

User participation in innovation platforms: empirical studies and a tool to design for motivation

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Declaration of Authorship

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Signed:

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Date:

Abstract

User participation in company's innovation processes is an efficient way for companies to receive customer feedback and it is associated with value for customer-company relationship and for company's innovation. Innovation platforms host web-based user participation in firms' innovation processes and show a positive effect on service innovation practices, while increasing the competitive advantage of firms.

The aim of this thesis is to explore the user participation in firm-initiated innovation platforms, in order to reach a better understanding of how companies can benefit from the adoption of innovation platforms. This thesis employs a multidisciplinary view in innovation platforms, where empirical studies in the field of service innovation, human-computer interaction and design-thinking, discuss how the user participation is supported in the design of innovation platforms, with platform characteristics, motivation factors and design tools. Four case studies with business partners and two evaluation studies supported this thesis to build on the role and characteristics of innovation platforms in companies, why and how users interact and contribute to innovation platforms, and how tools support the design of motivational systems.

The thesis findings advance the knowledge in innovation platforms and its use in companies, making three contributions. First, the innovation platforms are underscored as tools that can be used in service innovation processes while their role is much broader than an idea gathering tool for the fuzzy front-end of innovation. Second, user participation in innovation platforms involves motivation factors and trust, many interaction and contribution types with varied quality of contribution, as well as ethical issues. Third, design for enhancing user participation and motivation in such platforms can be achieved by using structured and artefact-based tools that support the early design phases, in multidisciplinary teams.

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List of publications

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2. Dimitra Chasanidou, Amela Karahasanovic, and Marika Lüders. *Introducing Open Service Innovation Platforms: A Case Study*. ISPIM Conference Proceedings - The International Society for Professional Innovation Management (ISPIM). Lappeenranta University of Technology Press, 2014, pp. 1–8.
3. Dimitra Chasanidou and Amela Karahasanovic. *Co-creation for Innovation: Why Do Customers Get Involved?* In M. Lüders, T. Andreassen, S. Clatworthy, T. Hillestad (Eds.), *Innovating for Trust*, chapter 18. Edward Edgar Publishing, 2017, pp. 275–292.
4. Dimitra Chasanidou, Njål Sivertstøl, and Jarle Hildrum. *Understanding Employee Interactions and Contributions in a Firm-hosted Innovation Community*. Creativity and Innovation Management, John Wiley & Sons Inc., 2018 (submitted).
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7. Dimitra Chasanidou. *Design for Motivation: Evaluation of a Design Tool*. Multimodal Technologies and Interaction, MDPI Publishing, 2018, 2(1):6.

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Part I

Overview

Introduction

User involvement in innovation is frequently practised in companies, for product development, marketing, management, and many other purposes [8, 185, 133]. The user participation in the company's innovation processes is associated with economic value as it provides an efficient way for companies to receive customer feedback (e.g. [85]), value for companies in building relationships with the customers (e.g. [77]), value related to innovation and development where companies could better understand the needs of the consumers (e.g. [108, 121, 81, 150, 133]).

The users' participation in companies' innovation processes is achieved with the adoption of information technology platforms that have positive effect on service innovation practices and increase the competitive advantage of companies [32, 62]. In the last decade, various types of innovation platforms received increased recognition as a promising means for innovation and collaboration [103, 191, 189], including crowdsourcing (e.g. [64]), open innovation platforms (e.g. [62]), and innovation contests (e.g. [1]). The adoption of innovation platforms results in several advantages for both companies and users, for example ideation in a collaborative and interactive way, development of networks around innovation ideas, strategic assets that provide external expertise, generate ideas and support innovation development, as well as rewards for idea implementation [43, 191, 94, 13, 12, 4]. Therefore, the adoption of innovation platforms requires integration at several levels in the organisation and numerous decisions in platform's design, for example user activities and user engagement mechanisms [74, 10], decisions on idea management [95, 175], and rules of user participation [49, 73, 86].

Innovation platforms are utilised along with several other tools and methods in companies' innovation processes [147, 65], such as knowledge management [95, 175], business innovation management [161, 142], service innovation [15, 35], design and creativity [165, 28], co-creation techniques and traditional market research techniques [193]. However, the methods and tools alone do not assure the success of innovation processes, but they are only enabling factors for the creation of strategies, reasoning, insights and communication [95, 161]. Additionally, innovation platforms are typically built on voluntary participation [50, 4, 42, 79]. Thus, innovation management in companies started to stress the principles of user motivation why would users come and use the innovation platform and why would they contribute [4].

User motivation and motivation mechanisms is a key research issue for innovation platforms. User participation motives were studied by extant research in innovation and co-creation communities [75, 103, 81, 78, 55, 135, 136, 112, 20, 106, 74, 10, 21], while user participation can be further analysed in terms of quality of user interactions and contributions. Prior studies examined both qualitative and quantitative metrics of user participation, like novelty of ideas, number of submitted ideas per user and ratings from other users [100, 16, 79, 195, 97]. Unlike other online communities, user participation in innovation platforms may be generally associated with commercial interest of the host company, thus trust and ethical issues may rise. Prior studies investigated trust in online communities, showing that trust has a significant effect on relationship commitment while the antecedents of trust, such as the shared value, communication, opportunistic behaviour, speed of response and reputation, play a major role [153, 132, 6, 86]. Furthermore, the extant literature on user motivation assumes a symbiotic relationship between the firm and contributors, thus research on user misbehaviour, for example potential negative experiences, is limited [73]. Studies revealed that users in innovation platforms have fairness expectations, negative reactions and general dissatisfaction that could trigger dysfunctional user behaviour [124, 80, 49, 50, 73, 86], while the nature of participation rules and how actors may interface them can affect the extent of service innovation [118].

Additionally, user participation and user motivation can be treated as a design problem. Design for motivation was introduced as “a design practice focused on the activation of human motives, with short or long-term effects, to perform an action” [29]. Despite many existing design approaches and tools have been introduced, a number of design challenges limited the systematic development of motivational systems [162, 130, 29]. Some of the challenges refer to the inconsistent connection of motivation theories with practice [139, 162] and the lack of creativity when design motivational systems with the limited exploration and implementation of games elements across domain [5, 107, 162]. Suggestions in the literature points to design directions for the development process of motivational systems, such as a team-based activity and multidisciplinary view [152, 173, 113], the use of artefacts [56, 152, 22, 111, 116, 35, 113], the use of a user-centred approach [158, 162], and the structured, step-wise design approaches [114, 34].

This thesis addresses the above mentioned problems for innovation platforms by employing a multidisciplinary view and combining findings from the field of service innovation, human-computer interaction and design- thinking to reach a better understanding of how user participation could be supported in the design of innovation platforms. First, the main definitions of the thesis are analysed below.

1.1 Main definitions and focus area

This section introduces the main definitions of this thesis, with related work and clarifications on the definitions that are adopted here. The focus area of the thesis (Figure 1.2) and a table with definitions (Table 1.1) are presented at the end of this section.

1.1.1 The concept of innovation and innovation platforms

Using the keyword “innovation” in an unrestricted search of academic publications produces thousands of articles in various disciplines, such as organisation studies [84, 39], innovation and entrepreneurship [24, 160, 54], business and management [44, 7], economics [31, 115], marketing [14, 166], knowledge management [54, 175], technology science and engineering [68, 167, 72]. The existing definitions of innovation focus on attributes, dimensions and determinants of innovation; for example, the stage of innovation process (i.e. ideation, project definition, problem solving, development, and commercialization [39]), the level of analysis (industry, organization, or subunit [88]), and the type of innovation (product/process, incremental/radical, and administrative/technical [9]). The variety of definitions reveals the multidimensional nature of the term. From a systems thinking approach, innovation is defined as “the creation of new products, processes, knowledge or services by using new or existing scientific or technological knowledge, which provide a degree of novelty either to the developer, the industrial sector, the nation or the world and succeed in the marketplace” [83](p.1223). From an organisational perspective, innovation is described as a process and as an outcome, having three innovation determinants namely the leadership, managerial levels and business processes [39]. Literature reviews and meta-analyses provide an overview of innovation types and different levels of analysis (e.g. [9, 39]).

In this thesis, we adopt a multi-disciplinary definition that emphasises on the innovation as a multi-stage organisational process “whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace” [9]. The definition was suggested after reviewing 60 definitions of innovation from various disciplines [9].

Organisations employ various tools and methods to manage the multi-stage process of innovation. In the fuzzy front-end of this process, innovation platforms is a viable approach for companies to use as a source of innovation involving internal or external users [96, 102]. Innovation platforms consist of several common features, such as: (a) the initiator that could be a company, a public or non-profit organization or an individual; (b) the topic of innovation, which is described with high or low topic specificity by the initiator; (c) the purpose of innovation which refers to user activities, like problem-solving, idea generation, and co creation; (d) a user group that is invited to contribute (e.g. anyone, customers, employees); (e) an interaction and communication web-based space,

meaning the platforms with various design features and f) a desired outcome, which could be ideas, sketches, concepts, prototypes or finished solutions.

