems every day are the ones who hold the key to their answer.” (IDEO (Firm) 2015, 9). The authors advise that the tools they provide are not a prescription, as every design project is different, so they point out that some tools may be used several times in a project, and some not at all. The goal of human-centred design is to create solutions that are desirable, feasible, and viable.

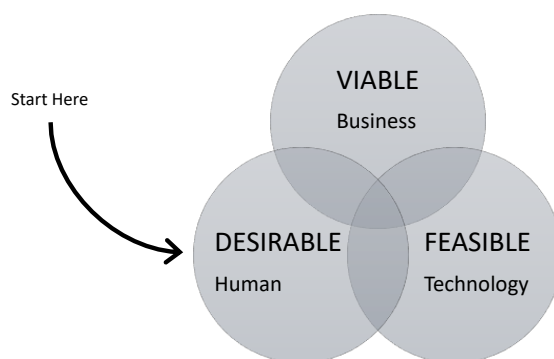


Figure 29: Guide on human-centred design goals, modified from (IDEO (Firm) 2015, 14)

In lines with other thinkers of IDEO they point out that this process involved both divergent and convergent activities. The guide provides 57 different design methods to help a designer along a design process of Inspiration (19 methods), Ideation (24 methods) and Implementation (14 methods). In comparison to some other method texts, some of the methods provide guidance on using tools. For example, the method Create Frameworks point to Journey mapping, relational mapping, and the use of 2x2 matrix - other texts might consider this as three different methods. As IDEO is a design company, the methods concentrate on the

initial designing, piloting, and initial version, rather than on the long-term development of an idea.

This is Service Design Doing and its accompanying handbook of methods (Method Library – *This is Service Design Doing* 2021) is a one-stop reference text on Service Design. This book is a sequel to *This is Service Design Thinking* (Stickdorn et al. 2011), and builds on the experience the authors and contributors gained since the first book was released. The book itself is co-created with many different Service Designers, and covers everything from initial concepts to implementation, as well as tools, methods, facilitation, and service design process creation. It does not mandate any particular process, but provides several different approaches arguing that the process should match the problems, and organization. However, the authors suggest 47 different methods or tools for use for research, ideation and prototyping. The book has a very clear differentiation between methods and tools: “Tools are concrete models, such as journey maps, spreadsheets, and storyboard templates....Methods are particular procedures to accomplish or approach something, such as conducting contextual interviews as a research method or doing desktop walkthroughs as a prototype method.” (Stickdorn et al. 2018, 37) In addition to the method handbook the main text describes 6 main service design tools families: research data, personas, journey maps, system maps, service prototypes, and the business model canvas. This text is very interesting for this research project because the authors also merge elements of software development, especially agile software development, with service design, and even add a software tool , user stories, as a method.

Designing for Growth (Ogilvie & Liedtka 2011) is a service design book aimed at convincing managers to adopt and support service design within organizations. Like other service design books, it is focused on practicalities of doing service design. The book itself describes 10 different methods for service design over a 4-phase process: What Is, What If, What Wows, and What works. Of the 10 methods, one (Visualization) is a meta-method: “It is an approach for identifying, organizing, and communicating in ways that access ‘right brain’ thinking while decreasing our dependency on ‘left brain’ media such as number.” (Ogilvie & Liedtka 2011, 22) This approach highlights the value of service design for this research project, as many of the advantages of a community of practice are not strictly quantifiable, although some researchers like Ropes (2010) have tried. This textbook contains 9 methods focused on the different phases, but also contains 4 project management aids, or tools, to help managers capture key outcomes of the different phases: the design brief, the design criteria, the napkin pitch, and the learning guide.

101 Design Methods, by Vijay Kumar, is a compendium of different design methods spread over a seven-phase process concentrating on facilitating innovation. The author provides a 7-phase process for doing design, based on a four-task model, while emphasizing that the

process is non-linear: “Although the idea of a process implies a linear sequence of events, this can be misleading. Many projects are actually nonlinear.” (Kumar 2012, 9)

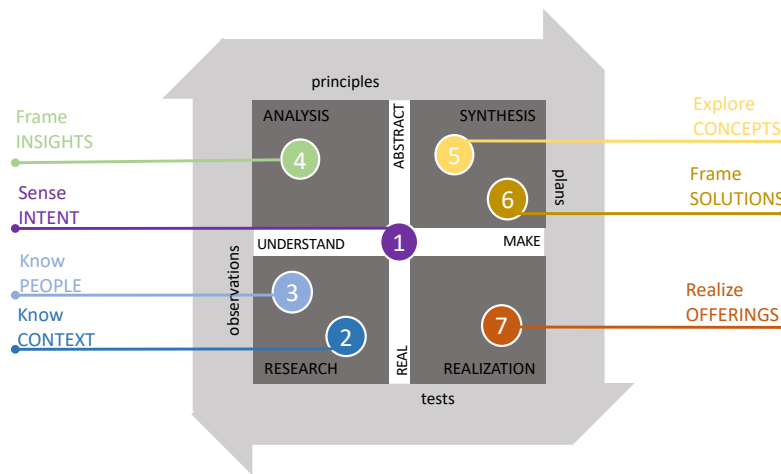


Figure 30: Kumar's seven-phase innovation process, from Kumar (2012, 8)

The seven phases are: Sense Intent, Know Context, Know People, Frame Insights, Explore Concepts, Frame Solutions, and Realize Offerings. The 101 design methods mentioned in the book are spread over the seven phases. As such, not all the methods are applicable to this research - especially those that offer advice more than a concrete artifact that can be used by a community organizer. For example, Sense Intent is more about exploring industry trends, consumer trends, etc. rather than capturing a concept relevant to individuals or organizations.

The final set of sources, *Business model generation*, *Value proposition design*, and *Open space technologies* are single method texts. *Business model generation* is the foundational text on the Business Model Canvas and how it can be used to capture a business model. It can also be used to help alignment in non-profit organizations, as quoted by a user “We used it to DESIGN + ALIGN members of the leadership team” (Osterwalder & Pigneur 2010, 50). This text gives detailed guidance on how to construct an initial canvas, starting with consumers and ending with cost structure. *Value proposition design* is a supplemental text to Business Model Generation, it provides a new canvas-based tool, the Value Proposition Canvas, to capture a value proposition inherent in a Business Model: “The Business Model Canvas and Value Proposition Canvas perfectly integrate, with the latter being like a plug-in to the former that allows you to zoom into the details of how you are creating value for customers.” (Osterwalder et al. 2014, xvi) Both the Business Model Canvas and Value Proposition Canvas can be used to capture how a service offering, like a community of practice delivers value to others. The final source of methods/tools for this project is *Open space technologies*, added as a suggestion from [Informant_3] as a method for running communities of practice meetings.

5.1.2 Selection of candidate service design tools

The set of sources above have 240 design methods listed, consisting of both methods and tools, this needs to be refined into a short-list of possible tools. There is some overlap between the methods described by different sources, for example, the Business Model Canvas appears in 4 different sources. The first refinement step is to remove methods with unique names, this leaves a possible candidate set of 227 different methods and tools.

The second step taken by this research is to concentrate on tools that create boundary objects, because “boundary objects are useful to co-create a shared understanding of a concept” (Stickdorn et al. 2018, 43). This reduction in the potential service design tools is more nuanced, because many methods or tools describe a procedure to achieve a service design goal - these methods can proscribe ways of presenting information similar to a tool without providing a template. The approach used here is to survey all the design methods to find those that provide a template or sufficient information to create a template in the opinion of the researcher. This considerably reduces the number of unique design tools from 227 to 45. An additional action is taken by to reduce this number by combined similar tools, for example, Descriptive Value Web as defined by *101 Design Methods* is almost the same as Systems Mapping defined by *This is Service Design Doing*, this refines the number to 42.

The final step is to review each tool from the perspective of the goals of this research: improving community engagement, capturing organizational value, and constructing a working model. This results in 29 tools that could be applied to one goal, and 11 tools that could be applied to 2 goals - however 7 of these are from only one source text. From the initial discussion on service design tools there are some additional criteria that need to be applied to tool selection:

- The tool should be well-known, i.e., listed in 2 or more sources, or
- It is known to software developers.

Tools with these characteristics are candidates for this research project because of the depth of design experience related to them—they have proven their value in other design contexts. These can be combined with the tools most valuable to the research objective, leading to the 16 candidate tool short-list shown in Table 7.

Tool Goal	Tool Name	Source(s)
Grouping based on two attributes	Idea portfolio	<i>This is Service Design Doing</i>
	Research Participant Map	<i>101 Design Methods</i>
Communicate service model.	Business Model Canvas	<i>Design council, The Field Guide to Human-Centered Design, This is Service Design Doing, Business Model Generation</i>

Tool Goal	Tool Name	Source(s)
	Service Blueprint	<i>Design council, This is Service Design Doing</i>
Capturing value networks	Value Chain Analysis	<i>Designing for Growth</i>
	System mapping/Stakeholder Map/Value Web	<i>101 Design Methods, This is Service Design Doing</i>
Capturing user perspective	Generating jobs-to-be-done insights	<i>This is Service Design Doing</i>
	Writing user stories	<i>This is Service Design Doing</i>
	Developing key insights	<i>This is Service Design Doing</i>
	User Persona's	<i>Design council, This is Service Design Doing, 101 Design Methods, Common SW Concept</i>
	Journey Mapping	<i>Design council, This is Service Design Doing, Designing for Growth, 101 Design Methods</i>
Capture the service value	Value Proposition Canvas	<i>Value Proposition Design</i>
	Create a Pitch/Napkin Pitch	<i>The Field Guide to Human-Centered Design, Designing for Growth</i>
Capture design challenge	How Might We	<i>The Field Guide to Human-Centered Design, This is Service Design Doing</i>
	Design Brief/Intent Statement	<i>Design council, Designing for Growth, 101 Design Methods</i>
	Design Criteria	<i>Designing for Growth</i>

Table 7: List of candidate Service Design Tools

Table 7 has the final list of tools to be considered for this research project, grouped according to the tool's goals. Some more detailed refinement is needed, as several of the tools have both similar goals and form.

5.1.3 Tools for grouping according to attributes

The candidate list of tools has two tools useful for grouping ideas or participants based on two attributes. A good example of this approach is the Idea Portfolio (Method Library – This is Service Design Doing 2021) where ideas are grouped along 2 dimensions, such as impact and feasibility. The goal is to identify ideas that have both high impact, and that are easily achievable. A generic example outcome of this approach is shown in Figure 31. This concept of using two dimensions to identify key items is also used by the Research Participant Map from Kumar (2012), where 2 different attributes are used to separate out possible research participants to identify different types of participants.

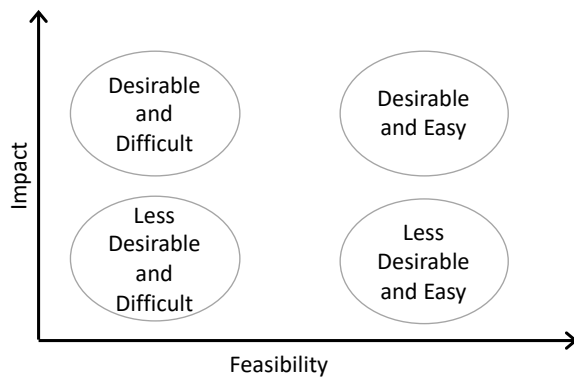


Figure 31: Example Idea Portfolio

For communities of practice this approach can be used to identify practices or domains that have high impact on both community members, and the hosting organization.

5.1.4 Tools to communicate service model

There are two tools identified that define how a service operates: the Business Model Canvas, and the Service Blueprint. The Business model canvas is widely used outside of Service Design to capture a company’s, especially a start-up’s, business model. The primary source for this method is *Business model generation* (Osterwalder & Pigneur 2010). The canvas concisely presents information about how a business creates value, and revenue, while including information about the operation of the business. Therefore, it is useful to capture the value of a service, and how it can generate a sustainable revenue for a company. Creating a correct business model can take a long time. However an initial version based on assumptions and domain knowledge can be created in a short period of time, Stickdorn et al. (2018) suggest 3-4 hours. It can also be changed to match the needs of the project, with different elements being completed as knowledge increases, or being removed if unnecessary (for example in Figure 32).

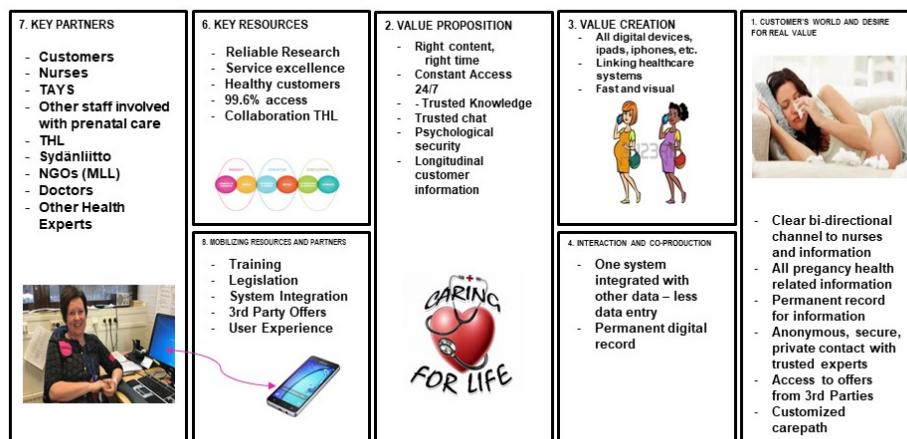


Figure 32: Example modified business model canvas (costs/revenue sections removed)

Creating a business model canvas requires knowledge of a range of topics from different perspectives. This means its creation required the participation of a wide range of people from the target business. Therefore, it is common to build the canvas in stages using other tools to capture features of the business, such as the customer value sections based on customer research. This tool could be used to achieve goal alignment within a community on the community structure and value propositions, and it could help the community define its value proposition to the organization.

The service blueprint can be described as one of the key artefacts within service design, as it appears in almost every practical service design book, and has been the topic for service research as in Bitner, Ostrom & Morgan (2008). It has also been described in Reason, Løvlie and Flu (2015), Design Council (2015), Stickdorn et al. (2018, 2011), Meroni and Sangiorgi (2016), Tschimmel et al. (2015), and Løvlie et al. (2013).

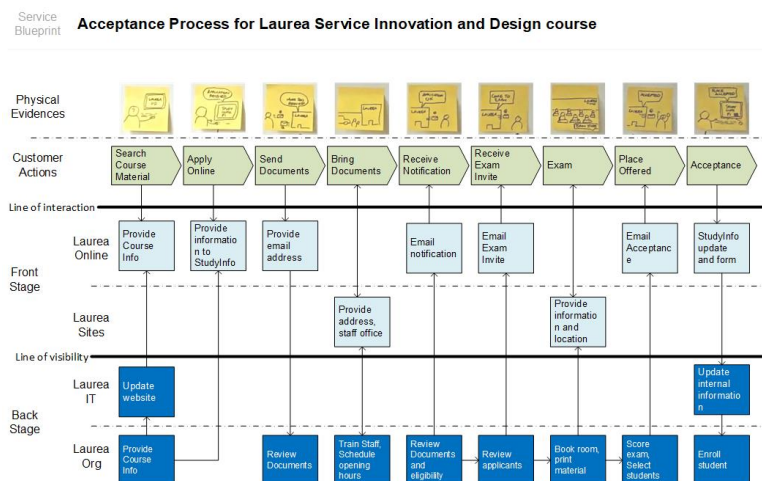


Figure 33: Sample Service Blueprint

The service blueprint is incredibly scalable and can be expanded or contracted depending on the amount of detail required, and the extent of the service.

The method to create a service blueprint is to start with a customer journey and expand downwards adding the customer interactions with personnel and systems, before going into the processes used to support personnel and define systems. The blueprint can be extended by adding symbols to indicate the types of the interactions, and other aspects of the service. Additionally, layers can be added to the blueprint to capture multiple channels, and even multiple users (Wreiner et al. 2012). Within this work this tool could be used to capture the working model of a community.

5.1.5 Tools to capture value networks

The analysis of tools points also to tools that can capture value chain, or service ecosystem. The first is the Value Chain Analysis presented in *Designing for Growth* (Ogilvie & Liedtka 2011). The goal of value chain analysis is to look at the upstream and downstream value chain around an offering. It is scalable, it can be used to analyse the immediate elements in the chain, upstream elements, or downstream elements to gain an understanding of a service's ecosystem. It links an offering to the business, so it can be used to verify an offering's profitability and alignment with the business. There are seven steps in creating a value chain, from Ogilvie and Liedtka (2011, 76):

1. Draw the value chain for your business: by laying out the cluster of activities working backward from the value proposition endpoint
2. Analyse the competitive environment in each cluster
3. Identify the core strategic capabilities needed to create value in each cluster
4. Evaluate the bargaining power and influence of each player in each cluster
5. Determine the possibilities for advantage
6. Assess your vulnerabilities
7. Identify themes

The book uses the personal computer manufacture as an example, and provides the following template:

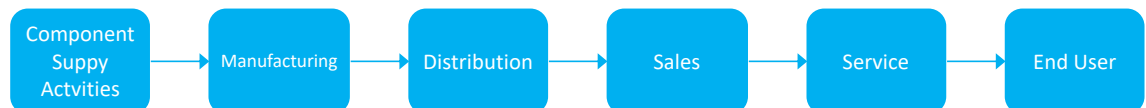


Figure 34: Example Value Chain from Ogilvie and Liedtka (2011, 77).