The above characteristics formulate various types of innovation platforms, such as open innovation platforms, crowdsourcing platforms, and organisational innovation platforms among other types. For instance, crowdsourcing platforms emphasize on a broad user group of innovators and they could be defined as “a type of participative online activity in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task [...]” [64](p. 197). In open innovation, a rather general definition states that “an open innovation platform is defined as a virtual environment that offers digital services, with the aim to allow the creation of innovations by facilitating time- and location-independent, voluntary interaction of innovators.” [93](p. 22). It is important to note that the use of the term “platform” has a broader meaning than the “physical components, tools and rules” [18], thus the term “community” has been used alternatively. One example is given by the definition for organisational innovation community which identifies four community characteristics: (a) a shared purpose to search, select and develop innovations in line with an organisation’s strategic objectives; (b) membership limited to employees of a specific organisation; (c) interaction and communication of members that primarily takes place on platforms; and (d) the lack of sustained and ongoing mutual relationships, as well as mutual interdependence, as prerequisites [7](p.44). This description emphasizes on innovation not as a process carried out by single individuals, but rather as a social and communicative process [94].

In the thesis’ papers, different terms for innovation platforms were adopted to reflect the company’s view and my understanding to the thesis’ focus. For example, open service innovation platforms (Paper 2, Chapter 9), crowdsourcing platforms (Paper 3, Chapter 10) and organisational innovation communities (Paper 4, Chapter 11) have the same functional characteristics, while the differences in these terms reflect mainly the differences in submission periods and user groups. In this thesis, we adopt the term “innovation platforms” which embeds the above mentioned sub-categories. The focus is on the firm-initiated innovation platforms that encompass online and/or offline connections of users, while the user interactions and communications are hosted on a web-based platform (Figure 1.1). Users could be either employees within firms’ boundaries or external users, like customers. The purpose of innovation concerns mainly the idea generation or co-creation regarding a firm-related topic of innovation. The outcome is usually ideas or concepts for firms’ service innovation process.

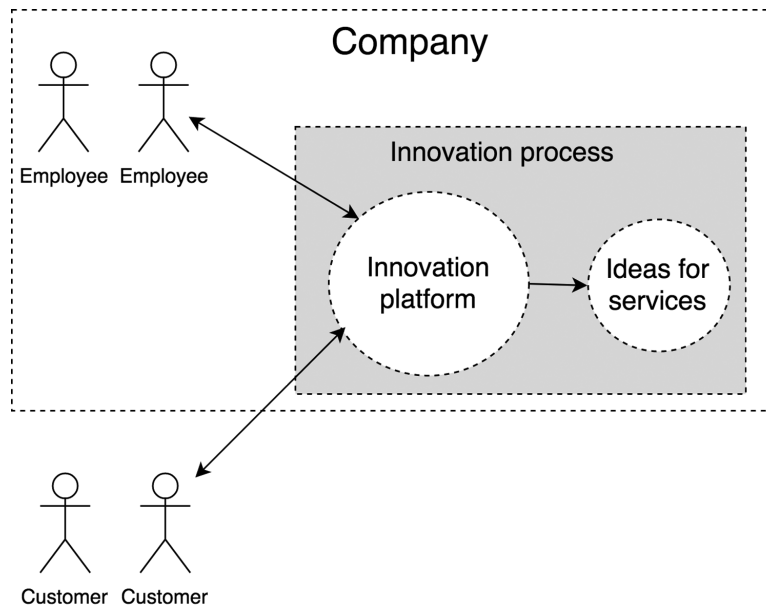


Figure 1.1: Conceptualisation of the innovation platform, in the context of a company's innovation process.

1.1.2 The concept of service and service innovation

The service concept has, traditionally focused on the nature of service performance, activities, processes, and interactions for a specific group of market offerings labelled as “services” [192, 178, 59]. Scholars defined the concept of service in various disciplines to describe and analysed a range of service characteristics (e.g. intangibility, inseparability, heterogeneity, perishability), service dimensions (activities, interactions, solutions), or other service quality factors in specific contexts [91, 57, 59, 151]. A literature review in service definitions identified two main approaches within service research: service as a category of market offerings and service as a perspective on value creation [59]. A definition refers to services as “the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself” [177, 178](p.2). Another definition refers to the service concept “as an activity or series of activities of a more or less intangible nature that normally, but not necessarily, take place in the interaction between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems” [90]. However, it was found the definitions of service are too narrow and the characteristics are outdated as generic service characteristics [59]. In this thesis, the term “service” is used as a perspective on value creation to describe who is portraying the service through the platform and the purpose [59]. The focus is on value through the lens of the users (customers, employees and other parties) who utilise a company's innovation platform and portray the service, describing the service characteristics that are important for them.

1. INTRODUCTION

Furthermore, it is important to explain the term of “service innovation” which has been given with several definitions and interpretations, yet the core concept remains vague and dispersed [194]. Systematic reviews of existing research on service innovation makes a contribution to understanding what a service innovation is [144, 25, 194]. Service innovation refer to the “offering not previously available to the firm’s customers—either an addition to the current service mix or a change in the service delivery process—that requires modifications in the sets of competences applied by service providers and/or customers” [140]. Additionally, service innovation can be defined as “the creation of new value propositions by means of developing existing or creating new practices and/or resources, or by means of integrating practices and resources in new ways.”[166](p.137). This definition is also adopted in this thesis. This perspective implies a value proposition as a platform for value co-creation in the customer context and that both product and process can be part of the value proposition offered to customers as a service innovation [166]. Theories and methods of service innovation in this perspective depart from a service logic [128, 194].

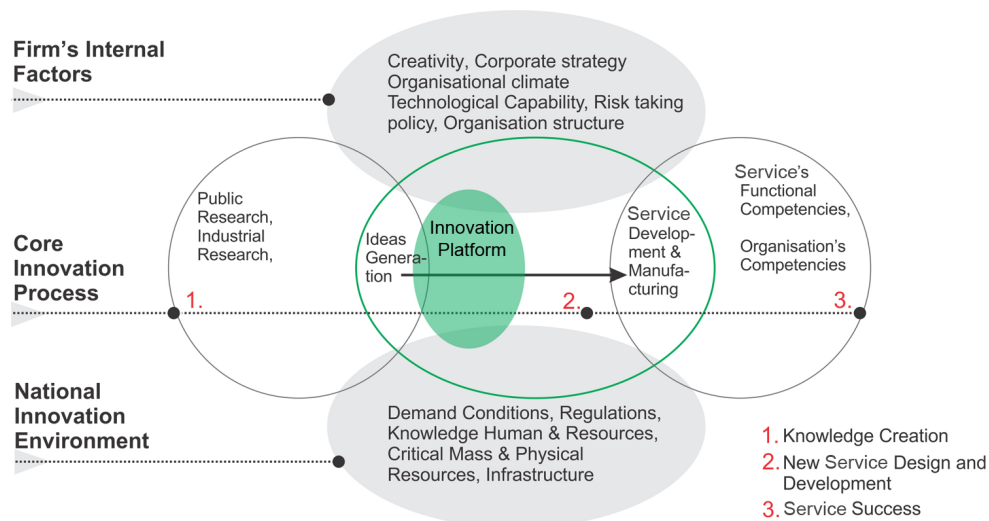


Figure 1.2: Conceptualisation of the service innovation process, based on [83]. The focus area of the thesis is on the fuzzy front-end.

To conceptualize the service innovation process, we employed the concept of “creative factory” [83] to describe an innovation process with a systems thinking approach (Figure 1.2). The concept consists of three main parts: the firm’s internal factors, the core innovation process and the innovation environment. This concept has the company in the centre (represented with green line), as it is the generator and promoter of innovations in the market. The innovation process is affected by internal factors of the firm as well as by other external factors, like the national innovation environment. The concept includes all aspects

that need to be considered around innovation activity, meaning the academia, a firm and the policy making bodies. The focus area of this thesis is the company's innovation process (represented with green circle), starting from the idea generation phase until the selection phase, without including the development phase. Primarily, the focus is on the fuzzy front-end of the innovation process, which includes part of company's internal and external factors.

Table 1.1 presents an overview of the definitions that are adopted in this thesis.

Term	Definition of this thesis	Reference
Innovation	<i>A multi-stage process whereby organizations transform ideas into new/ improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace.</i>	[9]
Innovation platform	<i>A firm-initiated, web-based innovation platform that encompasses online and/ or offline connections of users (employees, customers, other companies). The purpose of innovation concerns mainly the idea generation or co-creation regarding a firm-related topic of innovation. The outcome is usually ideas or concepts for firms' service innovation process.</i>	[93], [64], [7]
Service	<i>It is used as a perspective on value creation to describe who is portraying the service through the platform and the purpose. The focus is on value through the lens of the users (customers, employees and other parties) who utilise a company's innovation platform and portray the service, describing the service characteristics that are important for them.</i>	[59]
Service innovation	<i>The creation of new value propositions by means of developing existing or creating new practices and/or resources, or by means of integrating practices and resources in new ways.</i>	[166]
(Service) innovation process	<i>The process of creation of new value propositions by means of developing existing or creating new practices and/or resources, or by means of integrating practices and resources in new ways</i>	[166]

Table 1.1: Summary of definitions of this thesis.

1.2 Objective and research questions

The thesis explores the issue of user participation in innovation platforms by employing a multidisciplinary view: an organisational, a user and a design perspective (Figure 2.1). On the one hand, companies utilise several systems for innovation management and they are challenged to integrate the innovation platforms efficiently in their service innovation processes. On the other hand, these platforms need increased user participation to be efficient. Triggers for user participation, like motivation factors, have still unclear impact in innovation platforms, while design approaches could support to embed those triggers in innovation platforms.

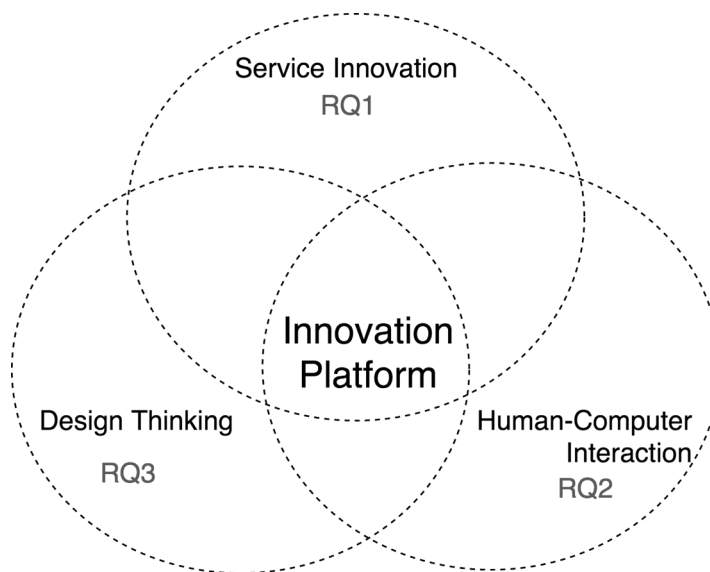


Figure 1.3: Theoretical disciplines of the thesis.

It is still unclear how user participation can be better supported in the design of innovation platforms in order to be an effective tool for companies and users. Therefore, the objective of the thesis is set up as follows:

How can companies benefit from innovation platforms?

By addressing the issue of user participation in firm-initiated innovation platforms, four case studies with business partners, and two evaluation studies were organised to answer the main research question. Three questions are formulated to explain better the main research question (Table 1.2).

RQ1: What is the role and characteristics of innovation platforms in companies?

The first research question explores the organisational perspective when an innovation platform is adopted by a company. First, the service innovation process is explored and the role of the tools, like innovation platforms, to enable such processes. Second, the focus is on the innovation platforms and on the

characteristics, like manager's requirements, needs, and selection criteria that are needed to facilitate service innovation processes.

RQ2: Why and how users interact with and contribute to innovation platforms?

The second research question explores the user perspective of two user groups, customers and employees, based on their interactions and experiences with innovation platforms. First, the relationship between customers' motivation and trust to participate in a company's innovation platform is examined. Second, the employees' interactions and contributions are explored in an organisational innovation platform. Third, ethical issues of user participation are explored in regards of how they are addressed in the design of innovation platforms.

RQ3: How tools can support the design of motivational systems?

The third research question explores the design perspective of innovation platforms, in terms of developing motivational mechanisms for both companies and users. First, a design tool is introduced for early-stage development of motivational systems, followed by a usability evaluation. Second, the focus is on the exploration of the design process. A second evaluation of the tool-mediated process provides an in-depth understanding of the development of motivational systems.

Research Question	Objective	Paper
RQ1: What is the role and characteristics of innovation platforms in companies?	<ul style="list-style-type: none">• explore the service innovation processes and the role of the methods and tools• explore organizational selection criteria, requirements and needs, in relation with innovation platforms	Paper 1 (Chapter 8) Paper 2 (Chapter 9)
RQ2: Why and how users interact and contribute to innovation platforms?	<ul style="list-style-type: none">• explain the relationship between customers' motivation and trust to participate in a company's innovation platform• explore employees' interactions and contributions in a company's innovation platform• explore how user participation rules and other ethical issues are addressed in the design of innovation platforms	Paper 3 (Chapter 10) Paper 4 (Chapter 11) Paper 5 (Chapter 12)
RQ3: How tools support the design of motivational systems?	<ul style="list-style-type: none">• introduce and evaluate a tool to design motivational systems• provide an in-depth understanding of the tool-mediated design process for creating motivational systems	Paper 6 (Chapter 13) Paper 7 (Chapter 14)

Table 1.2: Research questions of the thesis.

1.3 Thesis contributions

This thesis provides three main contributions. First, it presents empirical studies in innovation management process and tools in firms. Second, it presents empirical studies in user participation factors and user behaviour in innovation platforms. Third, it contributes with a novel design tool for developing motivational systems, designed exclusively for innovation platforms, as well as

it provides empirical studies in evaluation. In detail, the contributions of this thesis are listed below:

1. It identifies the organisational service innovation processes and the role of the methods and tools in this process, according to various innovation phases (Paper 1, Chapter 8).
2. It identifies the characteristics for adoption of innovation platforms, meaning the decision criteria, requirements and needs of organisation (Paper 2, Chapter 9).
3. It examines the user participation and the relation of motivational factors and trust in innovation platforms (Paper 3, Chapter 10).
4. It examines the nature of user interactions and contributions in innovation platforms, as well as the user roles, and suggests evaluation metrics for user interactions (Paper 4, Chapter 11).
5. It identifies the ethical issues in design of innovation platforms and presents design suggestions for involving users in innovation platforms (Paper 5, Chapter 12).
6. It presents and evaluates a novel design tool which supports the design of motivational systems (Paper 6, Chapter 13).
7. It examines the design process for developing motivational systems with the suggested design tool, within multidisciplinary teams (Paper 7, Chapter 14).

Figure 1.4 presents the contributions of the thesis according to the multidisciplinary view on innovation platforms.

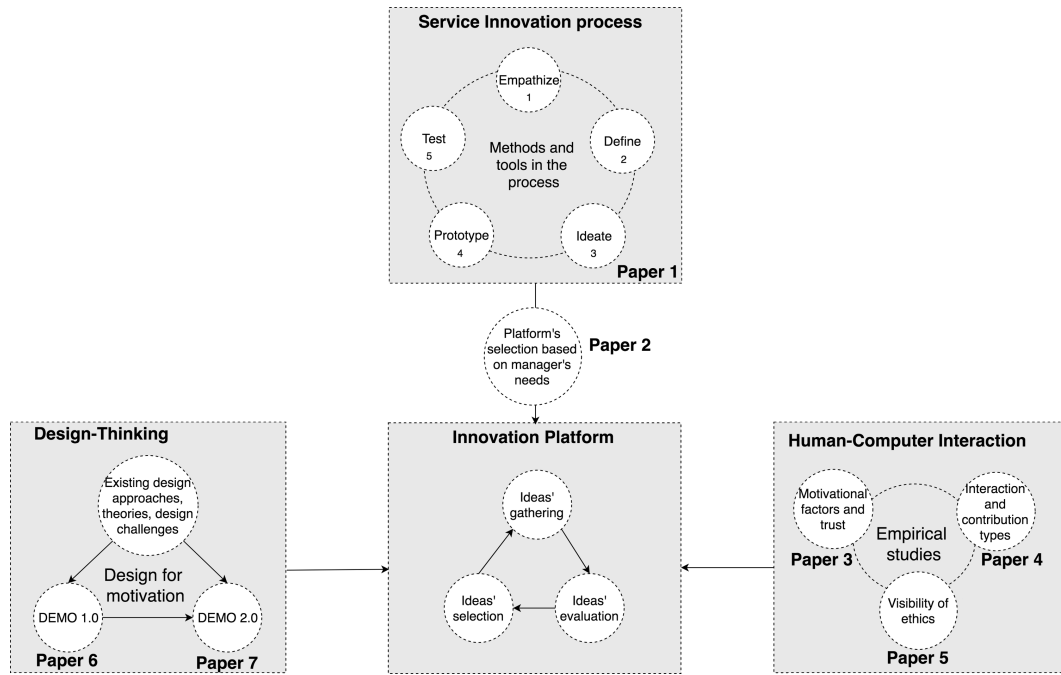


Figure 1.4: Overview of thesis' contributions.