A value chain may be used to understand how communities of practice integrate into a company's value chain and can also be used to align a community with the surrounding organization.

This is Service Design Doing Method Library describes a method/tool for capturing a Stakeholder Network, a Value Web, or a Service Ecosystem. This can be seen as a generic method that can be applied to achieve different goals depending on the project. The approach is very simple, list out the key stakeholders and position them based on their relationship with the central organization, as shown by the example in Figure 35.

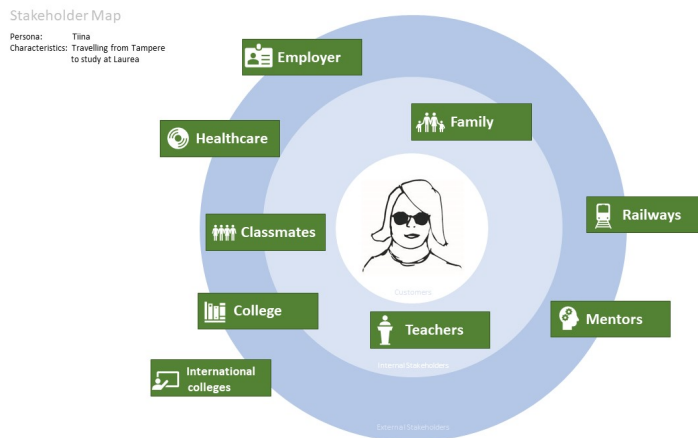


Figure 35: Sample Stakeholder Map for an individual

To capture a Value Web, value exchanges between Stakeholders can be added to the map. To capture a Service Ecosystem, addition stakeholders, systems, platforms, and other entities can be added along with their relationships to each other. In *101 Design Methods* (Kumar 2012) uses a similar approach to generate an Offering-Activity-Culture Map during the Sense Intent phase of the process. This tool is also similar to the Create Frameworks tool in *The Field Guide to Human-Centered Design* (IDEO (Firm) 2015), which points to several different ways of capturing a framework for describing a system.

The goal of capturing the value of a community is key to gaining successful support from managers and members.

5.1.6 Tools for capturing user perspective

Service design is very user focused, and being human-centered is one of the 6 principles of service design listed in Stickdorn et al. (2018, 27) so it is not surprising there are many different tools and methods for capturing a user's perspective. Most of the methods/tools are approaches to generating customer insights, there are less boundary objects. *This is Service Design Doing* however has 3 different form-based templates for capturing a user's perspective during service design. The first is a way to capture insights in a succinct form, as shown in Figure 36.

ONE WAY TO FRAME AN **INSIGHT** IS WITH THIS TEMPLATE:

..... (persona, character, role)

..... (activity, action, situation)

because

..... (aim, need, outcome)

but

..... (restriction, obstacle, friction).

Figure 36: Key Insight Form from (Method Library – This is Service Design Doing 2021)

This form builds on the idea of a persona, which is commonly used within agile software development to describe an idealized user. Another method from the same source captures job-to-be-done insights related to a user, as shown in Figure 37.

ONE WAY TO FRAME A **JTBD** IS WITH THIS TEMPLATE:

When

..... (situation),

I want to

..... (motivation or forces),

so I can

..... (expected outcome).

Figure 37: Jobs-to-be-done template from (Method Library – This is Service Design Doing 2021)

This is an interesting tool because it aligns with the Value Proposition Canvas, where jobs-to-be-done are an element in a customer description. Another form-based template is also available from the same sources, the User Story template as shown in Figure 38.

OFTEN, **USER STORIES** ARE FORMULATED LIKE THIS:

As a

..... (type of user/persona/role),

I want

..... (action),

so that

..... (outcome).

Figure 38: User story template from (Method Library – This is Service Design Doing 2021)

This method also focuses on an outcome like the previous two tools and shares the concept of a persona with the Key Insight template. The big advantage of User Stories within this

project is its common use in software development, and the familiarity of the different engineers and managers with the tool inside the case organization. The Key Insights, Job-to-be-done, and User Story templates can be used by an organizer to capture the views of community members or the host organization.

Personas are a convergent method used to condense a range of information about users into a useful form. As a concept, Personas have been used in user interface design for many years. In the service design world, the method for creating personas can be found in Kumar (2012, 210) and Stickdorn et al. (2011, 178, 2018, 128). The process for generating personas is:

- Identify segments of the users of a system, using the sample customer behaviours, or the outputs of customer research,
- Create a template for the interesting/relevant data of the user, and
- Fill in the template for personas based on the identified segments' information.

Some key aspects for creating personas are that the template should have the possibility to add a picture. Personas should contain demographic information, and a quotation describing the target segments' relationship to the service being designed.

One nice thing about personas is that they condense a wide range of information into a very digestible form that can be easily used to communicate user needs to designers, managers, and other stakeholders. If personas are based on real people, they can become powerful arguments for different aspects of a service. Additionally, personas can be invented, and then verified later based on research.

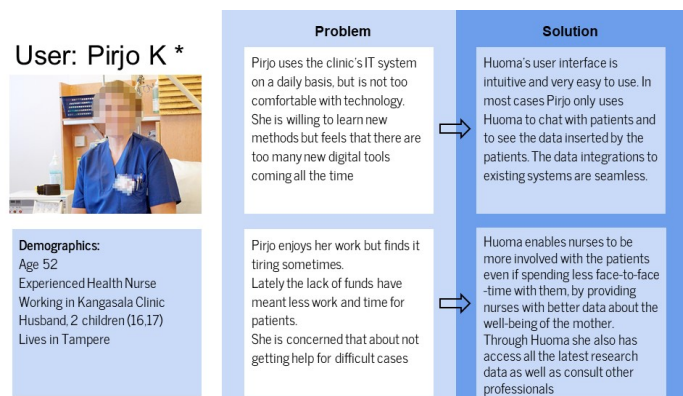


Figure 39: Example persona

A difficulty with personas is their potential for continual refinement, and the possibility of generating incorrect personas. In the first case, timeboxing can be used to restrict persona creation. In the second case, personas should be grounded in actual research to avoid unreal

depictions of users. Personas could be a great way for a community organizer to capture a description of a member.

The final candidate tool that is used to capture user perspectives is the Journey mapping tool. The journey is a base service design method suggested by four of the listed sources. In its basic form it is a simple list of interactions between a customer and a service over time. However, this form is normally expanded to include more information, for example emotional state. Additionally, pictures, or diagrams can be used to document the customer's interactions at any point. Another addition is the customer's emotional states at each touchpoint.

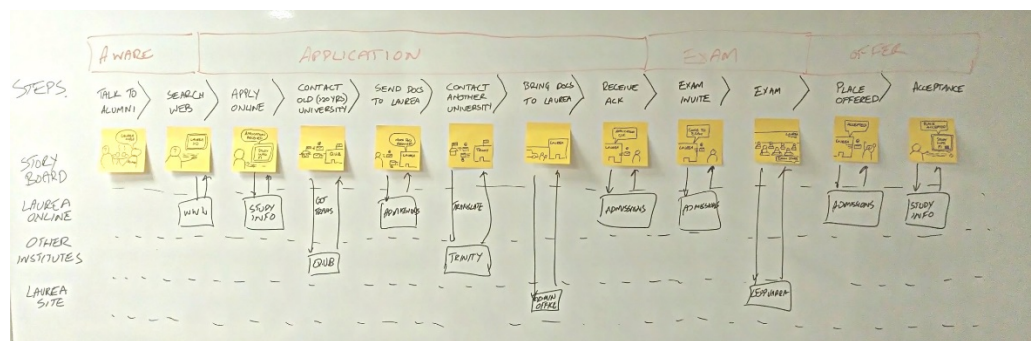


Figure 40: Example customer journey map

Creating a customer journey requires understanding how they move through a service offering. This information can come from many different sources, such as customer interviews, service usage information, and customer observation. The number of customer journeys needed to generate a comprehensive view of a service varies on the scale of the service, the number of touchpoints/channels, and the number of customer types.

Like personas, customer journeys are a great boundary objects for communicating the state of a service to stakeholders. The addition of swim lanes for different channels can highlight the effect of silos on the customer experience. Like personas, customer journeys can be created based on assumptions as a starting point, before being verified by customer research. One difference is that personas are generally stable over the course of a service design project, customer journey maps need to be “living” documents that change based on new information or project needs. Within community of practice literature, a user journey is very similar to the concept of a member trajectory that describes how a member moves from a community periphery to its core before transitioning out of the community: “The difference between peripherality and marginality must be understood in the context of trajectories that determine the significance of forms of participation.” (Wenger 1999, 166). This is a critical aspect of a working model of a community, there has to be a defined journey from non-

participation to playing an active role within a community. Additionally, this tool can serve as an initial step in creating a Service Blueprint.

5.1.7 Tools to capture the service value

Advice given by Wenger et al. (2002) for nurturing communities of practice contains seven principles, and one of these is “Focus on value.” (Wenger, McDermott & Snyder 2002, 51) As suggested in Chapter 2, communities of practice can be seen as services, and therefore service design tools that capture the value of a service have the potential to help community organizers. The method review and analysis derived two methods for succinctly capturing service value: the Value Proposition Canvas, and a Pitch, like the Napkin Pitch.

The Value Proposition Canvas is the key tool contained in the source *Value Proposition Design*. The idea is to simply and graphically capture a value proposition in 1 diagram. The Canvas itself has two parts: the customer profile containing a customer’s pain points (pains), desires (gains) and a customer’s needs (Jobs to be done); and, the Value Map that contains a set of services and products, a set of customer pain relievers, and a set of customer gain creators. A sample canvas is shown in Figure 41.

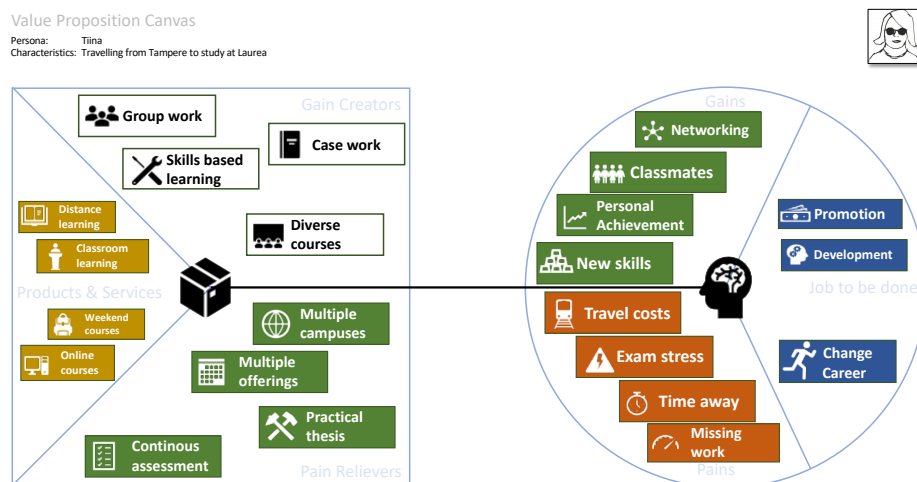


Figure 41: Example Value Proposition Canvas

There are two common ways to create a value proposition: a technology push, where a solution exists and the goal is to align with a customer segment; and a market pull, where the starting point is a customer problem. A value proposition canvas can be built in stages, starting with building customer profiles, one for each customer segment - the value map can be adjusted to each segment. As a tool, the value proposition canvas is designed to “Gain Clarity.” and “Get your team aligned.” (Osterwalder et al. 2014, VIII), which are two key activities needed to coordinate value delivery. Additionally, the Value Proposition Canvas integrates with the Business Model Canvas by making value propositions more visible and

tangible, enriching the Value Proposition and Customer Segment section of the Business Model Canvas. This tool could be used by community organizers to capture the value a community provides to both members and the host organization.

The goal of a pitch is to capture the essence of an offering in a succinct concise format. There are many different versions of pitches, including the “elevator pitch”. Two of the sources refer to different types of pitch, the first is from *The Field-Guide to Human-Centered Design*, and the second is the Napkin Pitch from *Designing for Growth*. The role of the pitch is clear, “it puts concepts into a distilled form that lets collaborators focus on the essential elements” (Ogilvie & Liedtka 2011, 208).

Create a Pitch

Succinctly, what is your project?
Auili is a sustainable social business designed to reduce under-five mortality in the Democratic Republic of the Congo. It offers clean water, a health clinic, and agricultural services.

Who do you need to pitch?
Funders

What format(s) will your pitch take?
A video to convey the vision
A presentation that we can make to possible funders

What's your short pitch? As you write it, think about how you'll expand it into a longer one.
In the Democratic Republic of the Congo, 20% of children don't live to see their fifth birthdays. Auili, a new sustainable social enterprise from the American Refugee Committee and IDEO.org, is changing all that. By designing a holistic new approach to health care, food, clean water, and agriculture with the people of the DRC themselves, Auili is ensuring that more kids than ever get the right start.

NAPKIN PITCH: Concept Name

<p>Need</p> <ul style="list-style-type: none"> • What customer wants this? • What unmet need(s) does it serve? 	<p>Approach</p> <ul style="list-style-type: none"> • What asset or capability does this leverage? • How would it create value? • How will our company create a sustainable advantage?
<p>Benefit</p> <ul style="list-style-type: none"> • How will the customer benefit? • How will our company benefit? • What other parties will benefit? 	<p>Competition</p> <ul style="list-style-type: none"> • What firms currently serve this need? • How will they respond to our entry?

Figure 42: A sample pitch (IDEO (Firm) 2015, 151), and the Napkin Pitch template from Ogilvie and Liedtka (2011, 209).

While there is little guidance on how to produce a pitch in the source texts, the key points are that it has to be concise, and clear about what an offering it, and how stakeholders can benefit. For communities of practice organizers these could be used to explain a community to members and to managers.

5.1.8 Tools to capture a design challenge

A community of practice can be seen as a design challenge, as treated by Grenville (2014), so tools that capture a design challenge can be used to help create a community. The analysis found three tools that can be applied in this situation, these can be used to help drive engagement and achieve alignment.

The first tool used to capture a design challenge is creating “How Might We” questions that guide a design by creating stimulating questions from insights based on research. This

method occurs in both *The Field Guide to Human-Centered Design*, and *This is Service Design Doing - Method Library*. The method is quite simple:

1. Review your insights into a topic based on research to spot design challenges
2. Ask questions about how to overcome these challenges
3. Review the questions to see that they are not too narrow or too broad: narrow questions steer the design; and broad questions do not provide enough guidance.

An example mapping is given in Figure 43.

Create How Might We Questions

Turn Your Insights Into How Might We Questions

Insight:

Women want a private space in which to enter and exit the toilet.

How might we create a private zone for women before they fully exit the toilet?

Insight:

Without proper maintenance, toilets will become dirty very quickly.

How might we design toilets to be easily serviced and maintained?

Figure 43: How Might We example from (IDEO (Firm) 2015)

This method can help community organizers capture the definition of their community by asking questions related to insights about potential community members, or the hosting organization.

The Design Brief is a convergent method used to present the goal of a design in a clear and simple format. As this is a common requirement for many different service design processes it is often called by a different name, for example it is known as an “Intent statement” in Tschimmel et al. (2015), or a “Design Challenge” (IDEO (Firm) 2015). The format of the brief is a series of statements regarding the design problem being addressed, and the goals of the design.

The image shows a form titled "INTENT STATEMENT" with the subtitle "The foundation of the business process, based on the identification of opportunities." The form is divided into five horizontal sections, each with a label on the left: "INTENTION:", "OPPORTUNITIES:", "NEW VALUE:", "PUBLIC:", and "RISKS:". The form is otherwise blank, intended for user input.

Figure 44: Sample Intent Statement (Design Brief) from Tschimmel et al. (2015)

The advantage of this tool is that it is a simple document used to communicate the direction a design will go. As such, it forms an input to any project plan, or project charter inside a standard project management process, it is listed as a Project Management Aid in Ogilvie and Liedtka (2011). For certain customers, this document helps integrate the service design approach with other business processes.

The difficulty with the Design Brief is getting the scope of the problem statement correct. A narrow scope constrains the solution too much, a broad scope can lead to solutions beyond the resources of the target organization.