1.4 Research setting

This research is part of a research project of Center for Service Innovation (CSI)¹. CSI is a Norwegian Center for Research-based innovation, funded by the Research Council of Norway (RCN) and it is a coordinated effort by the Norwegian School of Economics (NHH) to focus on the innovation challenges facing the service sector. Research and business partners of CSI participated in this research, in various studies that is described in detail below. Business partners who adopted innovation platforms as part of their service innovation processes, were invited to study the effect of innovation platforms. Large companies with long experience in innovation management, great capacity to absorb innovation practices, and companies that had employed an innovation platform, were included in the study. The collaboration with companies and their innovation platforms started from the beginning of this thesis and lasted until the end. Employees at companies who were affiliated with CSI were involved at several meetings in order to discuss our goals and study perspectives. Given the fact that innovation processes vary in companies, for instance in terms of project duration or processing time of ideas, different partners were involved in research to ensure rich results. Having the main focus in studying the fuzzy front-end of the innovation processes in companies, user participation in innovation platforms was examined in several research settings.

¹Website: csi.nhh.no

1.5 Thesis overview

This thesis is based on a collection of seven papers and it is structured into two main parts. Part I is the introductory part, which explains the background work and the thesis contributions. Part II includes the collection of the papers. The introductory part is organised into the following chapters:

- Chapter 1: Introduction provides an overview of this thesis, presents the research questions, the contributions and important definitions of this thesis.
- Chapter 2: Theoretical perspectives provide a conceptual framework to explain how the thesis is examined according to three perspectives with corresponding related work.
- Chapter 3: Research method presents the context, the epistemological assumptions and the detailed methods of each study.
- Chapter 4: Findings include the main results of each study, organised based on the research questions.
- Chapter 5: Discussion presents the main contributions and the study implications, with limitations of this thesis.
- Chapter 6: Conclusion provides the concluding remarks of the thesis, with future research directions.

Theoretical Perspectives

This section presents the theoretical disciplines and perspectives that have been adopted in this thesis along with related work. Figure 2.1 presents the focus of the thesis that is on innovation platforms and three theoretical disciplines contribute to its examination. Research questions are addressed from each perspective.

- Service innovation and the Service-Dominant (S-D) logic which examine the organisational perspective,
- Human-computer interaction (HCI) and motivation theories which examine the user perspective, and
- Design thinking (DT) and design science which examine the design perspective.

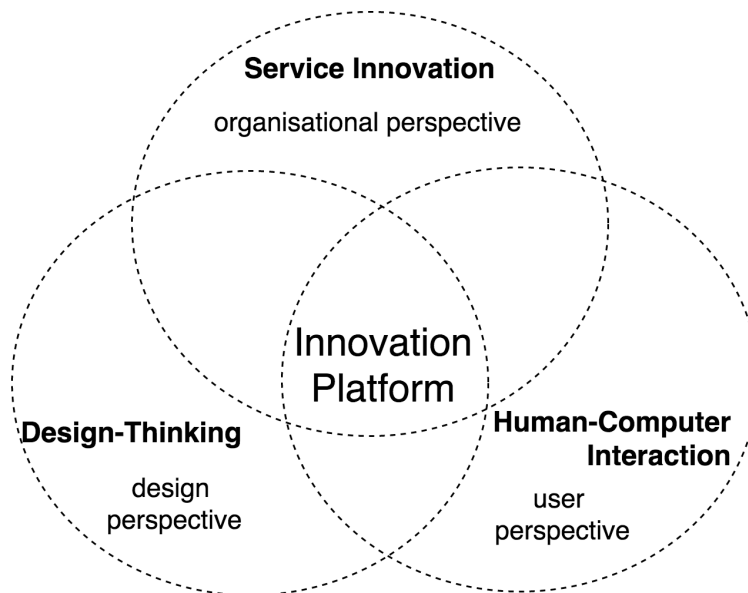


Figure 2.1: Theoretical disciplines of the thesis, with corresponding perspectives.

2.1 Service Innovation: the organisational perspective

The first discipline to examine innovation platforms is service innovation. In this section, the discipline of service innovation is analysed by using the service-dominant (S-D) logic [118] and the S-D logic framework [118], as well as the related work in service design and innovation management. The S-D logic is utilised in the analysis of innovation processes and innovation platforms in companies. More specifically, S-D logic has been applied in the examination of methods and tools in service innovation processes and in the decision criteria, requirements and needs for innovation platforms. The S-D logic framework helps in explaining both the organisational and user perspective.

2.1.1 Service-Dominant logic and framework

The S-D logic is based on an understanding of the individuals and organizations, brought together into networks and societies, while the S-D logic recognises the firm and its exchange partners who are engaged in the co-creation of value through reciprocal service provision [119]. The S-D logic is philosophically grounded in a commitment to collaborative processes with customers, partners, and employees and challenges management at all levels in order to be of service to all the stakeholders. In S-D logic, the customer is seen as an operant resource – a resource that is capable of acting on other resources, a collaborative partner who co-creates value with the firm [177].

The S-D logic framework [118] is utilised to conceptualize service innovation in organisations that operate innovation platforms. The framework consists of three elements: the service ecosystem, the service platform, and the value cocreation. First, the service ecosystem refers to the conceptualization of service innovation as being embedded in an actor-to actor network. The second element of the framework is the service platform, meaning a modular structure that consists of tangible and intangible components and facilitates the interaction of actors and resources. The third element, the value cocreation, refers to the processes and activities that underlie resource integration and incorporate different actor roles in the service ecosystem.

In this thesis, the S-D logic and framework are utilised to examine the service innovation processes and innovation platforms in companies, as well as the user participation in those processes and platforms. Drawing on S-D logic, the service innovation processes in companies facilitate a common environment for creating innovations by diverse actors such as employees, customers, or any other interacting party within the organisation. In innovation platforms, many actors interact with each other, submit ideas, seek or discover novel solutions; this resource exchanges may lead to innovative solutions for the organisation. S-D logic emphasises that all actors integrate various types of resources to create value. Innovations could be cocreated by the organisation and the diverse

actors (e.g. customers, employees) or among actors. For example, customers utilise the innovation platform as the firm's offering because they view it as an important part of their communication with the organisation and they need or want to integrate this offering with other communication means. Therefore, actors that benefit (e.g. customers) are always part of value cocreation.

In addition, the S-D logic framework is utilised to examine user participation and engagement of actors in innovation platforms. We focus on understanding the architecture of participation that the organisation provides in innovation platforms. This refers to rules and mechanisms that enable participation, collaboration and engage actors in service exchange. In this thesis, we consider how a set of rules brings clarity to service exchange enabled by the innovation platform. The nature of the rules and how actors may interface them can affect the extent of service innovation. In the platform design, if the rules of participation and engagement are clearly specified, the innovation platform will support a greater degree of resource exchanges and serve as a venue for actor interactions and generation of viable solutions.

2.1.2 Innovation management and service design

The related work on the fields of innovation management and service design are relevant to study the innovation processes and platforms. Innovation management requires management of various areas, such as strategy of innovation, leadership and organizational culture, innovation processes and performance measures in an organisation [2, 101]. The adoption of innovation processes in organisations demands effective and timely decisions based on multiple factors [101]. Similarly, the adoption of innovation platforms demands numerous decisions regarding the design and integration of the platform at several levels in the organization - from the strategic level to the operational and actor levels [172]. A major challenge for organizations is to ensure that decisions at each of these levels are made consistently, focused on delivering the correct service to the targeted group [87]. From the service organization's perspective, designing a service means defining an appropriate mix of physical and non-physical components, as the development of an appropriate 'service concept' is a critical stage in service design [60]. Previous studies examined the employment of innovation platforms by analysing: (a) users, like user activities and user engagement mechanisms [10, 74], (b) innovation process and management, like decisions on idea management [95, 175] and rules of participation [49, 86, 73]. Related studies examine the implementation of specific innovation types and platforms. However, a holistic view on the decisions related with innovation platforms, both as a part of innovation process and as a service for innovation, hasn't been discussed in the literature yet.

Additionally, the field of service design is relevant to study the use of innovation platforms in companies. The notion of service design refers to the planning of the service concept, service process, and service system in a manner

that enables the value-in-use of the intended service to be realised [58, 87, 46]. Prior studies underscored the importance of organisation culture to introduce new tools within the organization, the positive performance of co-creation techniques and a strategy for leveraging the added value of networked innovation [161, 95, 193, 117]. In companies, innovation platforms are used together with other tools and methods to enable the user involvement in their innovation processes [147, 65]. Companies utilise various tools to gain user insights and feedback about a service, for example common market research techniques (surveys, in-depth interviews, and focus groups) [180], and methods to engage the user actively in a creative problem-solving, such as the lead user method [184, 120]. Previous work examined methods and tools that support innovation from various perspectives, such as knowledge management [95, 175], business innovation management [161, 142], service innovation [15, 35], design and creativity [165, 28], co-creation techniques and traditional market research techniques [193]. In addition, the focus was on the analysis of a specific tool or phase [95, 15, 142, 35, 28], the analysis of a specific organisational context and company size, i.e. small/medium-sized enterprises [161, 95], the use of the tool from a specific perspective, i.e. managers' [95, 101], or designers' [165, 35] and the tool's evaluation was limited in projects', firms' or business units' performance [161, 95, 101, 175, 193]. However, the methods and tools have been examined with limited view throughout an innovation process, and it is missing a holistic view of the innovation process, as a coherent process, and the use of the tools in that process.