Another tool to capture a design’s scope is the Design Criteria template from *Designing for Growth*. Within the source’s methodology this is used to limit or constrain the divergent activity of speculating What If or ideating potential design solutions to meet the design criteria. Like How Might We and the Design Brief, the goal is to succinctly capture the limitations of a design.

DESIGN CRITERIA	
Design Goal	<ul style="list-style-type: none"> • What have you learned about the target customer? • What needs (functional, emotional, psychological, social) does the design have to fulfill for the target customer? • Why is it strategically important for your organization to address those needs?
User Perceptions	<ul style="list-style-type: none"> • How important is your proposed offering to the target customer’s well-being? • Are there aesthetic attributes necessary to succeed with the target customer? • Does the target customer expect the offering to have certain social, ethical, or ecological attributes? • What does ease-of-use mean to the target customer?
Physical Attributes	<ul style="list-style-type: none"> • Must the offering be able to capture, store, and /or transmit information about usage? • Does the offering need to be designed for use in specific environments or situations? • Are there weight or size considerations for lifting, use, or transport? • Are there memory, bandwidth, or connectivity issues?
Functional Attributes	<ul style="list-style-type: none"> • Does the design of the offering need to accommodate specific use-case scenarios? List them in order of importance to the target customer. • Does the design need to address compatibility or standards issue?
Constraints	<ul style="list-style-type: none"> • Does the final offering need to be completed by a specific date? • What constraints does your current business impose (the offering must use the existing manufacturing base, provide higher profit margins than current offerings, leverage proprietary technologies, etc.)? • Are there ecosystem and regulatory concerns (height of shelves at retailers, OSHA regulations, etc.)?

Figure 45: Design Criteria template from Ogilvie and Liedtka (2011, 207).

Within this project, the design criteria could be used by community organizers to capture the criteria for a community. Key elements are the focus on the target customers need and constraints posed by the organization.

5.2 Creating the community organizer's toolbox

The above tools are described and defined from the service designer's perspective, and could feasibly be applied by a service designer to help create a community of practice. However, the goal of this research is to provide tools to community organizers who are not necessarily service designers. These tools need to address the issues identified during the Discover/Define stage of the process:

- *Community engagement*: Facilitating member engagement so that they both contribute to and benefit from a community
- *Community value*: Aligning the value of community to the organization and community members
- *Working model*: Defining a working model of a successful community of practice as it evolves

From the interviews, the organizers tend to be individuals with a knowledge of software development methods, an interest in stepping outside organizational boundaries, and a personal interest in the practice. However, the organizers also have little time to spend on community organizing, normally lack a supporting core team, and difficulty in selling a community to others. To help organizer run and create a community, it makes sense to build on their existing software-oriented skills, so techniques similar to software development tools are preferable. Additionally, tools that require elaborate experience or training are less applicable because an organizer would need support to use the tool. This section contains the tools chosen for validation and the reasoning behind the choice.

From the list of candidate tools there are no tools from the "Capture Design Challenge" category because these are difficult to apply without training. For example, "A design brief that is too abstract risks leaving the project team wandering about in a fog... too narrow a set of constraints, however, almost guarantees that the outcome will be incremental and, most likely, mediocre." (Brown 2009, 24).

From the user perspective toolset, only writing user stories was chosen. The primary reason is that user stories are commonly used within the software industry to capture requirements. User Personas are also used within the software industry, but they are normally created by UX departments rather than engineers. The Jobs-to-be-done and Journey mapping tools are incorporated into other tools chosen (the Value Proposition Canvas, and Service Blueprint). The Developing key insights tool, while useful in capturing drivers of both community

engagement and community value, like the Design Brief tool, takes practice and experience to apply effectively.

On the other hand, capturing the value network around a community could in theory be used to help align a community within the organization’s value network. However, this task would require significant effort by a community organizer to capture. It would be possible if the organization’s own value network was available to community organizers. In the case organization, the explicit value network for the organization was not available to the researcher, so these methods have been excluded due to the time taken to create them. Additionally, effectively capturing a value stream using Value Stream Mapping is a specialized task that take training and additional effort by community organizers, such as Martin and Osterling (2014).

The Research Participant map is the one tool within the Grouping based on two attributes category not chosen. The reason is that although this tool can help segregate stakeholders of a community (managers, members, etc.) this is of less value than the Idea Portfolio, which achieves a similar goal in a more general method. The proposed set of service design tools are given in Figure 46, which maps the proposed tools to the critical issues presented in Section 4.4.

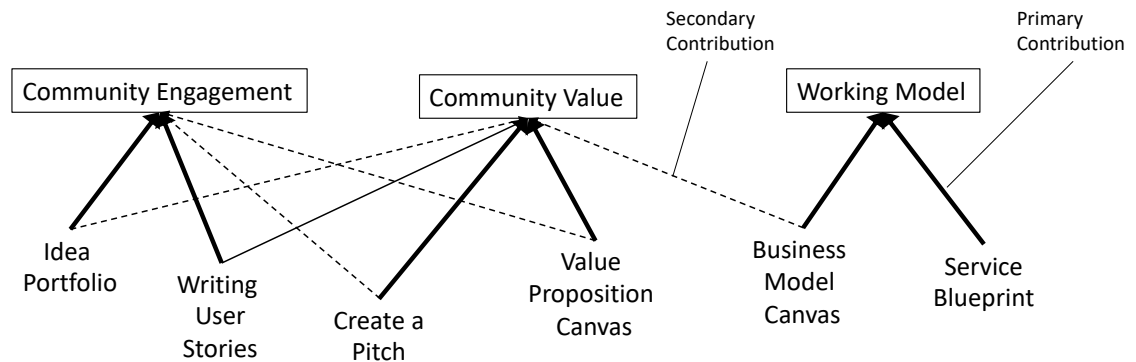


Figure 46: Mapping of proposed service design tools to critical issues

Another approach to link the selected tools to the objectives of this research project is given in Table 8, which links the design objective to the associated challenges, and the proposed tool.

Objective	Challenges	Service Design Tools
Drive Community Engagement	<ul style="list-style-type: none"> • Attracting members • Forming Core Group 	Writing User Stories Idea Portfolio

Align Community Value	<ul style="list-style-type: none"> • Capturing value to organization • Capturing value to members 	Value Proposition Canvas Creating a Pitch
Define Working model	<ul style="list-style-type: none"> • Defining community activities 	Business Model Canvas Service Blueprint

Table 8: Community Issues, challenges, and related service design tools

The next section discusses how these tools, with minor adaptations, resolve the issues identified during the Discover/Define phase of the project. Although many tools can apply to more than one target area, the sections below review the tools within the primary contribution area shown in Figure 46.

5.2.1 Facilitating community engagement

The first tool proposed is “Writing User Stories”, which can be used to capture user perspectives. In this case the primary perspective is that of a community member. By taking a member-oriented point of view, this tool helps focus community organizers on membership. The basic form of this tool then becomes:

As a community member, I want *<action related to the community’s practice>* **so that** *<outcome>*.

The primary advantage of this proposed tool is that is familiar to the R&D personnel in the case organization. This tool also incorporates elements of Jobs-to-be-done, and the Design Intent. Ideally the outcome is valuable to the organization too, but the primary focus of this tool is the user, or in this case the community member.

Another proposed tool for driving community engagement is the Idea Portfolio. The reason for this tool is that it can capture both the member interest and organization interest in an area of practice. The ideal situation is that a community would be interesting to both members and the host organization. However, if the practice is of critical interest to the organization a more formal structure may either exist or be created to fulfil the organizational need. An Idea Portfolio can capture those practices, and areas that are interesting to potential members, and can help them in progressing within the organization. The activities, practices, and domain of a community can be plotted on a 2-dimensional graph to identify whether there is sufficient member interest to make a community of practice. If the practice is already of interest to the organization, it will be easier to identify sponsors, potential members, etc. The basic structure of the modified Idea Portfolio is given in Figure 47.

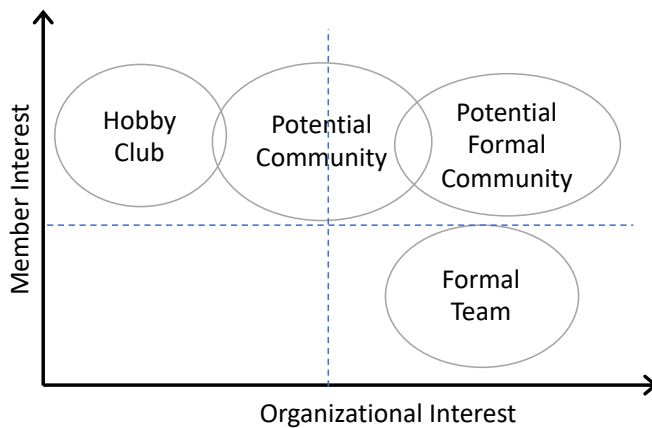


Figure 47: Proposed Community of practice Idea Portfolio

Like the Writing User Stories tool, this tool can be used to help facilitate organizational alignment by taking the organization's interests into consideration. However, the key thing is to capture the members' interests as they are essential to a community.

5.2.2 Capturing community value

From the research analysis there is a need to capture community value to align with the organization. This needs also to align with member value. The analysis of the various service design tools point to two tools that can be used to succinctly capture the value of a community: the Value Proposition Canvas and the Pitch. The first tool is the more complicated of the two, and the Pitch is a tool comes in various forms some of which are familiar to R&D professionals.

The Value Proposition Canvas can be quite complex, and the creation of a value proposition can be a time consuming, and complex process. However, one advantage of the Value Proposition Canvas is that it captures information in a compact graphical form that can be used to present a community's value to others. Additionally, the tool itself provides guidance to community organizers on what information is included in a value proposition. A community of practice has two key customers, the members of the community, and the hosting organization. The low number of customer segments allows the Value Proposition Canvases of both segments to be combined into one canvas as shown in Figure 48.

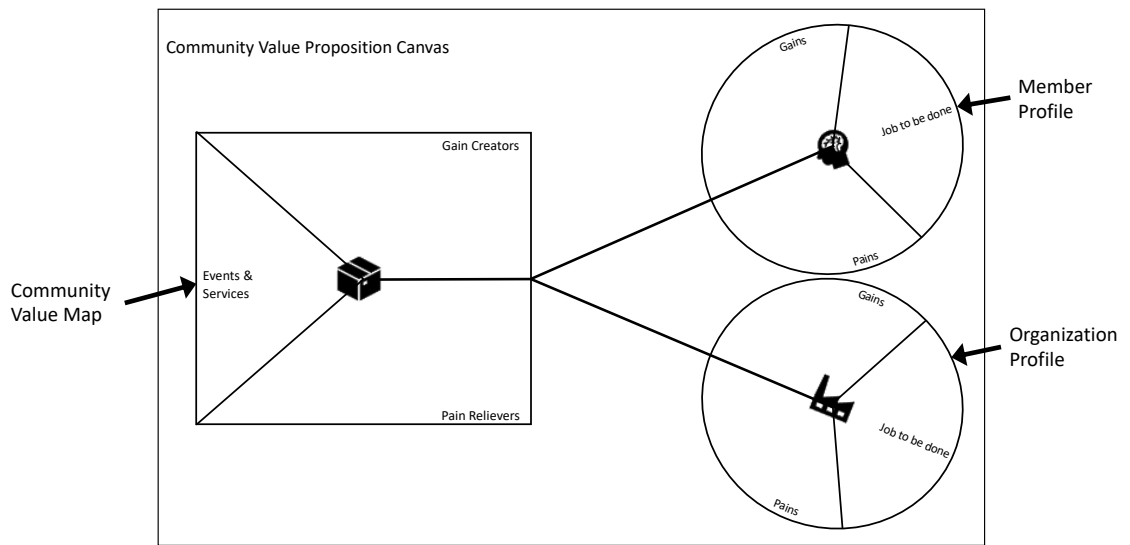


Figure 48: Proposed Community Value Proposition Canvas

As before, a user of the modified canvas can start by analyzing a member's perspective to focus the Value Map part of the canvas. The organizational perspective can be added to show how a community benefits an organization. As before, the value proposition can be driven by the community, as a solution, by the members, as a grass roots issue, or by the organization, as a problem that needs a cross-organizational solution.

The Napkin Pitch and the example Pitch from *The Field Guide to Human-Centered Design*, are ways of focusing a designer on simplifying and distilling the value of a design into a concise form that is easy to present, and for others to digest. The advantage of "the pitch" approach to communities of practice within the host organization is familiarity - most professionals have heard or practiced an elevator pitch for selling ideas internal to an organization. The community pitch is similar and can be used to sell a community to new members, or to sponsors within the organization. Taking the Create a Pitch template from *The Field Guide to Human-Centered Design* and simplifying it to remove the target stakeholders (a community only has two main stakeholders) results in the templates shown in Figure 49.

Create a community pitch

Succinctly, what is your community?

What form will your pitch take for members and for the organization?

What's your short pitch? As you write it, think about how you'll expand it into a larger one.

Figure 49: Proposed Community Pitch template

The first question of the pitch focuses the user on briefly/succinctly stating their domain, community, and practices, which is needed to capture the essence of the community of practice. The following questions focus an organizer on how to communicate, and how to state its value in a brief, easy to communicate form.

While the Pitch and Value Proposition Canvas are primarily targeted at capturing the value of a community, they can also be used to help Community Engagement. The Pitch captures the essence of a community for recruiting members, and the Value Proposition Canvas helps create a value offering that attracts membership participation.

5.2.3 Tools for capturing a working model for a community

The tool analysis suggests two well-known service design tools for capturing a working model of a community, the Business Model Canvas and the Service Blueprint. The Business Model Canvas (BMC) is a well-known tool frequently mentioned in relation to software startups, so some familiarity may be assumed. A key difference between the standard BMC, from Osterwalder and Pigneur (2010), is that there are already identified customers - the members, and the organization. Additionally, as a community does not generally have additional costs, or revenues, these sections can be removed. The canvas proposed here is shown in Figure 50.

Community Model Canvas

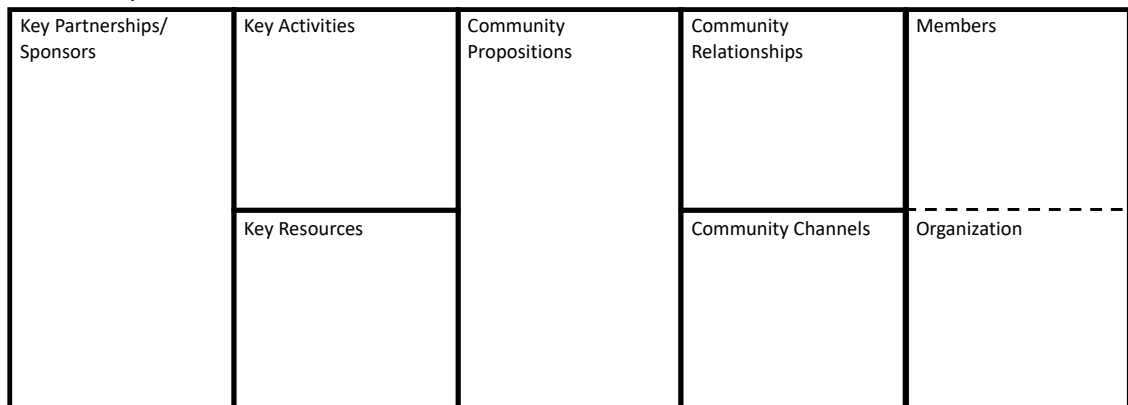


Figure 50: Proposed Community Model Canvas

One aspect that the BMC captures that the other tools do not is the idea of “Key Partnerships”, which in the case of a community involves sponsorship, and relations to other communities. This could be a key aspect of a working model, as both sponsorship and interaction with other communities have been linked to community success according to Probst and Borzillo (2008).

The other tool proposed to capture a working model of a community is the Service Blueprint. In *This is Service Design Doing*, the Service Blueprint is related to a customer journey and includes the activities of the service provider to support a customer journey. This method may be difficult to explain, but within the software industry there are two similar tools that are used: an activity diagram from UML, and EventStorming. An Activity Diagram (Unified Modeling Language, v2.5.1 n.d.) can be used to capture procedures, like organizational processes in a manner similar to the Service Blueprint. EventStorming (Brandolini 2013) is very similar to a Service Blueprint, although the starting point is the events sent between activities rather than a customer’s interaction. Within communities of practice, there is a concept similar to the customer journey, the member trajectory. The member trajectory moves from peripheral participation to active leadership to departure and this can be a foundation of a Service Blueprint, directing community organizers to focus on activities to support some or all of this trajectory. Consequently, next a community of practice blueprint is proposed for defining a working model of a community (Figure 51).