2.2 Human-Computer Interaction: the user perspective

The second discipline to examine innovation platforms is the Human-Computer Interaction (HCI). The discipline of HCI emerged as the primary area within computing-related research and it is positioned among design of novel information, interaction, and communication technology [51, 110, 156, 66]. HCI has been an interdisciplinary area, driven by many related fields like computer science, sociology and anthropology, psychology and industrial design [51, 110, 156]. In this thesis, HCI perspective examines the user interaction and behavior in innovation platforms by utilising motivation theories and related work in user motivation and participation, as well as ethics of user participation.

2.2.1 Motivation theories

"The investment on a web-based open innovation platform is a waste of money if motivation factors are not understood" [4](p.101). Given the importance of user motivation in the related work (e.g. [103, 55, 112, 20]), innovation man-

agement of the platforms needs to stress the principles of user motivation; *why would users come and use the innovation platform and why would they contribute*. In this thesis, the role of motivation theories is explanatory and supports the analysis and understanding of the user behavior in innovation platforms. Two types of user motivation are mainly discussed in the literature: intrinsic and extrinsic. Intrinsic motivation refers to performing an activity for the sake of inherent satisfactions and enjoyment rather than for some separable consequence, while extrinsic motivation refers to a behavior that is driven by external influences and rewards [176, 157]. For instance, user participation in innovation platforms due to fun of the activity or learning from others refer to intrinsic motives, while the use of various types of rewards, such as money, prizes and status, contribute to extrinsically motivated users [157]. Several other categorisations of motivation are utilised in the literature of innovation studies. A spectrum-based approach of motivation theories visualizes the extrinsic motivation with rewards-based theory on the right end, the intrinsic motivation with needs-based theories on the left end, while the social theories are placed in the middle [179]. Rewards-based theories explain the motivation to perform actions or behaviors driven by extrinsic rewards, like expectancy value theory [164], and the needs-based theories, like Maslow's Hierarchy of Needs [123]. Finally, social identity theories refer in general to the problems of an individuals self-definition in a social context [170]. Thus, innovation management needs to stress how users are motivated and enabled to contribute to achieve critical mass and to make the innovation successful.

2.2.2 User motivation, user behaviour and ethics of participation

One important question to raise when developing innovation platforms is what would trigger user participation and contribution. Extant research in innovation and co-creation communities identified a number of participation motives, such as fun, learning, sense of belonging, recognition, monetary rewards, collaboration, peer recognition, and many other [103, 75, 76, 77, 80, 81, 82, 78, 55, 112, 135, 136, 20, 196, 4, 74, 106, 21, 10]. The results show that intrinsic motivation was more important for user participation than extrinsic motivation (e.g. [4, 74]). However, extrinsic and social motivation had a strong effect on the time spent on the platform (e.g. [106]). Several other motivations are relevant for examination in innovation platforms. For example, trust is a significant issue in building long-term relations in online communities, while understanding the mechanisms of trust among community members and in organizations is a prerequisite [6]. Due to the fact that companies may be generally perceived as powerful and wealthy and their commercial interests behind any activity for user involvement may provoke mistrust, companies attempt to harness the motivational power of innovation platforms building trust relations and engage users in service innovation activities [86]. Previous studies investigated trust

in online communities, such as in online banking community [132] and virtual communities [153, 6]. The results showed that trust has a significant effect on relationship commitment while the antecedents of trust, such as the shared value, communication, opportunistic behaviour, speed of response and reputation, play a major role in trust. However, it remains unclear what the relation of the common motivational factors and trust is in innovation platforms.

Another important question to raise refers to the user behaviour in innovation platforms. Prior research in innovation communities and platforms primarily focused on studying individual factors of user behaviour, such as motivation, roles, and personality aspects (e.g. [103, 73, 86, 79, 13]), as well as organisational and contextual factors, like organisational culture, leadership style, and organisational design (e.g. [148, 163, 42, 183, 98]). Furthermore, previous studies examined and measured the quality of user interactions and contributions based on qualitative and quantitative metrics, like novelty of ideas, number of submitted ideas per user and ratings from other users [100, 16, 79, 195, 97]. The study results showed that combined metrics and multi-criteria rating scales outperform solely quantitative or qualitative metrics. Studies also underscore the importance of specific user roles in innovation platforms, like community moderators to ensure a constructive process with the desired outcomes for companies, as well as the importance of feedback provided by community moderators shortly after an idea submission [41, 195, 17]. The latter is positively associated with active participation and longer active participation in community interactions positively benefits the participants. However, it is not clear how the user behaviour and user interactions are related with quality of contributions in innovation platforms.

The extant literature on user motivation assumes a symbiotic relationship between the firm and external contributors, who participate in company's activities, where both parties have largely complementary motives and they are only interested in their own utility [73]. So far, research on co-creation has mostly concentrated on the triggers of a compelling and enjoyable experience and its positive effects. While user motivation and user behaviour have been examined extensively in the literature (e.g. [82]), research on user misbehaviour is limited, such as potential negative experiences and how to deal best with them in innovation platforms. Prior studies showed that users in innovation platforms have fairness expectations, negative reactions and general dissatisfaction that could trigger dysfunctional user behaviour [124, 80, 49, 50, 73, 86]. Rules of participation bring clarity to service exchange enabled by the innovation platform, as well as the nature of the rules and how actors may interface them can affect the extent of service innovation [118]. A general view on what ethics for innovation platforms and rules of participation might encompass is provided by previous studies in related fields, such as organisational innovativeness [154], business ethics [126], ethics for innovation communities and projects [159, 52], and ethics for digital technologies and open source software [89, 71, 89]. This is also reflected in the platform design. If the rules of participation and en-

agement are clearly specified, the platform will support a greater degree of resource exchanges and serve as a venue for user interactions and generation of viable solutions [118]. Furthermore, the visibility as an approach to the issue of ethics has been underscored by studies in related fields, such as social computing information technology and other fields [63, 89, 174, 73, 125]. Studies in addressing ethical issues through design of specific areas (e.g. [45, 26]), as well as studies that focus on particular ethical issues (e.g. [143]), provide limited generalizability to innovation platforms. Although, previous studies focused on examining the user misbehaviour and potential solutions, the research and application in innovation platforms is limited.

2.3 Design-thinking: the design perspective

The third discipline to examine innovation platforms is Design Thinking (DT). DT is described as a multidisciplinary, human-centric innovation approach inspired by the way that designers think and work [104, 149]. This discipline integrates expertise from design, social sciences, engineering, and business, while it integrates human, business and technological factors in problem-forming, -solving, and -design [149]. In this thesis, DT is seen here as a methodology for integrating both company and user perspective, including the technological factors of innovation platforms, in the development of a tool that will help companies to create innovation platforms.

2.3.1 Design science

Design science research is a problem-solving paradigm, having a fundamental principle that the knowledge and understanding of a design problem and its solution are acquired in the building and application of an artifact [122, 182]. Design is both a process (set of activities) and a product (artifact) [186]. In this thesis, both the generation of a product, design tool called DEMO (DEsign for MOtivation), and a process that is supported by the design tool are described. The design tool targets to solve the problem of creating innovation platforms that motivate and trigger user participation. Following the framework from Von Alan et al. [182], the design of the tool was conceptualised in relation with the service ecosystem that is created around an innovation platform and the existing knowledge base, such as previous studies related with the topic. Figure 2.2 presents the service ecosystem with its included entities (on the left), namely users, company, and innovation platform, and, the existing knowledge base (on the right), with related studies. Both the service ecosystem and the the existing knowledge base contributed to the development of the DEMO tool that consists of two iterations. Two versions of the tool were evaluated; one usability evaluation and one evaluation of the design process with the tool. The results from the evaluations could be further used as practical or theoretical considerations for innovation platforms.