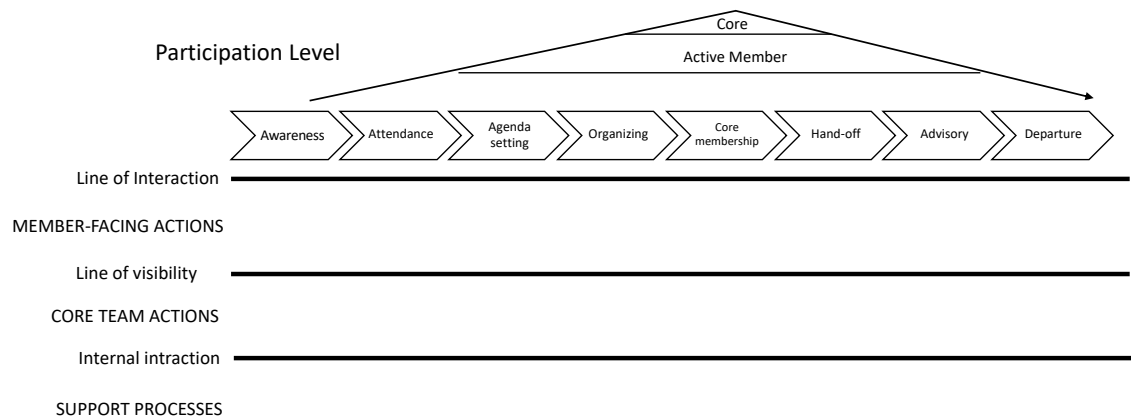


Figure 51: Proposed Community of Practice Blueprint

This template helps community organizers concentrate on the activities they need to attract members, encourage deeper participation, and manage a member's departure from the core group or the community. Some of these activities might also include the use of other tools listed above.

5.3 Validation

So far, this research has gathered empirical data, reviewed relevant literature, specified a needed intervention, reviewed relevant service design tools, selected appropriate tools, and adapted them to the situation under study. The fundamental question is whether the results of these activities are valuable to community organizers, this requires a method for validation. To be practical for the purposes of time-limited research, the method of validation must be done within a limited amount of time, over time stronger methods of validation can be achieved. Additionally, the method of validation should be appropriate for an industrial management environment, such as software development organizations. Finally, the method of validation should be appropriate for constructive research.

Building on the work of Kasanen, Lukka and Siitonen (1993), there are three levels of market validation available for a construct used within management:

- **Weak market test:** Has any manager responsible for the financial results of his or her business unit been willing to apply the construction in question in his or her actual decision making?
- **Semi-strong market test:** Has the construction become widely adopted by companies?
- **Strong market test:** Have the business units applying the construction systematically produced better financial results than those which are not using it?

Ideally, the best and strongest form of validation is measurable results from the widespread introduction of the construct in industry practice; this takes years to accomplish, and during this period the construct itself may change based on practical experience. The next strongest level is that organizations deem the construct(s) so useful that they use it widely. The weakest level is that a manager is willing to apply this construct in practice.

From the perspective of community of practice facilitation this method of validation needs to be altered slightly to reflect the nature of communities of practice. The key change is that instead of a manager in the weak market validation, the key decision maker is a community organizer whose interest is in building a strong community. Additionally, the semi-strong and strong market validation levels would involve the construct being used by a large number of community organizers. For this research, it would be necessary to find a community organizer willing to take the constructs into use.

There is a fundamental problem with finding an appropriate community organizer. To be a community organizer, the individual would have already started a community and therefore would not need the facilitation tools. It would also be difficult to identify a person who may become a community organizer, because there is no guarantee that they will form a community. To solve this issue, the approach taken was to validate the constructs using a community organizer of a failed or inactive community who was interested in re-launching their community or starting another. This provides a community organizer who can be used to validate the tools for facilitating the launch of a community.

5.3.1 Review of the community organizer toolbox

The weak market text was helped by Informant_1, who was the leader of the agile community of practice that flourished for a short period of time and is now inactive. He has a strong interest in re-launching the community to improve agile practices within the case organization. The method taken to achieve this validation was to present the constructs to the community organizer and discuss whether they feel that the constructs are useful, discuss any challenges with using the constructs, and verify their willingness to take the constructs into use. The review took place over two different sessions, the first explained the background of the tools, and the second reviewed the tools from the perspective of whether they could be used by the community organizer.

Following the flow of the toolkit presentation, the first tool reviewed with the community organizer was writing user stories. The user story concept was well-known to the community organizer, and the only comment was that it could be extended to include experiments by adding methods to measure outcomes. This would have impact to value measurement. The Idea Portfolio was also familiar to the community organizer:

"I use that with different axes names"[Informant_1]

, who used a similar technique to classify other concepts. The use of Member Interest and Organizational Interest as axes was considered interesting because it helps position a community within the organization:

"It's very important that the organizational interest, I think that was the bit that, that at least was definitely lacking"[Informant_1]

The Value Proposition Canvas was also known to the community organizer, as they had encountered this tool at an external meetup. They were unsure whether they could put this tool into practice though as it is more complicated and less commonly used than the previous tools. The "tweak" of putting both the member viewpoint and the organization viewpoint in the same map was considered to be positive as it captures the community proposition in one concise diagram. While the community pitch was new to the community organizer, the idea of using a pitch was very familiar, as they had been trained in creating pitches for different purposes. The community organizer also recognized alignment within a community as another benefit of the pitch idea:

"It's a great tool to create that inner perspective. So that then you align the noses of the different people"[Informant_1]

This was viewed as something that could be taken into use easily by an organizer.

The Business Model Canvas was known to the community organizer, so the canvas concept was familiar. The immediate reaction to the presentation of the Community Model Canvas was that it would be useful for any community as it raises the right questions, and structures the information. The initial verdict was:

"I think this would have been very useful."[Informant_1]

The community organizer recognized that some sections, for example, key partners and sponsors, raise questions that steer a community's organizers to consider factors that may be overlooked. The Service Blueprint concept was not known to the community organizer, but the overall approach seemed related to user story mapping (A Guide to User Story Mapping: Templates and Examples (How to Map User Stories) 2021), which also uses a user journey as a driver for defining activities. However, this tool was considered novel, as the organizer stated:

"I mean, this is very good. I mean that I would've never even thought of these things before."[Informant_1]

The inclusion of a sample member trajectory helped focus the activity to capture a member journey from the periphery of community to its core, and then departure from the core team. During the discussion it became clear that the community blueprint would change over time, and the organizers would concentrate on different parts of the member trajectory at different time. A key feature of the community blueprint was the explicit inclusion of core team activities, as these often get overlooked when organizing or creating a community. The inclusion of level of participation concept and the core team activities were particularly valuable according to the organizer. Like the Value Proposition Canvas, taking the community blueprint into use is non-trivial so the organizer was unsure how easy it would be to adopt:

"I mean, this is, this is not a trivial one, but, but on the coaching aspect now I was quickly checking Miro. Miro has very nice. All these, all these setups are better already as templates and with explanations about that."[Informant_1]

This points to external support provided by a tool, Miro (Online whiteboard & online collaboration tool | Miro 2021) that can be used to support community organizers.

The conclusion of the review was that these tools could be taken into use by the community organizer. The Value Proposition Canvas was the only one that was considered to be difficult, however, the questions raised by the canvas were considered to be the primary value, as it steers community organizers to answer key questions regarding a community. The favorite tool was the Service Blueprint variation, as this raised key elements needed for a working community of practice. The result can be summarized by the following quote:

"Yeah. I mean, I mean all those things as well are a bit of when starting at that. So without the theory, so all this it's a bit of an overkill [too extensive], but I think it is good with the right measure, I mean, they are good it's, I think it promotes the right thinking. So I don't have any complaints."[Informant_1]

This also highlights the role of tools in focusing the organizers on the issues discovering in the empirical research.

5.3.2 Validation Findings

The primary finding of the validation is that the tools can be used by a community organizer to facilitate a community of practice. The tools focus an organizer on key aspects of communities across the three target areas and provide a concise method of capturing data useful for a community. The validation confirmed the approaches used to identify the tools chosen to help a community organizer, in particular, the choice of tools that can be applied

to multiple areas, such as User Stories, which helps both community engagement, and community alignment.

Another finding from the tool validation was the benefit of choosing tools that are widely known within the Service Design community. This is particularly beneficial for the more complicated tools like the Business Model Canvas, the Value Proposition Canvas, and the Service Blueprint. The key advantage was the availability of training material, templates and other support online. This is especially relevant since the community organizer was a frequent user of Miro (Online whiteboard & online collaboration tool | Miro 2021), which has templates and guidance for these tools. This points to the possibility of using more sophisticated Service Design tools if they have good support available to help community organizers use the tools.

To sum up the validation showed that the following proposed tools can be used:

- *Community engagement*: the user stories and idea portfolio tools can be taken into use without further action.
- *Community alignment*: pitches can be used without further action; however, the community proposition canvas would need further education (either self-education on value proposition canvas, or more guidance).
- *Working model*: the proposed tools, community model canvas and community of practice blueprint, would require more effort on the part of community organizers, but are possible to use with support from external sites.

The overall finding shows that the tools are valuable in promoting the right thinking about communities of practice, however it seems that the effort to use all the tools maybe “overkill”.

5.4 Summary of research on facilitating CoPs with service design tools

The goal of the Developer/Deliver phase of this research was to construct and validate a set of tools, based on Service Design tools, that can be used by a community organizer to facilitate a community of practice. As these tools are targeted to software community of practice organizers at the early phase of the community of practice lifecycle, the targeted areas were community engagement, community alignment and a community working model. The first step in this action was to gather a wide range of Service Design tools from various sources based on a combination of community of practice and service design literature. From these tools, a selection was chosen based on their widespread use and/or applicability to the research topic. The final selections were:

- Community engagement: User Stories, Idea Portfolio

- Community alignment: Value Proposition Canvas, Pitch
- Community working model: Business Model Canvas, Service Blueprint

These tools were mildly altered to support community of practice facilitation by including concepts from community of practice literature, in particular Wenger (1999), Wenger et al. (2002), Probst and Borzillo (2008), McMillan (1996), and Webber (2016). The proposed tools were shown to be valuable based on a weak-market validation approach, using a community organizer (Informant_1) to review and evaluate the usefulness of the tools.

6 Research contribution

The contributions of this research of can be listed as follows:

- Confirmation of earlier findings and exploration their nature in a new context - software development in a regulated software industry
- Identification of new challenges relevant for organizing a CoP
- A proposed set of tools to assist community organizers within the case organization

The first two contributions are all the result of the qualitative study into the case organization based on semi-structured interviews, followed by coding and analysis, see Chapter 4. These add to the current body of knowledge surrounding communities of practice. The second contribution may be specific to the case organization, but the experience of the informants interviewed, and other research (such as Mestad et al. (2007)) indicate this may be a wider issue. This contribution also points to community engagement, community alignment, and working model as topics that community organizers inside the case organization should address when creating a community. Finally, the third contribution results from an analysis of available service design tools to select those applicable to the three topics. These tools are design to help the case organization to establish communities of practice as a new institutional structure for knowledge management and development.

6.1 Confirmation and exploration of earlier findings in a new context

Every organization is unique in its own special ways, and in this case the researched organization has several features that differ slightly from those already studied: it functions in a regulated software industry, and it is undergoing an agile transformation. The results of this case study can help strengthen the understanding of communities of practice by confirming existing findings reported by others. The case organization is similar in some characteristics to others reported in the literature, such as Ericsson (Paasivaara & Lassenius 2014) and a start-up company (Mestad et al. 2007). However, as this software development company works within a highly regulated industry, challenges of running a community of

practice in a bureaucracy as reported by Harvey et al. (2013) also occur. This research supports for many of the findings of these and other researchers investigating communities of practice in other fields and organizations.

Probst and Borzillo (2008) point that organizational alignment is a key success factor in any community of practice, from our empirical this seems to be the case, even if a community does not have an explicitly defined goal - this is reflected in the “Testing Guild”, which had explicit managerial support, and aligned to the testing needs of the organization. Harvey et al. (2013), Wenger et al. (2002), and Iaquinto et al. (2011) suggest building communities on existing networks, this was evident in the testing community of practice reported here that built in pre-existing roles. This form of organizational alignment was sufficient to overcome many other challenges in creating a community. Another form of organizational alignment, sponsorship, is recommended by Probst and Borzillo (2008), Nickols (2003), Iaquinto et al. (2011), and Wenger et al. (2002, 78), this too was present in the successful testing guild.

Other advice from the literature, such as having a core group (Probst & Borzillo 2008; Pyrko, Dörfler & Eden 2017), was also repeated in the advice given by informants to other community organizers. Forming a core group was considered an important step in the Building phase of a community of practice by Gongla and Rizzuto (2001), and others (see Probst and Borzillo (2008), and Pyrko et al. (2017)). For the testing community this was not an obstacle, but it was a factor in the struggles of other communities, especially when the community organizer was unavailable. The form of community leadership most often observed in the case organization’s communities was the “single leader” form (see Webber (2016)), which results in fragile communities. This confirms the reported need for a core group (within active “Spotify Guilds”, Smite et al. (2020) report 1-4 core coordinators per community), and strengthens the suggestion by Webber (2016) to form a shared leadership, or a co-owned community.

6.2 Identification of new challenges relevant for organizing a CoP

6.2.1 Organizers’ lack of knowledge of CoP

This research raises one potential issue neatly captured by an informant regarding creating communities of practice within organizations, where he described a previous manager just directing people to create a community of practice without any guidance:

“Engineering director came and said that we need to have community of practices and throw the ball on the people, man. Now you go and do it totally.”[Informant_10].

This illustrates the challenges of community organizers within the case organization, *they are attempting to create communities of practice without knowledge of what communities are, and how they operate*. This has not been highlighted by researchers who have an understanding of the concept and use the concept to describe their research, such as Schenkel and Teigland (2008), Probst and Borzillo (2008), and Harvey et al. (2013).

While this issue has been alluded to in different places within the literature reviewed for this thesis, the topic of community of practice knowledge within community leaders has not been explicitly studied. Harvey et al. (2013) mention some issues related to introducing communities of practice into a bureaucratic organization - especially the challenges of introducing the self-organizing, self-regulating and unstructured nature of community to a conservative culture. Pyrko, Dörfler and Eden (2017) comment on an informant confusing a community communication channel with the actual community, as commented above by Informant_6. Of the 10 informants, only one had any experience in participating in a community prior to working in the case organization. Within the research literature there seem to be similar difficulties in defining a clear view of a community of practice: the Spotify model has communities of practice known by other names, Chapters and Guilds (Smite et al. 2020), and the work by Mestad et al. (2007) use "Skill Circles" to describe communities of practice. Taking models from other organizations is problematic because organizations' relationships to communities are different, as encountered by Harvey et al. (2013). When there is no working model that they can apply, companies need to discover their own version of a community of practice, as in Mestad et al. (2007).

The lack of knowledge of communities of practice has impact to how community organizers try to create and maintain communities. This is clear in the case organization, where no community explicitly defined a "joint enterprise" or objective, as suggested by Probst and Borzillo (2008), Michalk (2013), and Gongla and Rizzuto (2001). This forms one of the three key elements of the community of practice model from Wenger (1999). Additionally, most communities in the case organization defaulted to a single-leader structure, similar to a standard team structure - there was little activity towards creating a core group. This lack of mutual engagement was evident in one community supported by a single leader (Informant_6), whose community did not have regular meetings. This lack of mutual interaction has been identified as a problem by Pyrko, Dörfler and Eden (2017) when creating communities of practice. Based on the comments from informants about the need for a core group, this element was missing from many of the communities studied in the case organization.

The research here suggests that it is important to understand the level of knowledge about communities of practice within organizations as a first step to help organizers create communities. According to Kruger and Dunning (1999), the best way to improve the situation

in an organization adopting communities of practice would be to educate the organization's novice community organizers about communities of practice in general.

6.2.2 Key problems when starting a CoP

One contribution of this research is the elicitation of a range of problems that the case organization had in creating communities of practice. These problems consist of several identified by others, such as the lack of community objectives discussed above, and a key problem of lack of community of practice expertise within the organization. The empirical research resulted in 3 key themes arising from interviews with informants:

- **Community Nature:** community of practice knowledge, especially how it differs from other organizational structures
- **Alignment:** organizational, member and community alignment, the need for alignment on different levels
- **Working model:** a basic functional model for a community operating inside the case organization.

Some of these themes arise in others' research, for example, alignment through clear objectives and sponsorship is identified by Probst and Borzillo (2008). The need for a working model endorsed by the organization also arises in Harvey et al. (2013).

Combining the empirical research with the literature studied pointed to a requirement for constructs based on three key needs:

- *Community engagement:* encouraging members to take a more active role in an unstructured and self-regulating community of practice.
- *Community value:* aligning the of community to the organization.
- *Working model:* defining a working model for a community inside the case organization.

These issues parallel some of the issues identified by Harvey et al. (2013), in a bureaucratic organization, especially the search for a working model and improving community engagement. Probst and Borzillo (2008) note the need for community engagement to create a vibrant community. The topic of aligning a community is common advice from community of practice proponents (Probst & Borzillo 2008; Wenger, McDermott & Snyder 2002; Harvey et al. 2013).