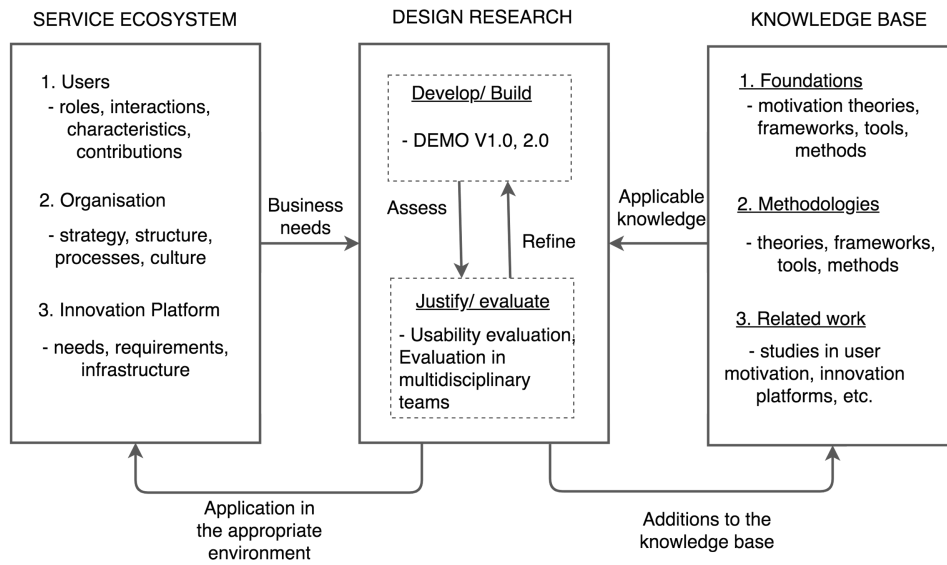


Figure 2.2: Conceptual framework of this thesis' design research.

2.3.2 Design for motivation: design approaches and problems

User motivation is a major issue in platforms with voluntary use, such as innovation platforms [4, 74, 198]. User participation and user motivation can be treated also as a design problem. Design for motivation was introduced as “a design practice focused on the activation of human motives, with short or long-term effects, to perform an action” [29](p.343).

Related fields, such as persuasive design, game design and gamification, present design approaches to support the development of motivational systems. First, persuasive design aims to change users' attitudes or behaviours by applying persuasion and social influence through the design of a technology [69, 70, 181, 188, 139]. The design tools of persuasive technology include the Fogg Behaviour Model (FBM) [69], the framework for Persuasive Systems Design (PSD) [139], and a taxonomy of motivational affordances for the design of persuasive technologies [188]. Second related field is the games that are believed to be capable of changing user behaviour both in the game world and in the real world [181]. A game experience is often conceived with the presence of one or more game elements, such as competition, conflict, rewards, resources, time and levels, that are suggested to be treated as sets of building blocks or features shared by games [48, 181]. Game design uses limited design techniques and tools, meaning design documents and software prototypes as the basic tools for development [3], while one well-known game design tool is the MDA (Mechanics, Dynamics, Aesthetics) framework [99]. The third related field can be found at the intersection of behaviour analysis and game design, which is the widely-used approach of gamification [47]. Gamification is positioned as a “tool that may be used to facilitate extrinsic and intrinsic motivation to accomplish

specific tasks through the selective use of game element” [162](p.20). Gamification elements, like game design elements, have been applied and measured in a broad range of fields, such as marketing, learning and health [109, 127, 162]. Many design tools have been developed for gamification, such as the ‘player centered design’ process [109], the user-centred RECIPE framework [138], the taxonomy for gamification elements [155], the ‘player experience design’ process [23], the “Six D’s” gamification design framework [190], and the method for analysing the effectiveness of gamification [5]. However, the existing design approaches have not been sufficiently explored through applied research and/or evaluated according to usability, performance or other metrics [162, 130, 29].

Furthermore, four main challenges have been discussed in the literature that limit the systematic development of motivational systems [130, 162, 29]. First, the existing tools refer to designers - like game designers, experience designers or similar - as their target group for utilising them [130]. However, the suitability of designers in developing motivational systems has been questioned due to the complexity of the design task, as it requires expertise from diverse areas, acknowledging different aspects of technology [173, 155]. Second, the theoretical foundations of motivation have been interpreted and applied in different ways in the literature [139, 162]. The majority of applied research lacks of theoretical connection and practical use of the existing design approaches in the systems’ design. Moreover, the dialogue with end-users should influence the design process from the beginning. The communication of the developing team with end-users and their involvement is central to the design process [113, 152]. Finally, the design of motivational systems is an activity that designers need to acknowledge, explore and understand as they design things [152]. The challenge in this case is to create dialogue within the design team that differs from a traditional communication process and to use artefacts in a material form, which could influence the way of thinking and acting when designing for motivation [113, 152].

To summarize, key design directions have been suggested point to four design directions. First, given the entanglements of the design problem, the focus has been suggested to be on optimising design as a team-based activity [152, 173, 29, 145]. A multidisciplinary team of professionals, like game developers, experience designers, and psychologists, could argue how design, use and objects are related to create motivational systems [152, 145]. Second, the argumentation through the use of artefacts is suggested as a means of dialogue generation in multidisciplinary teams, beyond traditional communication processes [146, 36, 19, 152]. Third, the use of a user-centered approach ensures that user needs, motivations, and goals are considered from the early design phases [162, 152, 145]. User-centred design could be used to define the area in terms of methods and approaches rather than as a specific kind of design [152]. Lastly, the motivational design process could benefit from structured approaches with steps to guide the design team to a solid outcome [29, 145, 129]. Existing motivation concepts, theories, instruments, design methods, game elements and

2. THEORETICAL PERSPECTIVES

other existing tools should be available to the target group in order to make informed decisions for a commonly agreed outcome [29, 129]. Despite the interest of the research and design communities, these findings haven't been applied to motivational systems' development, according to the suggested directions or problems, as well as the design process haven't been studied in detail.

Research Method

3.1 Research context

This thesis has been conducted in the context of the organisational innovation platforms. We study companies with long experience in innovation management, with great capacity to absorb innovation practices, and companies which have employed an innovation platform. Furthermore, we focus on large companies with large number of employees and customers that would potentially provide rich results. Norwegian companies and collaborators in the CSI fulfilled our criteria. Table 3.1 presents an overview of the research contexts that were utilised to answer the research questions of this thesis, with study details, company names and description of the service sectors. First, the research context is on the service organisation and their innovation platform, where the role in the innovation process and the characteristics of the platform are examined (Paper 1: Chapter 8, Paper 2: Chapter 9). Second, the research context is on the innovation platform where the user interactions and contributions to the platforms are examined (Paper 3: Chapter 10, Paper 4: Chapter 11, Paper 5: Chapter 12). Third, the research context is on the design tools for development of innovation platforms and the way such tools support the design of motivational systems is examined (Paper 6: Chapter 13, Paper 7: Chapter 14).

More specifically, I studied the organisational perspective of innovation platforms, regarding their service innovation process and characteristics of innovation platforms (Paper 1: Chapter 8, Paper 2: Chapter 9). A large company was selected for one case study with embedded units of analysis [197, 168, 11]. The company was selected because of its size, capacity to absorb innovation practices and previous experience with innovation platforms. The company, named Posten, is a mail and logistics company that develops and delivers solutions within postal services, communications and logistics in the Nordic area. The company incorporates two brands, one for the mail services and one for the logistics, while it has over 20.000 employees. Posten embraces various innovation practices and involves customers in innovation activities. At the end of 2013, Posten was piloting an innovation platform only for employees aiming to gather ideas for service innovation processes. Managers who participated in the first case study with embedded units of analysis [197, 168, 11] were experienced in innovation management activities, like implementation, management and testing of the platform, and other innovation activities, such as

3. RESEARCH METHOD

Research Question	Context	Study	Company name	Service sector	Paper
RQ1: What is the role and characteristics of innovation platforms in companies?	Service organisation	Case study 1 (embedded units of analysis)	Posten	Nordic mail and logistics company	Paper 1 Ch. 8
RQ1: What is the role and characteristics of innovation platforms in companies?	Service organisation	Case study 1 (embedded units of analysis)	Posten	Nordic mail and logistics company	Paper 2 Ch. 9
RQ2: Why and how users interact and contribute to innovation platforms?	Innovation platform	Case study 2	DnB	Nordic financial services company	Paper 3 Ch. 10
RQ2: Why and how users interact and contribute to innovation platforms?	Innovation platform	Case study 3	Telenor	Norwegian, multinational telecommunications company	Paper 4 Ch.11
RQ2: Why and how users interact and contribute to innovation platforms?	Innovation platform	Case study 4	e.g. Dell, LEGO, Unilever	Various sectors	Paper 5 Ch.12
RQ3: How tools support the design of motivational systems?	Design of innovation platforms	Design and evaluation study	-	-	Paper 6 Ch.13
RQ3: How tools support the design of motivational systems?	Design of innovation platforms	Design and evaluation study	SINTEF	Research organisation	Paper 7 Ch. 14

Table 3.1: Overview of the research context of the thesis, with study details.

collecting, management and evaluation of ideas. Furthermore, the managers work in different areas, such as business and concept development, corporate strategy, customer-relationship management. Therefore, the multidisciplinary nature of the manager's roles allowed the exploration of various perspectives in innovation processes, such as the managerial, design and technical perspective.