For novice community of practice organizers these are not always obvious, although it takes little for them to realize the benefits of these elements. In the case study, when prompted, both Informant_1 and Informant_6 noted the need for a core, active, and engaged group

needed to maintain a community. The working model of the community needs to be such that an organizer can maintain it within organizational constraints, in this case the time permitted by their manager for these activities (a few hours per month). Alignment with the organization can consist of goal alignment (as in the case of the testing guild where the individual and community goals matched), and role alignment (again in the testing guild which consisted of people with the same role). The needs identified here parallel the needs identified by Pyrko et al. (2017), when suggesting a causal mapping workshop to help community organizers.

6.3 Proposed set of tools to facilitate a CoP

The identified needs of the case organization can be used to help create a set of constructs that can be used by a community organizer to initiate a community. Following Grenville (2014), this research takes a service design approach to communities of practice, and uses the service marketing gap model of Wilson et al. (2016) to help analyze potential problems in community of practice operation. The facilitation is similar to the approach of Pyrko et al. (2017), where causal mapping is used as a tool to facilitate communities. A key difference between this work and Grenville (2014) is the goal of providing tools that community organizers can use without the presence of a service designer or causal mapping expert.

The tools proposed here are tailored to the needs of the case organization based on the empirical research, especially the need to address some of the key community of practice concept from Wenger (1999), and Wenger et al. (2002). Additionally, the tools are chosen to match those in use by software organizations (e.g., User Stories), and those common across service designers (e.g., Business Model Canvas, Service Blueprint). The final tools are:

- Community engagement: User Stories, Idea Portfolio
- Community alignment: Value Proposition Canvas, Pitch
- Community working model: Business Model Canvas, Service Blueprint

The approaches used to select the tools seem to make the tools easier for a software professional to adopt. These tools can be easily adapted to embed some community of practice theory and emphasize some key community elements to guide users. The weak-market validation done here shows that by using tailored tools it is possible to instigate the “right thinking” in community organizers.

6.4 Limitations of the research process

This study has its limitations, some are standard for a qualitative case study and constructive research, whereas others are unique to the topic and this study. These and other limitations are discussed here.

The first limitation is that it has been done by a lone researcher, whose internal biases and preconceptions can influence the data collection and analysis. The researcher was motivated to do this research based on their experience in a failing community of practice. This could bias the research findings to lack of organizational support or external factors. This was mitigated by interviewing others from other more “successful” communities of practice. As the researcher is a key factor in qualitative research, the use of semi-structured interviews based on background theory helps eliminate preconceptions by creating an independent framework for forming interview questions, leading to insights less tied to the researcher’s experience. Another limitation to this research is that it is focused on a single organization, in a heavily regulated industry, in a single location.

The use of snowballing to identify informants has its drawbacks. As the initial informant had a negative experience with communities of practice within the organization, there is a chance this could negatively influence the study. This is compensated by including members and leaders of communities of practice considered successful by others. By using snowballing sampling, it was possible to identify and to access informants unknown to the researcher, including those of a successful community of practice.

The design of the construct is limited by the researcher’s knowledge of service design tools. There are other sources that could contain tools applicable to communities of practice for example Tschimmel et al. (2015), Meroni and Sangiorgi (2016), and Stickdorn et al. (2011). While the researcher reviewed 240 methods, there may be tools and tool variations unknown to the researcher that are closely aligned with communities of practice. This limitation is difficult to overcome, but there are some fundamental themes and patterns to service design tools, especially those that are widely known and used such as the Business Model Canvas (Osterwalder & Pigneur 2010). Therefore, although there might exist an ideal specific tool unknown to the researcher there are sufficient inputs to create a construct similar to the appropriate tool.

The validation of the service design tools generated by this research is also limited. The method of weak market validation required an individual with responsibility to express willingness to use the tools for community creation. The need to have a community organizer evaluate the tools and to be willing to use the tools to create a community of practice severely limited the possible candidate organizers for validation. The tools were validated by a community organizer of an inactive community who showed interest in using the tools to re-activate the community. Finally, the effectiveness of the resulting construct of the research cannot be fully evaluated within the timeline of this research project. It will take several years to estimate whether the final construct is successful. By using the weak-market test an initial level of validation is possible, but naturally it would be preferable if the construct has been shown to produce the desired result.

7 Conclusions

The starting point for this thesis was the recognition that while communities of practice are essential for software organizations, there is little guidance or support for community organizers. In particular, while there are many different tools within the software industry for creating products, teams, and organizations, there are few tools related to community of practice facilitation. This realization led to this research to resolve the following questions:

- What limits the creation of successful communities of practice in agile software organizations?
- What service design tools are appropriate for creating successful communities of practice in such organizations?

The second question has an implicit assumption that service design tools are appropriate for this purpose based on the research by Grenville (2014). The approach taken in this research has been to use a constructive research approach to create a set of tools useful for community organizers. This is based on a case study approach for one software organization developing software using an agile process. The case organization fulfilled the needs of this research by being accessible to the researcher, being a software organization, and having several communities of practice. This provides the environment and method for answering the two research questions when supplemented with a theoretical investigation of the underlying concepts and their supporting literature.

7.1 Challenges of creating successful communities of practice

At the start of the research process the researcher, based on personal experience, felt that the core challenge for creating a successful community of practice was obtaining organizational support. This was partially corroborated by community of practice researchers who identified a sponsor as a critical factor in community success. However, there are indications that this is not sufficient for community success and other factors are also critical from Probst and Borzillo (2008).

The empirical research into the organization's community of practice considered organizers', members', and managers' perspectives to gain insights on the challenges within the organization. This proved highly enlightening for two major reasons: the first, is that reported success factors also apply to the organization; and the second is that lack of knowledge of communities of practice caused significant problems for organizers. The reported factors of core teams, sponsors, organizational alignment and networking appeared also in the case organization. However, the lack of community of practice expertise has not been widely reported. This poses a problem for starting communities of practice in organizations that have not used communities in the past, there is no working model or

guidance on how to run a community, or ways to identify a successful community. The empirical research supports advice given by others when starting a community, build on existing systems and networks. In this case, a successful community built on a network of existing members with the same functional role, and an existing management structure of one lead with a virtual team. From the empirical and theoretical research, the challenges in creating a community of practice are based on raising community engagement, achieving member and organizational alignment, and creating a good operational model for a community.

7.2 Service design tools for facilitating communities of practice

The problem of support community creation has been identified by others who suggested using the technique of causal mapping to help organizers, such as Pyrko et al. (2017). This suggests that providing tools can help community organizers structure a community so that it has a higher chance of success. Other researchers have used service design tools for a similar purpose with great success by Grenville (2014). However, there still is a need for a set of tools that can be used by organizers themselves with little or no outside guidance.

This research focused on identifying service design tools that can be used by community organizers to create a community. Service design tools are used because they can act as boundary objects between community members and organizations to communicate information in a concise clear manner. The other advantage of service design tools is that they deliberately focus their users on key questions related to the topic being designed. For example, a Business Model Canvas asks users to identify key partners, forcing users to identify and rank partners. Similarly, for a community of practice, the Community Model Canvas presented in Chapter 5 asks community organizers to identify sponsors for their community.

An important goal of this research is to identify service design tools useful for creating community within an organization. This occurs in the early, informal, and uncertain phase of a community's lifecycle when it is unclear whether a community should be created, who its members should be, and what is the relation with the surrounding organization. This implies a decentralized approach where individuals within the organization use these tools without assistance from the organization. So appropriate service design tools must be self-explanatory, or widely supported, to be useful for this research.

By linking a wide survey of service design tools with the empirical research, a set of tools was created by slightly modifying existing tools. The modifications were done to elicit questions fundamental to a community of practice, which overcomes some of the lack of expertise in community of practice theory. These tools, presented in Chapter 5, were evaluated by a community organizer, who viewed the tools as both practical and useful, as well as being able to be adopted without further training. A key factor in this evaluation was the availability of

material online related to the tools, and the similarity of the tools to other tools in a software developer's repertoire.

7.3 Future research

As with most case studies an obvious candidate for future research would be to replicate this research in another organization. Of particular interest would be the level of community of practice knowledge and the impact on community organizers, this would confirm whether this is a challenge in other organizations. As this research concerns software organizations, it would be interesting to see if they have similar challenges and whether the tools presented here could be used to improve communities. This was alluded to in this research when informants referred to challenges with communities of practice in their past.

As this research was the result of a single researcher, expanding the research team could improve the quality and depth of the research. In particular, increasing the researchers in the qualitative section of the research process would reduce the chances of researcher bias affecting the outcome. Additionally, increasing the number of researchers in the toolkit construction could provide different viewpoints and improve the depth of the analysis.

This research was time-limited to weak market validation of the service design tools chosen to help community organizers. The next step would be to apply the tools in practice and analyze the results. The goal of this research would be to measure the early stages of the community's development in terms of engagement, alignment, and a clear operative model supporting a member trajectory. These measurements could provide better validation of the tools. Another way to improve validation would be to advertise the tools within the organization so that prospective community organizers could use them when starting a community.

A common issue with case study research is that it is very useful for defining theories and gaining insights, however, its applicability to the wider environment is doubtful. Therefore, one future step could be to do quantitative research with a wider set of participants to check whether the findings are supported by a larger sample of organizations, communities, and members. This could be expanded to include both the theoretical findings, and the community organizer tools.

One point mentioned by the community organizer during validation was the need for tools to capture community value. This indicates the need for more tools to cover other phases of a community lifecycle. Another example would be the use of Open Space Technology (Owen 2008), as suggested by an informant, to organize meetings. During the validation, one suggestion was to add measurements to user story outcomes to capture the impact of a community on the organization. Similarly, the theoretical framework points to improved

skills and knowledge of community members as a valuable outcome, so metrics and tools to analyze these would be useful.

The current toolset resulting from this research forms a set of boundary objects useful for communities. However, it might be useful to organizers to provide additional guidance about how to use the tools, and supporting methods. This is similar to the ideas from Pyrko et al. (2017) where a workshop format and process is described. The resulting workshop specification could be used by potential organizers to drive the completion of the service design tools. Like the toolset, the workshop format can be validated using a similar process to evaluate its effectiveness and potential for community organizers.

One of the more theoretical possibilities for future research with the community of practice concept is how to place it in relation to other economic and managerial frameworks (Duguid 2005). The concept came from the theory of social learning, where the goal is the transfer of knowledge from senior members of a community to junior members (Lave & Wenger 1991). The focus of communities of practice has changed throughout the years from a spontaneous social structure created by members of an organization (Wenger 1999) to something that becomes a critical element in a company's knowledge management strategy (Alavi & Leidner 2001; Bjørnson & Dingsøy 2008). This thesis uses the lens of service-dominant logic from Vargo and Lusch (2016) to view communities of practice as a service for knowledge management for both individuals and organizations - something that may be pursued further.

The area of community of practice facilitation is important for different organizations. It is particularly important for software organizations adopting agile software processes, because communities become a critical part of the organization's knowledge management strategy. This research shows that by treating communities as services and leveraging service design theory, concepts, and tools, it is possible to empower community organizers. The importance of communities to the long-term viability of organizations cannot be understated and needs further investigation to support this critical organizational tool.

References

- Alavi, M. & Leidner, D.E. 2001. Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS quarterly* 107-136.
- Anon, 2020. Communities. Large Scale Scrum (LeSS). Referred 7.3.2020. <https://less.works/less/structure/communities.html>.
- Anon, 2021. A Guide to User Story Mapping: Templates and Examples (How to Map User Stories). Planio. Referred 2.5.2021. <https://plan.io/blog/user-story-mapping/>.
- Anon, 2021. Manifesto for Agile Software Development. Referred 20.4.2021. <https://agilemanifesto.org/>.
- Anon, 2021. Method Library – This is Service Design Doing. Referred 10.4.2021. <https://www.thisisservicedesigndoing.com/methods>.
- Anon, 2021. Online whiteboard & online collaboration tool | Miro. <https://miro.com/>. Referred 2.5.2021. <https://miro.com/features/>.
- Anon, 2021. Qualitative Data Analysis Software | NVivo. Referred 7.3.2021. <https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home>.
- Anon, 2021. SAFe 5.0 Framework. Scaled Agile Framework. Referred 9.6.2021. <https://www.scaledagileframework.com/>.
- Anon, n.d. Agile Teams. Scaled Agile Framework. Referred 24.4.2021. <https://www.scaledagileframework.com/agile-teams/>.
- Anon, n.d. Portfolio Canvas - Scaled Agile Framework. Referred 4.4.2021. </portfolio-canvas/>.
- Anon, n.d. Unified Modeling Language, v2.5.1. Unified Modeling Language 796.
- Auerbach, C. & Silverstein, L.B. 2003. *Qualitative data: An introduction to coding and analysis*. NYU press.
- Bandura, A. 1971. *Social learning theory*. Morristown.
- Berger, P.L. , Luckmann, T. , & Zifonun, D. 1967. *The social construction of reality*.
- Bitner, M.J. , Ostrom, A.L. , & Morgan, F.N. 2008. Service blueprinting: a practical technique for service innovation. *California management review* 50(3), 66-94.
- Bjørnson, F.O. & Dingsøyr, T. 2008. Knowledge management in software engineering: A systematic review of studied concepts, findings and research methods used.
- Boehm, B. 2006. A view of 20th and 21st century software engineering. *Proceedings of the 28th international conference on Software engineering*. pp.12-29.
- Brandolini, A. 2013. Introducing Event Storming. Ziobrando's Lair. Referred 19.4.2021. <http://ziobrando.blogspot.com/2013/11/introducing-event-storming.html>.
- Brar, S.S. 2020. Indian Railway Case study: how to use Double diamond process in UX. Medium. Referred 26.2.2021. <https://uxdesign.cc/how-to-use-double-diamond-process-in-ux-practice-e437f3e3ce47>.

- Brown, J.S. & Duguid, P. 1991. Organizational learning and communities-of-practice: Toward a unified view of working, learning, and innovation. *Organization science* 2(1), 40-57.
- Brown, T. 2009. Change by design.
- Brown, T. & Wyatt, J. 2010. Design thinking for social innovation. *Development Outreach* 12(1), 29-43.
- Bryson, J.M. , Ackermann, F. , Eden, C. , & Finn, C.B. 2004. *Visible thinking: Unlocking causal mapping for practical business results*. John Wiley & Sons.
- Cook, S.D. & Brown, J.S. 1999. Bridging epistemologies: The generative dance between organizational knowledge and organizational knowing. *Organization science* 10(4), 381-400.
- Coughlan, P. & Coughlan, D. 2002. Action research for operations management. *International journal of operations & production management*.
- Cox, A. 2005. What are communities of practice? A comparative review of four seminal works. *Journal of information science* 31(6), 527-540.
- Denning, S. 2021. What's Missing In The Agile Manifesto: Mindset. *Forbes*. Referred 16.5.2021. <https://www.forbes.com/sites/stevedenning/2016/06/07/the-key-missing-ingredient-in-the-agile-manifesto-mindset/>.
- Design Council, U. 2015. Design methods for developing services. *Keeping Connected* 23.
- Dingsøyr, T. , Bjørnson, F.O. , & Shull, F. 2009. What do we know about knowledge management? Practical implications for software engineering. *IEEE software* 26(3), 100-103.
- Duguid, P. 2005. "The Art of Knowing": Social and Tacit Dimensions of Knowledge and the Limits of the Community of Practice. *The Information Society* 21(2), 109-118.
- Eisenhardt, K.M. 1989. Building Theories from Case Study Research. *The Academy of Management Review* 14(4), 532-550.
- French, S. 2009. Action research for practising managers. *Journal of Management Development*.
- Gioia, D.A. , Corley, K.G. , & Hamilton, A.L. 2013. Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational research methods* 16(1), 15-31.
- Gongla, P. & Rizzuto, C.R. 2001. Evolving communities of practice: IBM Global Services experience. *IBM systems journal* 40(4), 842-862.
- Greer, C.R. , Lusch, R.F. , & Vargo, S.L. 2016. A service perspective. *Organizational dynamics* 1(45), 28-38.
- Grenville, D. 2014. Using a service design perspective to create an employee community of practice. *Proceedings of the 13th Participatory Design Conference: Short Papers, Industry Cases, Workshop Descriptions, Doctoral Consortium papers, and Keynote abstracts-Volume 2*. pp.145-149.
- Hansen, M.T. , Nohria, N. , & Tierney, T.J. 1999. What's Your Strategy for Managing Knowledge? *Harvard Business Review* (March-April 1999), 1 Mar. Referred 14.3.2020. <https://hbr.org/1999/03/whats-your-strategy-for-managing-knowledge>.