Then, I studied the user perspective of innovation platforms, in terms of user participation, motives, interactions, and contributions. Two large companies were selected for two single cases [197, 168, 11] that employed innovation platforms. The first company, named DnB (Paper 3, Chapter 10), is Norway's largest financial services group and one of the largest in the Nordic region, with approximately 12.000 employees. The company has long experience with innovation practices and platforms. The company launched an innovation platform in 2011 in order to involve customers in ideation for bank's service innovation activities. Customers participated with ideas, comments and votes on the other users' ideas, submitted in the innovation platform. The company allocated human resources for platform's innovation management which has been active throughout these years. The feedback from customers was collected for one case study. The second company, named Telenor (Paper 4, Chapter 11), is a Norwegian and multinational telecommunications company with several departments in Europe and Asia, having 13 business units around the world. The company has long experience in innovation processes and launched an innovation platform in 2014. The purpose was to identify new business propositions that could help the company reach its growth targets in the future. A cross-functional team of managers and employees from various research departments were involved in the innovation management. Employees across the entire company participated and contributed with ideas within a short period of time. Employee' interactions and contributions were collected for the second case study. Furthermore, a third single case study [197, 168, 11] was organised to examine the ethics of user participation in web-based innovation platforms, initiated by large companies (Paper 5, Chapter 12). The study sample was chosen under three criteria: (a) the platform should be available online, (b) active for some time with a large number of users, and (c) it should be initiated by large companies. Ten innovation platforms were selected, supported by the following companies: AkzoNobel, Beiersdorf, BMW, Dell, LEGO, P&G, Philips, Starbucks, Statoil, and Unilever. The purpose of these platforms was to gather ideas for companies' service innovation processes. The rules of user participation and related ethical issues varied in the study sample, as well as the interaction and platform design.

Lastly, I examined the design perspective of innovation platforms and how tools can support the design of motivational platforms. Design science methods were followed with two evaluation studies [122, 182, 110, 156]. First, a design tool called DEMO (DEsign for MOtivation) was developed, according to the existing design challenges and related work (Paper 6, Chapter 13). The first evaluation of the tool was based on groups of experts in the field of HCI,

interaction design and design of information systems. The usability issues of the tool were examined and the suggested modifications led to the next version of the tool. Second, the design process with the DEMO tool was evaluated in an organisational setting (Paper 7, Chapter 14). The evaluation study was based on multidisciplinary teams that utilised the tool to develop an innovation platform for a research organisation, named SINTEF. The evaluation study included people with background in design, management, computer science, psychology, and others, that were found in the literature to be suitable in such cases.

3.2 Epistemological assumptions

I position the research perspective of this thesis and the underlying epistemological assumptions to fit into the interpretive and critical research paradigm. Epistemology refers to the assumptions about knowledge and how it can be obtained' [134]. The underlying assumptions refer to what constitutes 'valid' research and which research methods are appropriate. We follow the classification of underlying research epistemology suggested by Orlikowski and Baroudi [141]: positivist, interpretive and critical. Positivists generally assume that reality is objectively given and can be described by measurable properties which are independent of the observer and his or her instruments, while positivist studies generally attempt to test theory, in an attempt to increase the predictive understanding of phenomena [134]. Furthermore, interpretive researchers assume that access to reality is only through social constructions such as language, consciousness and shared meanings [134]. Finally, critical researchers assume that social reality is historically constituted and that it is produced and reproduced by people, while critical research focuses on the oppositions, conflicts and contradictions in contemporary society [134]. In my thesis, I follow the interpretive paradigm to analyse the company's and user's perspectives on innovation platforms, and the critical paradigm to develop a design tool for creating motivational platforms.

3.3 Research methods

The research method is considered a strategy of inquiry which moves from the underlying philosophical assumptions to research design and data collection [134]. This thesis combines the quantitative and qualitative research work, in a mixed-methods approach [38]. The mixed-methods approach is defined as the research in which the investigator collects and analyses data, integrates the findings and draws inferences using both qualitative and quantitative approaches or methods in a single study [171].

In this thesis, I use primarily qualitative methods [110, 38, 137] to explore the organisational innovation processes and platforms (Paper 1: Chapter 8, Paper

2: Chapter 9), to explore user participation ethics in the design of innovation platforms (Paper 5, Chapter 12) and to evaluate a tool to design motivational systems (Paper 6, Chapter 13). Semi-quantitative methods [92, 137, 110, 38] were used to confirm a hypothesis, to see how users actually behave in innovation platforms and to collect feedback from a large number of users (Paper 3, Chapter 10). Mixed methods approaches [38, 105] were employed to provide an in-depth understanding of the user behavior in innovation platforms (Paper 4, Chapter 11) and the design process of creating motivational systems (Paper 7, Chapter 14).

Although qualitative and quantitative research in information systems follow the social science model of research, research in design and design science follow the engineering model of research [122, 182]. The latter usually involves the design of an artefact. This approach was used in two cases (Paper 6: Chapter 13, Paper 7: Chapter 14).

Table 3.2 presents an overview of the research methods of this thesis, with research questions, epistemological assumptions, type of the studies, objectives, case participants, units of analysis, and corresponding publications. Case studies were used as a method for data collection because the study of the innovation platform cannot be separated from its organisational context, and the effects take time to appear [197, 168, 11]. In total four case studies were organised to answer two research questions, and the last question was addressed following the design research approach [122, 182]. Since the research questions differ in nature, they were addressed with different types of methodological approaches. In the following sections, the study methods for each research question are described in detail.

3. RESEARCH METHOD

RQ	Episte- mology	Type of study	Objective	Case Participant	Unit of analysis	Paper
RQ1	Inter- pretive	Quali- tative	Explore the service innovation processes and the role of the methods and tools	Mail and logistics company	Innovation process	Paper 1 Ch.8
RQ1	Inter- pretive	Quali- tative	Explore the organizational selection criteria, requirements and needs, in relation with innovation platforms	Mail and logistics company	Innovation platform	Paper 2 Ch.9
RQ2	Inter- pretive	Quan- titative	Explain the relationship between customers' motivation and trust to participate in a company's innovation platform	Financial services company	Innovation platform (external)	Paper 3 Ch.10
RQ2	Inter- pretive	Mixed methods	Provide an in-depth understanding of employees' interactions and contributions in a company's innovation platform	Telecom- munications company	Innovation platform (internal)	Paper 4 Ch.11
RQ2	Inter- pretive	Quali- tative	Explore how user participation rules and other ethical issues are addressed in the design of innovation platforms	Large firms	Online innovation platforms	Paper 5 Ch.12
RQ3	Critical	Quali- tative	Develop and evaluate a tool to design motivational systems	HCI/ usability experts	Design tool	Paper 6 Ch.13
RQ3	Critical	Mixed methods	Provide an in-depth understanding of the design process, mediated by a tool, for creating motivational systems	Multidi- sciplinary group	Design process with the tool	Paper 7 Ch.14

Table 3.2: Overview of the thesis' research methods, with study details.

3.3.1 RQ1: Case study for the service organisation

RQ1 is exploratory in nature and it was addressed with a qualitative approach. One case study with embedded units of analysis [197, 168, 11] was organised within the mail and logistics company, which was piloting an innovation platform.

First, the unit of analysis was the service innovation process of the organisation that leads to innovations and change (Paper 1, Chapter 8). The aim was to gain a deep understanding of the service innovation process and the role of the methods and tools. The innovation process was further deconstructed to phases, activities and groups of people, while the methods and tools are explained and placed in the innovation process. The study involved three managers who were working with innovation management and innovation processes. The study participants were working in the same projects but had different work positions and roles in the innovation process. The study was conducted in January 2016. The participants were interviewed with semi-structure, recorded interviews that lasted 45min and they were transcribed verbatim [110, 38]. A coding scheme was developed for the data analysis [110, 38, 137] with topics such as definitions and drivers for innovation, innovation process and phases, methods and tools in use, team's structure and roles, as well as involved parties in the process.

In the second study, the unit of analysis was the innovation platform. The aim was to explore organisational selection criteria, requirements and needs (Paper 2, Chapter 9). The study participants were managers who were involved in the innovation management and/or innovation strategy. The case study started with a pilot study in January 2014, where two managers participated in semi-structured interviews [110, 38]. The main study was conducted in March 2014 and six managers were interviewed about their experiences. All interviews lasted approximately 30 minutes, they were recorded and transcribed verbatim [110, 38]. The interview protocol included questions about innovation platform's management and general innovation management, such as previous experiences with innovation platforms, selection criteria, current needs, requirements, as well as general questions about organisational innovation strategy. We used the software NVivo10 to organise the data analysis. A coding scheme was developed for the data analysis with topics inspired by the interview protocol [110, 38, 137]. The data were analysed separately from the previous case.

3.3.2 RQ2: Case studies for the user interaction

RQ2 is explanatory and exploratory in nature. It was addressed with a quantitative, a mixed-methods and a qualitative approach. Three single case studies [197, 168, 11] were organised with different companies. The last case study was treated additionally with a design research approach [122, 182].