- Harvey, J.-F. , Cohendet, P. , Simon, L. , & Dubois, L.-E. 2013. Another cog in the machine: Designing communities of practice in professional bureaucracies. *European Management Journal* 31(1), 27-40.
- Iaquinto, B. , Ison, R. , & Faggian, R. 2011. Creating communities of practice: scoping purposeful design. *Journal of Knowledge Management*.
- IDEO (Firm) 2015. *The field guide to human-centered design: design kit*. IDEO.
- Jeremiah, J. 2021. Agile vs. waterfall: Survey shows agile is now the norm. TechBeacon. Referred 24.4.2021. <https://techbeacon.com/app-dev-testing/survey-agile-new-norm>.
- Kasanen, E. , Lukka, K. , & Siitonen, A. 1993. The constructive approach in management accounting research. *Journal of management accounting research* 5(1), 243-264.
- Kniberg, H. & Ivarsson, A. 2012. *Scaling agile@ spotify*.
- Kruger, J. & Dunning, D. 1999. Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of personality and social psychology* 77(6), 1121.
- Kumar, V. 2012. *101 design methods: A structured approach for driving innovation in your organization*. John Wiley & Sons.
- Larman, C. & Vodde, B. 2009. Scaling lean & agile development. *Organization* 230(11).
- Larman, C. & Vodde, B. 2016. *Large-scale scrum: More with LeSS*. Addison-Wesley Professional.
- Lave, J. & Wenger, E. 1991. *Situated learning: Legitimate peripheral participation*. Cambridge university press.
- Leigh Star, S. 2010. This is not a boundary object: Reflections on the origin of a concept. *Science, Technology, & Human Values* 35(5), 601-617.
- Less.works. 2021. Overview. Large Scale Scrum (LeSS). Referred 22.5.2021. <https://less.works/>.
- Li, L.C. , Grimshaw, J.M. , Nielsen, C. , Judd, M. , Coyte, P.C. , & Graham, I.D. 2009. Evolution of Wenger's concept of community of practice. *Implementation science* 4(1), 11.
- Løvlie, L. , Polaine, A. , & Reason, B. 2013. *Service design: from insight to implementation*. New York: Rosenfield Media, LLC.
- Lusch, R.F. & Vargo, S.L. 2014. *Service-dominant logic: Premises, perspectives, possibilities*. Cambridge University Press.
- Martin, K. & Osterling, M. 2014. *Value stream mapping: how to visualize work and align leadership for organizational transformation*. McGraw-Hill New York, NY.
- McMillan, D.W. 1996. Sense of community. *Journal of community psychology* 24(4), 315-325.
- Meroni, A. & Sangiorgi, D. 2016. *Design for services*. Routledge.
- Mestad, A. , Myrdal, R. , Dingsoyr, T. , & Dyba, T. 2007. Building a learning organization: Three phases of communities of practice in a software consulting company. 2007 40th Annual Hawaii International Conference on System Sciences (HICSS'07). IEEE, pp.189a-189a.

- Michalk, A. 2013. Online community building: common mistakes & tips for success. [Business] Referred 1.3.2020. https://www.slideshare.net/AlisonMichalk/online-community-building-common-mistakes-tips-for-success?qid=39386c82-a7aa-4bcc-859f-bec610289e1f&v=&b=&from_search=1.
- Millen, D.R. & Fontaine, M.A. 2003. Improving individual and organizational performance through communities of practice. Proceedings of the 2003 international ACM SIGGROUP conference on Supporting group work. pp.205-211.
- Nickols, F. 2003. Communities of practice: A start-up kit. *Distance Consulting* 3-13.
- Nonaka, I. 2008. *The Knowledge-Creating Company* (Harvard Business Review Classics). Harvard Business School Pr, ISBN.
- Nonaka, I. & Konno, N. 1998. The concept of “Ba”: Building a foundation for knowledge creation. *California management review* 40(3), 40-54.
- Nonaka, I. & Takeuchi, H. 1995. *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford university press.
- Ogilvie, T. & Liedtka, J. 2011. *Designing for growth: A design thinking toolkit for managers*. Columbia University Press.
- Ojasalo, K. & Ojasalo, J. 2015. Adapting business model thinking to service logic: an empirical study on developing a service design tool. *THE NORDIC SCHOOL* 309.
- Osterwalder, A. & Pigneur, Y. 2010. *Business model generation: a handbook for visionaries, game changers, and challengers*. John Wiley & Sons.
- Osterwalder, A. , Pigneur, Y. , Bernarda, G. , & Smith, A. 2014. *Value proposition design: How to create products and services customers want*. John Wiley & Sons.
- Owen, H. 2008. *Open space technology: A user’s guide*. Berrett-Koehler Publishers.
- Oyegoke, A. 2011. The constructive research approach in project management research. *International Journal of Managing Projects in Business*.
- Paasivaara, M. & Lassenius, C. 2014. Deepening our understanding of communities of practice in large-scale agile development. 2014 Agile Conference. IEEE, pp.37-40.
- Perry, C. & Zuber-Skerritt, O. 1992. Action research in graduate management research programs. *Higher Education* 23(2), 195-208.
- Portigal, S. 2013. *Interviewing users: how to uncover compelling insights*. Rosenfeld Media.
- Probst, G. & Borzillo, S. 2008. Why communities of practice succeed and why they fail. *European Management Journal* 26(5), 335-347.
- Pyrko, I. , Dörfler, V. , & Eden, C. 2017. Thinking together: what makes communities of practice work? *Human relations* 70(4), 389-409.
- Pyrko, I. , Eden, C. , Dörfler, V. , & Stierand, M. 2017. Facilitating communities of practice with causal mapping workshops. *IFKAD 2017* 1966-1977.
- Reason, B. , Løvlie, L. , & Flu, M.B. 2015. *Service design for business: A practical guide to optimizing the customer experience*. John Wiley & Sons.

- Ropes, D.C. 2010. Measuring the impact of communities of practice: a conceptual model. *International Journal of Learning and Intellectual Capital* 8(1), 94-107.
- Royce, W.W. 1970. Managing the development of large software systems. In: *proceedings of IEEE WESCON*. Los Angeles, pp.1-9. Referred 17.3.2016.
http://leadinganswers.typepad.com/leading_answers/files/original_waterfall_paper_winston_royce.pdf.
- Rus, I. & Lindvall, M. 2002. Knowledge management in software engineering. *IEEE Software* 19(3), 26-38.
- Saldaña, J. 2021. *The coding manual for qualitative researchers*. SAGE Publications Limited.
- Schenkel, A. & Teigland, R. 2008. Improved organizational performance through communities of practice. *Journal of knowledge management*.
- Shull, F. , Singer, J. , & Sjøberg, D.I. 2007. *Guide to advanced empirical software engineering*. Springer.
- Smite, D. , Moe, N.B. , Floryan, M. , Levinta, G. , & Chatzipetrou, P. 2020. Spotify guilds. *Communications of the ACM* 63(3), 56-61.
- Stickdorn, M. , Hormess, M. , Lawrence, A. , & Schneider, J. 2018. *This is service design doing*.
- Stickdorn, M. , Schneider, J. , Andrews, K. , & Lawrence, A. 2011. *This is service design thinking: Basics, tools, cases*. Wiley Hoboken, NJ.
- Taylor, S.J. , Bogdan, R. , & DeVault, M. 2015. *Introduction to qualitative research methods: A guidebook and resource*. John Wiley & Sons.
- Tschimmel, K. , Santos, J. , Loyens, D. , Jacinto, A. , Monteiro, R. , & Valenca, M. 2015. *Research Report D-Think Design Thinking Applied to Education and Training*. ESAD Matosinhos, Portugal.
- Vargo, S.L. & Lusch, R.F. 2016. Institutions and axioms: an extension and update of service-dominant logic. *Journal of the Academy of marketing Science* 44(1), 5-23.
- Webber, E. 2016. *Building Successful Communities of Practice: Discover How Learning Together Makes Better Organisations*. Drew London Limited.
- Wenger, E. 1999. *Communities of practice: Learning, meaning, and identity*. Cambridge university press.
- Wenger, E. , McDermott, R.A. , & Snyder, W. 2002. *Cultivating communities of practice: A guide to managing knowledge*. Harvard Business Press.
- Wilson, A. , Zeithaml, V. , Bitner, M.J. , & Gremler, D. 2016. *Services Marketing: Integrating Customer Focus Across the Firm*.
- Wreiner, T. , Mårtensson, I. , Arnell, O. , Gonzalez, N. , Holmlid, S. , & Segelström, F. 2012. *Exploring Service Blueprints for Multiple Actors: A Case Study of Car Parking Services*. Conference Proceedings ServDes. 2009; DeThinking Service; ReThinking Design; Oslo Norway 24-26 November 2009. Linköping University Electronic Press, pp.213-223.
- Zuber-Skerritt, O. & Fletcher, M. 2007. The quality of an action research thesis in the social sciences. *Quality Assurance in Education*.

Figures

Figure 1: Participation and reification, modified from Wenger (1999, 63)	13
Figure 2: Dimensions of a community of practice, modified from Wenger (1999, 73)	13
Figure 3: Multi-community interaction, modified from Wenger (1999, 105).....	14
Figure 4: Design for learning, from Wenger (1999, 237)	15
Figure 5: Stages of community development	16
Figure 6: Knowing and different knowledge types, modified from Cook and Brown (1999, 391, 393).....	22
Figure 7: Knowledge spiral of knowledge creation, modified from Nonaka and Takeuchi (1995, 71, 73).....	22
Figure 8: The four types of Ba, modified from Nonaka and Konno (1998, 46).....	23
Figure 9: Axioms and Premises of S-D Logic, combined from Lusch and Vargo (2014) and Vargo and Lusch (2016).....	26
Figure 10: Exchange between community of practice actors: an illustrative simple model....	27
Figure 11: Operant resource integration in organizations and communities of practice: an illustrative model.....	28
Figure 12: Value cocreation cycle, based on Vargo and Lusch (2016, 7)	30
Figure 13: Community of practice ecosystem: an illustrative model.	30
Figure 14: Member-to-member knowledge cocreation, based on cf. Alavi and Leidner (2001, 117).....	32
Figure 15: Community supported interactions.....	32
Figure 16: Conceptual framework for community supported knowledge interactions inside an organization	33
Figure 17: Organizational knowledge ecosystem: an illustrative model	34
Figure 18: Service Marketing Gap Model, from Wilson et al. (2016, 100)	34
Figure 19: Community of practice Gaps model: an illustrative hypothetical model.....	37
Figure 20: High-level overview of the constructive research process, from Oyegoke (2011, 580)	39
Figure 21: Double diamond design process from (Design Council 2015)	40
Figure 22: The research process of this thesis: combined service design/constructive research process	40
Figure 23: Data Analysis process	46
Figure 24: Action research process modified from French (2009, 193)	48
Figure 25: Data analysis process	53
Figure 26: Codes, Categories, and Themes from empirical research	56
Figure 27: Interactions between empirical themes	65
Figure 28: Divergent and convergent processes in Service Design, from Brown (2009, 67).....	70
Figure 29: Guide on human-centred design goals, modified from (IDEO (Firm) 2015, 14).....	72
Figure 30: Kumar's seven-phase innovation process, from Kumar (2012, 8)	74

Figure 31: Example Idea Portfolio	77
Figure 32: Example modified business model canvas (costs/revenue sections removed).....	78
Figure 33: Sample Service Blueprint.....	78
Figure 34: Example Value Chain from Ogilvie and Liedtka (2011, 77).	79
Figure 35: Sample Stakeholder Map for an individual	80
Figure 36: Key Insight Form from (Method Library – This is Service Design Doing 2021)	81
Figure 37: Jobs-to-be-done template from (Method Library – This is Service Design Doing 2021)	81
Figure 38: User story template from (Method Library – This is Service Design Doing 2021) ...	81
Figure 39: Example persona	82
Figure 40: Example customer journey map	83
Figure 41: Example Value Proposition Canvas	84
Figure 42: A sample pitch (IDEO (Firm) 2015, 151), and the Napkin Pitch template from Ogilvie and Liedtka (2011, 209).	85
Figure 43: How Might We example from (IDEO (Firm) 2015)	86
Figure 44: Sample Intent Statement (Design Brief) from Tschimmel et al. (2015).....	87
Figure 45: Design Criteria template from Ogilvie and Liedtka (2011, 207).	87
Figure 46: Mapping of proposed service design tools to critical issues	89
Figure 47: Proposed Community of practice Idea Portfolio.....	91
Figure 48: Proposed Community Value Proposition Canvas.....	92
Figure 49: Proposed Community Pitch template	93
Figure 50: Proposed Community Model Canvas	94
Figure 51: Proposed Community of Practice Blueprint	95
Figure 52: A history of software engineering trends from Boehm (2006).....	118

Tables

Table 1: Table of Community Phases and activities based on Gongla and Rizzuto (2001)	17
Table 2: Key activities at Coalescing/Building stage of a community of practice	17
Table 3: Comparison of Special Interest Group and Skill Circle, from Mestad et al. (2007).....	19
Table 4: Knowledge management strategies, based on Hansen et al. (1999)	21
Table 5: Overview of the interview data	51
Table 6: Code table from empirical research.....	55
Table 7: List of candidate Service Design Tools	76
Table 8: Community Issues, challenges, and related service design tools	90

Appendices

Appendix 1: Overview of Software Paradigms 1950-	118
Appendix 2: Interview Guide	119
Appendix 3: Transcription/Coding Process	120
Appendix 4: List of surveyed Service Design methods and tools	121

Appendix 1: Overview of Software Paradigms 1950-

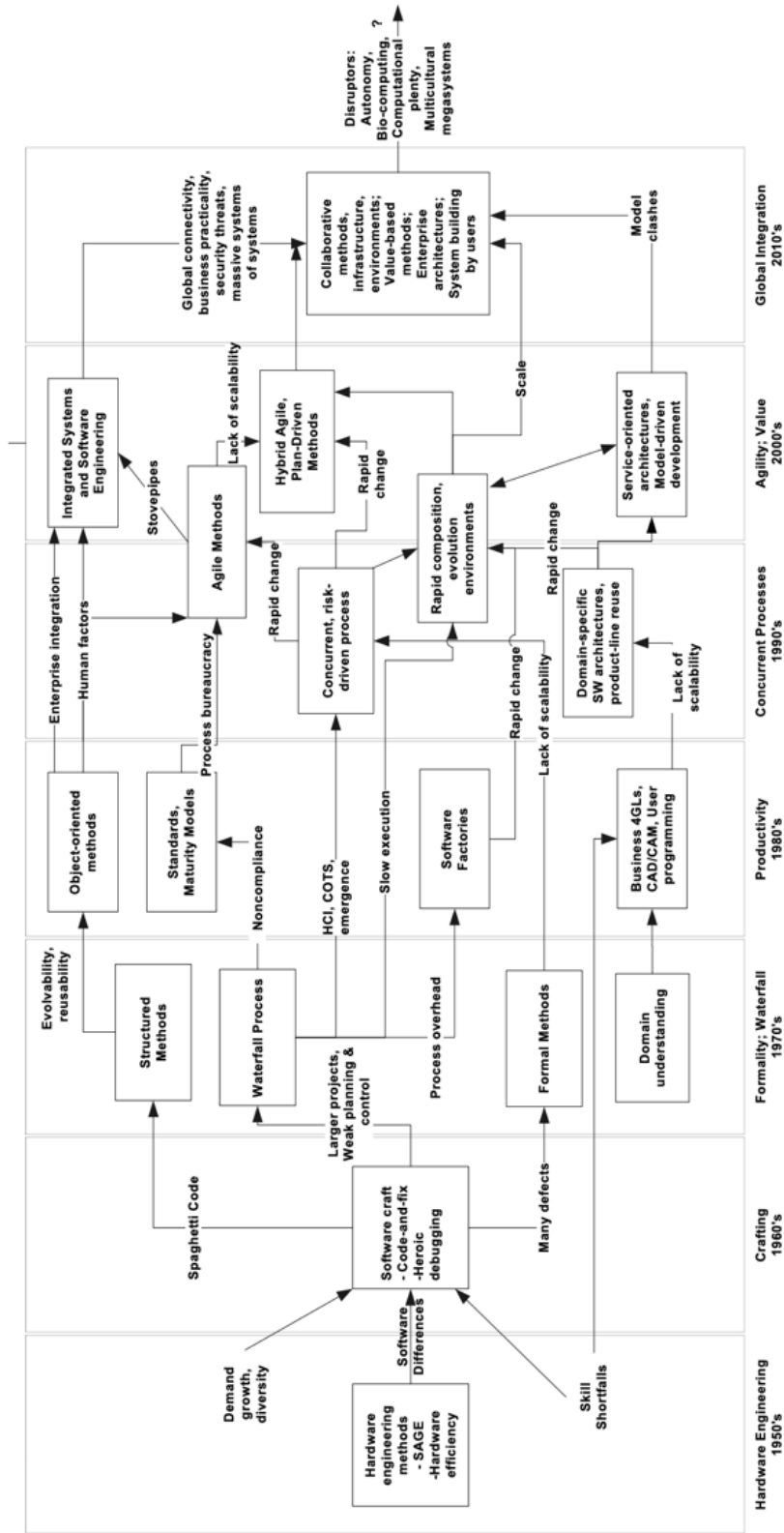


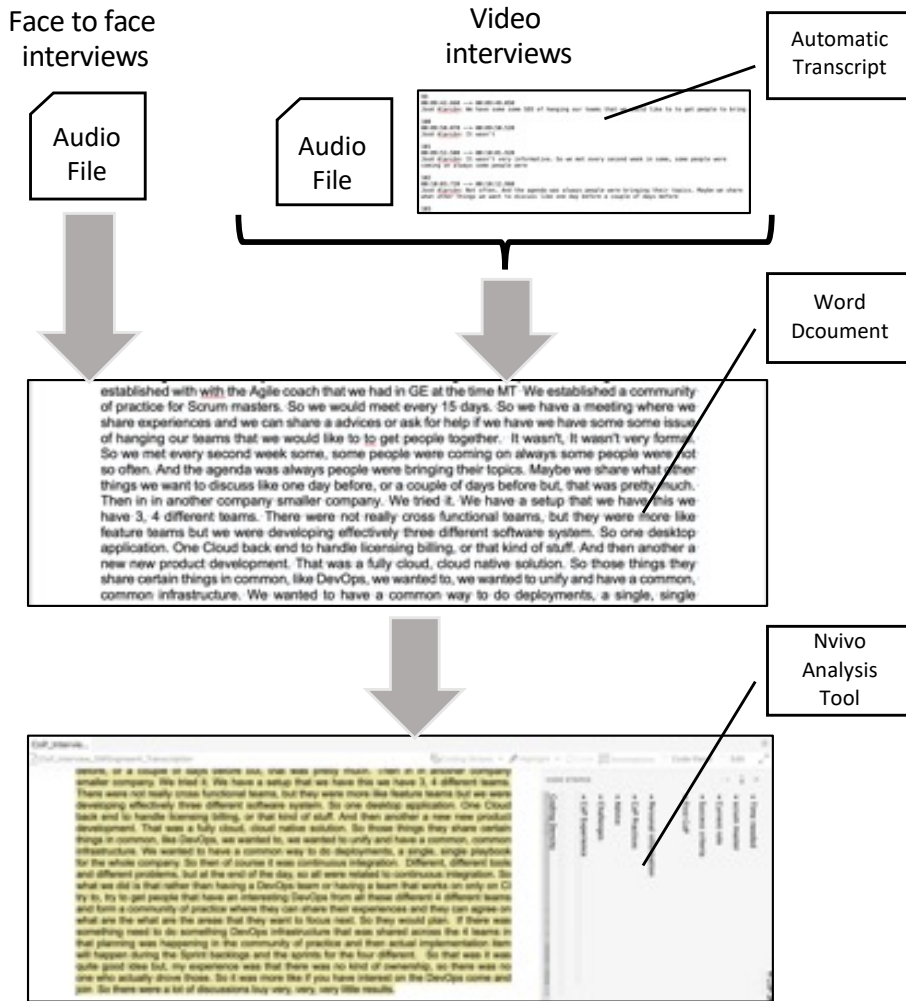
Figure 52: A history of software engineering trends from Boehm (2006)

Appendix 2: Interview Guide

<p>Field Guide: Community of Practice at Varian R&D</p> <p>Research questions</p> <ul style="list-style-type: none"> • <i>What is a successful CoP?</i> • <i>How to create a successful CoP?</i> • <i>How to support a CoP?</i> • <i>What stops a person from participating in a CoP?</i> • <i>What stops a person from starting a CoP?</i> • <i>What support should an organization give a CoP?</i> • <i>What benefit will an organization get from a CoP?</i> <hr/> <p>Introduction</p> <p>Thank you for meeting with us.</p> <p>This is a part of a case study related to the development of Communities of Practice at Varian Helsinki. The idea is to investigate what makes them successful or not, and how to guide their creation and maintenance using service design methods. This is part of my thesis work related to a service design MBA.</p> <p>I will be interviewing several people in Varian regarding this issue, to gain some insight into the operation of Communities of Practice.</p> <p>The goal of this interview is to gather your subject viewpoint on your experience inside a community of practice in Varian. The interview will start with some general questions and then move to more specific community of practice questions. It should take approximately 30-45mins.</p> <hr/> <p>Field Guide Questions on next page →</p> <hr/> <p>Other things that might be interesting</p> <ul style="list-style-type: none"> • Anything related to the value of a community of practice inside Varian? • Anything related to the support needed for a community of practice inside Varian? <hr/>	<p>Overview – CoP Member</p> <ol style="list-style-type: none"> 1. Please tell me little bit about yourself- what you do, your hobbies, family? 2. Could you please describe your current role Varian? 3. Could you describe a little bit what experience you have within a Varian CoP? <p>Basic Information</p> <ol style="list-style-type: none"> 4. Please describe your participation in a community of practice? 5. How clear were the community of practice's objectives? 6. How often did your community of practice meet? 7. What tools did you use to support your community of practice? 8. How did you document your community of practice? 9. What did you expect from your community of practice? <p>Problems</p> <ol style="list-style-type: none"> 10. What sponsorship did you receive at Varian? 11. How did the core group function? 12. How open were people to change and to new ideas? 13. What external experts were involved in your CoP's? 14. How did your CoP interact with others? 15. How did you measure the value of CoP? <p>Future</p> <ol style="list-style-type: none"> 16. What information do you think you could help future CoPs? 17. What support do you think managers should give to CoPs? 18. How would you measure the success of a CoP? 19. Who else should I talk to? <p>Wrapup</p> <ul style="list-style-type: none"> • Is there anything we didn't talk about? • Do you have something more you would like to add? • THANK YOU!!! <p>Thank you (Remember the door knob effect)</p>
---	--

<p>Overview - Manager</p> <ol style="list-style-type: none"> 1. Please tell me little bit about yourself- what you do, your hobbies, family? 2. Could you please describe your current role Varian? 3. Could you describe a little bit what experience you have within a Varian CoP? <p>Basic Information</p> <ol style="list-style-type: none"> 4. Why did you encourage communities of practice? 5. What communities of practice do you have in your organization? 6. What did you expect from your organization's communities of practices? 7. How did you measure your organization's community of practices? 8. What did you expect from your community of practice? <p>Problems</p> <ol style="list-style-type: none"> 9. What communities of practice did you sponsor? 10. What best practices were you interested in? 11. How often did you meet CoP leaders? 12. How clear were the community of practice's objectives? 13. How broad where your communities of practice? 14. What benefit did you get from your CoPs? 15. Did you start or stop a CoP? What happened? 16. Did you merge or split a CoP? <p>Future</p> <ol style="list-style-type: none"> 17. What information do you think you could help future CoPs? 18. What support do you think managers should give to CoPs? 19. How would you measure the success of a CoP? <p>Wrapup</p> <ul style="list-style-type: none"> • Is there anything we didn't talk about? • Do you have something more you would like to add? • THANK YOU!!! <p>Thank you (Remember the door knob effect)</p>

Appendix 3: Transcription/Coding Process



Appendix 4: List of surveyed Service Design methods and tools

Source	Tools/Method	Description	Phase
101 Design Methods	Activity Network	A method to analyse clusters by creating a map with clusters as nodes, and activities linking clusters as links.	Frame Insights
101 Design Methods	Analogous Models	A method for capturing analogies to a company's situation.	Know Context
101 Design Methods	Analysis Workshop	A method for analysing insights.	Frame Insights
101 Design Methods	Asymmetric Clustering Matrix	A method for using a matrix to capture relationships between entities, services, etc. And other attributes.	Frame Insights
101 Design Methods	Behavioural Prototype	A method for generating research data by prototyping interactions.	Explore Concepts
101 Design Methods	Buzz Reports	A method for creating a central repository of latest information.	Sense Intent
101 Design Methods	Compelling Experience Map	A tool for capturing a user experience.	Frame Insights
101 Design Methods	Competencies Plan	Advice on creating a competencies map for a strategy.	Realize Offerings
101 Design Methods	Competitors-Complementors Map	A tool for visualizing the market landscape along 2-dimensions.	Know Context
101 Design Methods	Concept Catalogue	A method for organizing a large number of concepts in a catalogue.	Explore Concepts
101 Design Methods	Concept Evaluation	A method for evaluating concepts based on some attributes, like user value and business value.	Frame Solutions
101 Design Methods	Concept Grouping Matrix	A method for clustering concepts based on a symmetric matrix.	Explore Concepts
101 Design Methods	Concept Metaphors and Analogies	A method for stimulating ideas by using metaphors and analogies.	Explore Concepts
101 Design Methods	Concept Prototype	A method for getting early feedback on an idea.	Explore Concepts
101 Design Methods	Concept Scenarios	A method for capturing a description of a service (storyboarding)	Explore Concepts
101 Design Methods	Concept Sketch	A method for generating insights related to a product idea.	Explore Concepts
101 Design Methods	Concept Sorting	A method for organizing a large number of concepts with a number of people.	Explore Concepts
101 Design Methods	Concept-Generating Matrix	A method for generating concepts from different factors, by forcing the intersection between the factors.	Explore Concepts
101 Design Methods	Concept-Linking Map	A method for creating solutions based on concepts evaluated using 2 attributes like user value and business value.	Frame Solutions

Source	Tools/Method	Description	Phase
101 Design Methods	Contextual Research Plan	A planning method for doing research (a project plan)	Know Context
101 Design Methods	Convergence Map	A Venn diagram of different innovations on topics to spot intersection.	Sense Intent
101 Design Methods	Cultural Artifacts	A method for stimulating user data generation by using a cultural probe package.	Know People
101 Design Methods	Descriptive Value Web	A tool for capturing value networks within a system.	Frame Insights
101 Design Methods	Design Brief/Intent Statement	A tool for presenting intent.	Sense Intent
101 Design Methods	Design Principles Generation	A method for mapping insights to design principles (clustered to ~3)	Frame Insights
101 Design Methods	Entities Position Map	A method for using a 2x2 matrix to map entities against 2 attributes.	Frame Insights
101 Design Methods	ERAF Systems Diagram	A tool for capturing the entities, relations, attributes and flows within a system.	Frame Insights
101 Design Methods	Eras Map	A tool for presenting how things change over time.	Know Context
101 Design Methods	Ethnographic Interview	A method for gaining qualitative data through interviewing.	Know People
101 Design Methods	Experience Simulation	A method for generating research data by prototyping interactions.	Know People
101 Design Methods	Field Activity	A method for generating research data by prototyping interactions in the field.	Know People
101 Design Methods	Field Visit	A method for gaining insight from a field visit.	Know People
101 Design Methods	Financial Profile	A method for approaching a company's situation.	Know Context
101 Design Methods	Five Human Factors	A tool for describing user experiences (Physical, Cognitive, Social, Cultural, Emotional).	Know People
101 Design Methods	Foresight Scenario	A tool for creating solutions based on 2x2 matrix of future scenarios, concepts mapped to scenarios, and linked to form solutions.	Frame Solutions
101 Design Methods	From ... To Exploration	A method for tabulating trends.	Sense Intent
101 Design Methods	Ideation Game	A method for generating concepts by playing a tailor-made game.	Explore Concepts
101 Design Methods	Ideation Session	Advice on how to run an ideation workshop to generate potential concepts.	Explore Concepts
101 Design Methods	Image Sorting	A method for gaining qualitative data while interviewing.	Know People
101 Design Methods	Implementation Plan	Advice on creating an implementation plan for a strategy.	Realize Offerings

Source	Tools/Method	Description	Phase
101 Design Methods	Industry Diagnostics	A tool for capturing the industry drivers.	Know Context
101 Design Methods	Initial Opportunity Map	A tool for capturing potential areas of opportunity along 2 dimensions.	Sense Intent
101 Design Methods	Innovation Brief	Advice on crafting a communication strategy.	Realize Offerings
101 Design Methods	Innovation Evolution Map	A method for presenting how innovations impact a company over time.	Know Context
101 Design Methods	Innovation Landscape	A method for representing the innovation trends over time in an industry.	Sense Intent
101 Design Methods	Innovation Sourcebook	A method for structuring research information.	Sense Intent
101 Design Methods	Insights Clustering Matrix	A method of using a symmetric matrix to capture relationships between insights.	Frame Insights
101 Design Methods	Insights Sorting	Advice on clustering insights from a collection of insights.	Frame Insights
101 Design Methods	Interest Groups Discussion	A guide for a group interview/forum discussion.	Know Context
101 Design Methods	Journey Mapping	A tool for capturing a user's journey through a service experience.	Frame Insights
101 Design Methods	Key Facts	A way for organizing research information.	Sense Intent
101 Design Methods	Keyword Bibliometrics	Advice on how to do a keyword-based literature search.	Sense Intent
101 Design Methods	Morphological Synthesis	A method for form solutions from concepts and user-focused categories.	Frame Solutions
101 Design Methods	Observations to Insights	Advice on extracting insights from observations.	Frame Insights
101 Design Methods	Offering-Activity-Culture Map	A mapping tool for capturing the context of a design element.	Sense Intent
101 Design Methods	Opportunity Mind Map	A tool for capturing opportunities around a single topic.	Explore Concepts
101 Design Methods	Pilot Development and Testing	A method to get feedback about a more refined concept.	Realize Offerings
101 Design Methods	Platform Plan	A method for investigating a platform solution strategy.	Realize Offerings
101 Design Methods	POEMS	A tool for describing user experiences (People, Objects, Environments, Messages, Services).	Know People
101 Design Methods	Popular Media Scan	Advice on how to create a popular media report.	Sense Intent
101 Design Methods	Popular Media Search	A method for generating a research report.	Know Context

Source	Tools/Method	Description	Phase
101 Design Methods	Prescriptive Value Web	A tool for capturing value networks within a future system.	Frame Solutions
101 Design Methods	Principles to Opportunities	A tool for moving from insights to principles to single, system, and strategic opportunities.	Explore Concepts
101 Design Methods	Publications Research	A method for doing literature research (tip: rate sources)	Know Context
101 Design Methods	Puppet Scenario	A method for engaging users to generate concepts by getting them to design and play out scenarios with puppets.	Explore Concepts
101 Design Methods	Remote Research	A method for generating research data by auto-ethnography by users.	Know People
101 Design Methods	Research Participant Map	A tool for grouping participants based on a 2x2 matrix.	Know People
101 Design Methods	Research Planning Survey	A method for identifying user groups for research.	Know People
101 Design Methods	Role-Play Ideation	A method for concepts by prototyping stakeholder interactions.	Explore Concepts
101 Design Methods	Semantic Profile	A method for display how different entities (products, services, activities, brands, user groups) compare.	Frame Insights
101 Design Methods	Solution Database	A method for archiving and organizing solutions in a database.	Frame Solutions
101 Design Methods	Solution Diagramming	Advice on how to diagram a future solution.	Frame Solutions
101 Design Methods	Solution Enactment	A method to validate a service by prototyping and getting feedback.	Frame Solutions
101 Design Methods	Solution Evaluation	A method for evaluating solutions based on some attributes, like user value and business value.	Frame Solutions
101 Design Methods	Solution Prototype	A method for gaining insight about a solution by providing a prototype.	Frame Solutions
101 Design Methods	Solution Roadmap	A method for describing how a solution will be delivered.	Frame Solutions
101 Design Methods	Solution Storyboard	A tool for capturing a description of a service.	Frame Solutions
101 Design Methods	Strategy Plan Workshop	Advice on how to have a workshop to create strategies.	Realize Offerings
101 Design Methods	Strategy Roadmap	A tool for capturing strategy development over time.	Realize Offerings
101 Design Methods	Subject Matter Experts Interview	A guide for a subject matter expert interview (similar to Trend Expert)	Know Context
101 Design Methods	Summary Framework	A method for summarizing findings (a table with Methods, Findings, Insights, Design Principle columns)	Frame Insights
101 Design Methods	SWOT Analysis	A tool for capturing issues related to a project.	Know Context

Source	Tools/Method	Description	Phase
101 Design Methods	Symmetric Clustering Matrix	A method for using a matrix to capture relationships between entities, services, etc.	Frame Insights
101 Design Methods	Synthesis Workshop	Advice on how to have a workshop to create solutions.	Frame Solutions
101 Design Methods	Team Formation Plan	Advice on using a matrix to guide team formation for an initiative.	Realize Offerings
101 Design Methods	Ten Types of Innovation Diagnostics	A tool for using the ten innovations to gain insights.	Know Context
101 Design Methods	Ten Types of Innovation Framework	A method for working out what innovations are involved in an industry.	Sense Intent
101 Design Methods	Tree/Semi-Lattice Diagramming	A method for presenting different entities using levels, and trees (strict hierarchy) and semi-lattices (non-strict hierarchy)	Frame Insights
101 Design Methods	Trends Expert Interview	Advice on how best to interview a trend expert to get a broad view.	Sense Intent
101 Design Methods	Trends Matrix	A format for capturing trends along different dimensions.	Sense Intent
101 Design Methods	User Groups Definition	A method for using a 2x2 to define 4 different user groups according to 2 attribute dimensions.	Frame Insights
101 Design Methods	User Observation Database Queries	Advice on using a user observation database to trend insights.	Frame Insights
101 Design Methods	User Observations Database	A method of collating a large number of research inputs.	Know People
101 Design Methods	User Persona's	A tool for presenting the results of user research by creating a model of a user.	Explore Concepts
101 Design Methods	User Pictures Interview	A method for gaining qualitative data through interviewing, with user pictures (POEMS as a guide)	Know People
101 Design Methods	User Research Plan	Advice on planning user research - create a plan.	Know People
101 Design Methods	User Response Analysis	A method for visualizing user responses.	Frame Insights
101 Design Methods	Value Hypothesis	A tool for generating elevator pitches around opportunities (users, needs, offering, benefits, competitors).	Explore Concepts
101 Design Methods	Venn Diagramming	A method for showing overlapping clusters.	Frame Insights
101 Design Methods	Video Ethnography	A method for gaining insights from video.	Know People
101 Design Methods	Vision Statement	Advice on crafting a vision statement.	Realize Offerings
Business Model Canvas	Business Model Canvas	A tool to communicate the value of the service to stakeholders.	Definition

Source	Tools/Method	Description	Phase
Design council	Brainstorm	A method to generate a large number of ideas	Define
Design council	Business Model Canvas	A tool to communicate the value of the service to stakeholders.	Develop
Design council	Design Brief/Intent Statement	The Design Brief forms a core reference point for all stakeholders in the Develop and Deliver phases of the design process. Captures the challenge	Define
Design council	Design Scenarios	A method to capture a shared understanding of a service and for describing a specific use	Deliver
Design council	Experience Prototyping	The idea of designing the touchpoints and simulating the service.	Develop
Design council	Journey Mapping	A tool for capturing a user's journey through a service experience	Discover
Design council	Service Blueprint	Describe how the service is delivered.	Develop
Design council	Service Safari	A method of capturing a user's experience	Discover
Design council	User Diary	A method of capturing a user's experience	Discover
Design council	User Persona's	A tool for presenting the results of user research by creating a model of a user.	Define
Design council	User Shadowing	A method of capturing a user's experience	Discover
Designing for Growth	Assumption Testing	A method for testing assumptions that form the basis for an idea	What wows?
Designing for Growth	Brainstorming	A method for generating a large number of ideas.	What if?
Designing for Growth	Concept Development	A method for generating concepts from a large number of ideas.	What if?
Designing for Growth	Create a Pitch/Napkin Pitch	A tool for capturing the sales pitch for a service.	What wows?
Designing for Growth	Customer Co-creation	A method for getting feedback from customers.	What works?
Designing for Growth	Design Brief/Intent Statement	The Design Brief forms a core reference point for all stakeholders in the Develop and Deliver phases of the design process. Captures the challenge	What is?
Designing for Growth	Design Criteria	A tool for capturing key design criteria.	What if?
Designing for Growth	Journey Mapping	A tool to capture a user's flow through and around a service.	What is?
Designing for Growth	Learning Guide	A tool to capture the learning goals from a prototype/pilot service.	What works?
Designing for Growth	Learning Launch	A method for testing a product in the marketplace, i.e., a pilot.	What works?

Source	Tools/Method	Description	Phase
Designing for Growth	Mind mapping	A method of collating a large number of inputs.	What is?
Designing for Growth	Rapid Prototyping	A method for generating insights related to a product idea (within this method there are various types of prototypes, including storyboarding)	What wows?
Designing for Growth	Value Chain Analysis	A tool to capture the ecosystem around an existing or future service.	What is?
Designing for Growth	Visualization	A general method for capturing ideas visually.	What is?
Open Space Technologies	Meeting facilitation	A lightweight method for organizing meetings with diverse interests.	Action
The Field Guide to Human-Centered Design	Analogous Inspiration	Looking for analogies for inspiration.	Inspiration
The Field Guide to Human-Centered Design	Brainstorm	A method for generating a large number of ideas.	Ideation
The Field Guide to Human-Centered Design	Brainstorm Rules	Rules for brainstorming.	Ideation
The Field Guide to Human-Centered Design	Build a Team	Capture the structure of the team	Inspiration
The Field Guide to Human-Centered Design	Build Partnerships	A method for identifying potential partners.	Implementation
The Field Guide to Human-Centered Design	Bundle Ideas	A way of combining ideas.	Ideation
The Field Guide to Human-Centered Design	Card Sort	An interview tool	Inspiration
The Field Guide to Human-Centered Design	Co-Creation Session	A method to include stakeholder input into an idea.	Ideation
The Field Guide to Human-Centered Design	Collage	An interview like technique, users generate collages	Inspiration
The Field Guide to Human-Centered Design	Conversation Starters	An interviewing tool	Inspiration
The Field Guide to Human-Centered Design	Create a Concept	A method for combining ideas into a concept.	Ideation
The Field Guide to Human-Centered Design	Create a Project Plan	Draft an initial project plan with dates	Inspiration
The Field Guide to Human-Centered Design	Create Frameworks	A group of tools (journey map, relational map, 2x2 matrix) for capturing ideas.	Ideation
The Field Guide to Human-Centered Design	Define Success	A method for capturing how to define milestones for service concept.	Implementation
The Field Guide to Human-Centered Design	Define Your Audience	More information about interviewing	Inspiration
The Field Guide to Human-Centered Design	Design Principles	A method for capturing the key elements in a design.	Ideation
The Field Guide to Human-Centered Design	Determine What to Prototype	A method of prototyping cheaply to check an idea.	Ideation

Source	Tools/Method	Description	Phase
The Field Guide to Human-Centered Design	Download Your Learnings	A method of sharing information	Ideation
The Field Guide to Human-Centered Design	Draw It	An interview technique, get people to draw the topic	Inspiration
The Field Guide to Human-Centered Design	Expert Interview	An expert interview versus an individual interview	Inspiration
The Field Guide to Human-Centered Design	Explore Your Hunch	A method for exploring a hunch cheaply.	Ideation
The Field Guide to Human-Centered Design	Extremes and Mainstreams	Guide to who to interview	Inspiration
The Field Guide to Human-Centered Design	Find Themes	A method of analysing information (affinity clustering)	Ideation
The Field Guide to Human-Centered Design	Funding Strategy	A method to discuss the funding of a project.	Implementation
The Field Guide to Human-Centered Design	Get Feedback	A method to get feedback.	Ideation
The Field Guide to Human-Centered Design	Get Visual	A way of presenting ideas to people.	Ideation
The Field Guide to Human-Centered Design	Group Interview	A group interview versus an individual interview	Inspiration
The Field Guide to Human-Centered Design	Guided Tour	Service Safari like technique	Inspiration
The Field Guide to Human-Centered Design	Gut Check	A method to pre-validate an idea by checking it.	Ideation
The Field Guide to Human-Centered Design	Immersion	Another method for getting insights, like service safari	Inspiration
The Field Guide to Human-Centered Design	Integrate Feedback and Iterate	A method to incorporate feedback and get more.	Ideation
The Field Guide to Human-Centered Design	Keep Getting Feedback	A method for getting more feedback about the service.	Implementation
The Field Guide to Human-Centered Design	Keep Iterating	A method for refining the concept.	Implementation
The Field Guide to Human-Centered Design	Live Prototyping	A method to validate a service by prototyping and getting feedback.	Implementation
The Field Guide to Human-Centered Design	Mash-Ups	A method for adding features to an existing idea.	Ideation
The Field Guide to Human-Centered Design	Monitor and Evaluate	A method for working out what to monitor and how (both quantitative and qualitative).	Implementation
The Field Guide to Human-Centered Design	Peers Observing Peers	A user diary technique, where users record themselves	Inspiration
The Field Guide to Human-Centered Design	Pilot	A method to get feedback about a more refined concept.	Implementation
The Field Guide to Human-Centered Design	Rapid Prototyping	A method for gaining insight about early idea.	Ideation

Source	Tools/Method	Description	Phase
The Field Guide to Human-Centered Design	Recruiting Tools	Capture who you need to talk to get the necessary input	Inspiration
The Field Guide to Human-Centered Design	Roadmap	A method to capture how a service will be launched.	Implementation
The Field Guide to Human-Centered Design	Role Playing	A tool for capturing a service experience.	Ideation
The Field Guide to Human-Centered Design	Secondary Research	Capture what background research is needed.	Inspiration
The Field Guide to Human-Centered Design	Share Inspiring Stories	A method of sharing information	Ideation
The Field Guide to Human-Centered Design	Staff Your Project	A method to discuss the staffing of the project.	Implementation
The Field Guide to Human-Centered Design	Sustainable Revenue	A method for working out where funding comes from in the long term.	Implementation
The Field Guide to Human-Centered Design	Top Five	A method of classifying important stories (everybody chooses 5)	Ideation
The Field Guide to Human-Centered Design	Business Model Canvas	A tool to communicate the value of the service to stakeholders.	Ideation
The Field Guide to Human-Centered Design	Create a Pitch/Napkin Pitch	A tool for capture the sales pitch for a service.	Implementation
The Field Guide to Human-Centered Design	Create Insight Statements	A template for capturing insights based on themes.	Ideation
The Field Guide to Human-Centered Design	Frame Your Design Challenge	A template for capturing an initial design challenge	Inspiration
The Field Guide to Human-Centered Design	How Might We	A tool for mapping insights to "How might we?" questions.	Ideation
The Field Guide to Human-Centered Design	Interview	An Interview guide	Inspiration
The Field Guide to Human-Centered Design	Resource Assessment	A tool for capturing how a service will be supported by the organization.	Implementation
The Field Guide to Human-Centered Design	Resource Flow	An input-output diagram for resources	Inspiration
The Field Guide to Human-Centered Design	Storyboard	A tool for capturing a description of a service.	Ideation
The Field Guide to Human-Centered Design	Ways to Grow Framework	A 2x2 matrix for analysing a service.	Implementation
This is Service Design Doing	Adding depth and diversity: Bodystorming	A method for generating ideas for a physical service.	Ideation
This is Service Design Doing	Adding depth and diversity: Ideation based on analogies and association	A method for stimulating ideas by creating analogies.	Ideation

Source	Tools/Method	Description	Phase
This is Service Design Doing	Adding depth and diversity: Using cards and checklists	A method for stimulating ideas by introducing randomness, or alternate structure.	Ideation
This is Service Design Doing	Building a research wall	A method for presenting research material to help find patterns.	Research
This is Service Design Doing	Business Model Canvas	A tool to communicate the value of the service to stakeholders.	Prototyping
This is Service Design Doing	Co-creative workshop: Creating personas	A method for generating user personas.	Research
This is Service Design Doing	Co-creative workshop: Journey mapping	A method for generating user journeys.	Research
This is Service Design Doing	Co-creative workshop: System mapping	A method for generating system maps.	Research
This is Service Design Doing	Compiling research reports	A method for structuring user research.	Research
This is Service Design Doing	Desk research: Preparatory research	A method for finding good questions.	Research
This is Service Design Doing	Desk research: Secondary research	A method for gaining background information in a report or mind map.	Research
This is Service Design Doing	Developing key insights	A tool for capturing insights, similar to Customer Insight Statements, but customer focused	Research
This is Service Design Doing	General methods: Mood boards	A method for generating insights related to a product idea.	Prototyping
This is Service Design Doing	General methods: Sketching	A method for generating insights related to a product idea.	Prototyping
This is Service Design Doing	General methods: Wizard of Oz approaches	A method for generating insights related to a product idea.	Prototyping
This is Service Design Doing	Generating jobs-to-be-done insights	A simple tool to capture jobs to be done.	Research
This is Service Design Doing	Generating many ideas: 10 plus 10	A method for generating a large number of ideas.	Ideation
This is Service Design Doing	Generating many ideas: Brainstorming	A method for generating a large number of ideas.	Ideation
This is Service Design Doing	Generating many ideas: Brainwriting	A method for generating a large number of ideas.	Ideation
This is Service Design Doing	How Might We	A tool for capturing design goals based on insights and how might we improve the situation.	Ideation
This is Service Design Doing	Journey Mapping	A tool for capturing a user's journey through a service experience.	Research
This is Service Design Doing	Journey Mapping	A tool for capturing the future/desired user journey.	Ideation
This is Service Design Doing	Mapping systems	A tool for capturing relations between stakeholders or systems.	Research

Source	Tools/Method	Description	Phase
This is Service Design Doing	Non-participant approaches: Cultural probes	A method for stimulating user data generation by using a cultural probe package.	Research
This is Service Design Doing	Non-participant approaches: Mobile ethnography	A method for generating qualitative data from users' actions recorded online.	Research
This is Service Design Doing	Non-participant approaches: Non-participant observation	A method for gaining understanding of a user's actions or inactions.	Research
This is Service Design Doing	Participant approaches: Contextual interview	A method for gaining qualitative data through interviewing.	Research
This is Service Design Doing	Participant approaches: Focus groups	A method for gaining qualitative data through group interviewing.	Research
This is Service Design Doing	Participant approaches: In-depth interview	A method for gaining qualitative data through interviewing.	Research
This is Service Design Doing	Participant approaches: Participant observation	A method for gaining understanding of a user's perspective, user shadowing.	Research
This is Service Design Doing	Pre-ideation: Slicing the elephant and splitting the ideation challenge	A method for simplifying user research according to different characteristics, like attributes, 5whys, 5whys+how, 6 thinking hats (AESEO)	Ideation
This is Service Design Doing	Prototyping digital artifacts and software: Interactive click modelling	A method for generating insights related to a product idea.	Prototyping
This is Service Design Doing	Prototyping digital artifacts and software: Paper prototyping	A method for generating insights related to a product idea.	Prototyping
This is Service Design Doing	Prototyping digital artifacts and software: Rehearsing digital services	A tool for generating insights related to a product idea.	Prototyping
This is Service Design Doing	Prototyping digital artifacts and software: Wireframing	A method for generating insights related to a product idea.	Prototyping
This is Service Design Doing	Prototyping ecosystems and business value: Desktop system mapping (aka Business Origami)	A method for generating insights related to a product idea.	Prototyping
This is Service Design Doing	Prototyping ecosystems and business value: Service advertisement	A method for generating insights related to a product idea.	Prototyping
This is Service Design Doing	Prototyping physical objects and environments: Cardboard prototyping	A method for getting early feedback on an idea.	Prototyping
This is Service Design Doing	Prototyping service processes and experiences: Desktop walkthrough	A tool for capturing a user's journey through a service.	Prototyping
This is Service Design Doing	Prototyping service processes and experiences: Investigative rehearsal	A method for generating research data by prototyping interactions.	Prototyping
This is Service Design Doing	Prototyping service processes and experiences: Subtext	A method for generating research data by prototyping interactions.	Prototyping

Source	Tools/Method	Description	Phase
This is Service Design Doing	Reducing options: Physical commitment	A method for rating ideas based on physical difference.	Ideation
This is Service Design Doing	Reducing options: Quick voting methods	A method for rating ideas (dot-voting and nose-voting)	Ideation
This is Service Design Doing	Self-ethnographic approaches: Auto-ethnography	A method for gaining qualitative data, includes service safari.	Research
This is Service Design Doing	Self-ethnographic approaches: Online ethnography	A method for gaining qualitative data, includes service safari, user diaries.	Research
This is Service Design Doing	Service Blueprint	Describe how the service is delivered.	Research
This is Service Design Doing	System mapping	A tool for capturing the future system map (stakeholder, value network, ecosystem)	Ideation
This is Service Design Doing	Understanding, clustering, and ranking options: Benny Hill sorting ("Thirty-Five")	A method for rating ideas.	Ideation
This is Service Design Doing	Understanding, clustering, and ranking options: Decision matrix	A multiple criteria method for rating ideas.	Ideation
This is Service Design Doing	Understanding, clustering, and ranking options: Idea portfolio	A tool for clustering ideas based on some attributes, like impact and feasibility.	Ideation
This is Service Design Doing	Understanding, clustering, and ranking options: Octopus clustering	A method for organizing a large number of ideas with a number of people.	Ideation
This is Service Design Doing	User Persona's	A tool for capturing and summarizing user perspectives.	Research
This is Service Design Doing	Writing user stories	A tool to capture a user's needs.	Research
Value Proposition	Value Proposition Canvas	A tool to communicate the value of the service to stakeholders.	Definition
Visual Thinking	Causal Mapping (Oval)	A method for mapping relationships between ideas. Can you used to clarify ideas, so could apply to all. Used here for Working Model because of previous research.	