3. RESEARCH METHOD

In the first case study the unit of analysis was the user interaction with innovation platform, with the aim to explain the relationship between customers' motivation and trust to participate in a company's external innovation platform (Paper 3, Chapter 10). Furthermore, the user motivation to participate in the innovation platform, trust issues and the general user experience were examined. The study was conducted with a financial services company in the beginning of 2015, and involved registered customers into the platform. A survey was organised and an online questionnaire was sent to all registered customers of the platform [110, 38]. The questionnaire included both open- and close-ended questions (5-item Likert scale) related to their trust, general experience and motivation of participation. In total, 161 customers participated in the study. All constructs were tested in a model with regression analysis [92], while content analysis was used for the qualitative comments [110, 38, 137]. We used the software NVivo10 and SPSS to organise the data analysis.

In the second case study the unit of analysis was the user behavior in innovation platforms. The aim was to explore employees' interactions and contributions in a company's innovation platform (Paper 4, Chapter 11). The user behavior was deconstructed to ideas, replies, and votes. The data from an internal innovation platform, initiated by the telecommunications company during 2014, were used in a mixed-methods study. The choice of this approach serves triangulation reasons to provide corroboration of the findings from qualitative and quantitative data analysis [38, 105]. The submitted 390 posted ideas and 1435 comments from employees were analysed using methods of content analysis [110, 38, 137] and social network analysis [187, 27] to explore the employees' behaviour in the platform. The study followed an across-stage mixed-model design [38, 105] because the mixing of qualitative and quantitative data took place across the stages of the research process. At the last stage of data integration [38, 105], both quantitative and qualitative data were integrated into a coherent diagram to describe the quality of user contributions, based on user interactions.

In the third case study the unit of analysis was the user participation rules in innovation platforms, with the aim to explore how the participation rules and ethical issues are addressed in the design of innovation platforms (Paper 5, Chapter 12). The study started by identifying emerging ethical issues that are addressed in the literature. Then, user participation further was related with specific categories of ethical issues found in the related work. The study was conducted during July of 2015 using ten web-based innovation platforms, initiated by large companies. The user participation in those innovation platforms was analysed according to the ethical issues, following a content analysis method [110, 38, 137]. Lastly, reflections on design of innovation platforms were suggested based on the study results [122, 182] highlighting the topic of the visibility of ethics in innovation platforms.

3.3.3 RQ3: Development and evaluation studies for designing innovation platforms

RQ3 is also exploratory in nature and it was treated with a design research approach, with problem identification, solution design and evaluations [122, 182]. First, the design problem was identified, then a design tool was introduced to fulfil the problem area. The RQ3 was also addressed with two evaluations of the tool [110] with different user groups.

The first study introduced a design tool called DEMO (DEsign for Motivation), after identifying design challenges with the existing tools to develop motivational systems (Paper 6, Chapter 13). The design of the tool followed a design research approach [122, 182] and it was suggested to fulfil the problem area, while it was designed for the development of innovation platforms. To ensure the usability of the tool and to identify potential usability problems, three group-based expert evaluation sessions [110] were conducted during February-March 2016. Nine experts participated in the evaluation with diverse backgrounds, such as HCI, interaction design and design of information systems. The data was analysed using content analysis method [110, 38, 137]. Potential problem areas related to the user experience and design of the tool were considered for the next version of the tool, as design improvements.

The second study was conducted with the aim to provide an in-depth understanding of the design process for creating motivational systems, when the process is mediated by the DEMO (Paper 7, Chapter 14). Following a design research approach [122, 182], the study extends the previous one with additional design challenges related with the design process of motivational systems. Then, the second version of the DEMO tool was introduced for the evaluation study. The study explored the design process, mediated by DEMO, in the context of a firm-initiated innovation platform. The study was conducted during January and February 2017, with 32 participants who were clustered in 7 workshop groups. A mixed-methods approach [38, 105] was employed to evaluate the design process with multidisciplinary teams. The choice of the mixed-methods approach serves triangulation reasons to provide corroboration of the findings from qualitative and quantitative data analysis [38, 105]. Data were collected from various sources, such as questionnaires, interviews, audio- and video-recordings, while data were analysed using three approaches: protocol analysis method [110, 53], grounded theory [37, 169] and content analysis [110, 38, 137]. The study followed an across-stage mixed-model design [38, 105] as the mixing of qualitative and quantitative data took place across the stages of the research process. At the last stage of data integration [38, 105], both quantitative and qualitative data were integrated into a coherent suggestion that corresponds to the aim of the study and the identified design problems.

Table 3.3 presents an overview of the study design for each research question, with research context, type of the study, method for data collection, sample size, method for data analysis and period/date for data collection.

3. RESEARCH METHOD

RQ/ Context	Type of study	Data collection method	Sample size	Data analysis approach	Date
RQ1 Service organisation	Case study 1, Exploratory	Interviews	6 managers	Content analysis, coding scheme	Jan 2014
RQ1 Service or- ganisation	Case study 1, Exploratory	Interviews	3 managers	Content analysis, coding scheme	Jan 2016
RQ2 Innovation platform	Case study 2, Explanatory	Survey, online question- naire	161 customers	Regression analysis, content analysis	Jan 2015
RQ2 Innovation platform	Case study 3 Exploratory	Log files	390 ideas with 1435 comments	Content analysis, social network analysis	Dec 2016
RQ2 Innovation platform	Case study 4 Exploratory	Online data	10 online innovation platforms	Content analysis	Jul 2015
RQ3 Design of innovation platform	Usability study, Exploratory	Group- based expert evaluation	9 experts	Content analysis	Feb- Mar 2016
RQ3 Design of innovation platform	Evaluation study, Exploratory	7 work- shops	32 participants	Protocol analysis method, grounded theory, content analysis	Feb- Mar 2017

Table 3.3: Overview of the thesis' study design.

Chapter 4

Findings

This section summarises the main findings from each study, highlighting the links with existing research. Four case studies and two evaluation studies were carried out to answer three research questions. The results of these studies are reported in detail in the seven papers appended to the thesis:

- RQ1 is answered in Papers 1 (Chapter 8) and Paper 2 (Chapter 9),
- RQ2 is answered in Papers 3 (Chapter 10), Paper 4 (Chapter 11), and Paper 5 (Chapter 12),
- RQ3 is answered in Papers 6 (Chapter 13) and Paper 7 (Chapter 14).

Figure 4.1 presents the thesis' contributions, with corresponding publications.

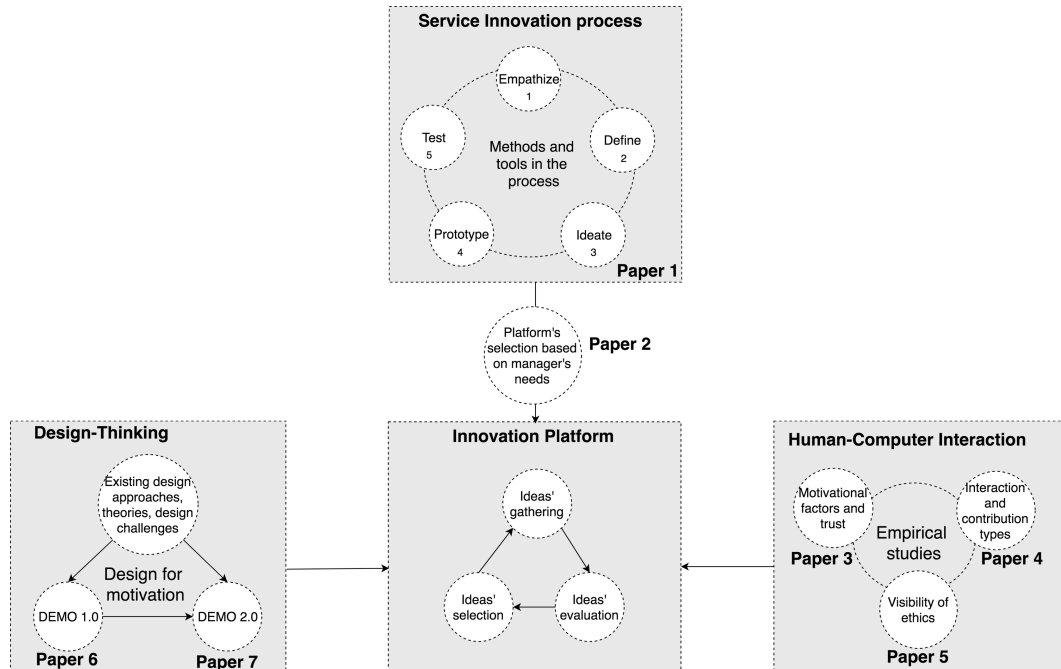


Figure 4.1: Overview of thesis' contributions.

4.1 RQ1- The organisational perspective

First, the innovation process and platform of the mail and logistics company were examined. The use of methods and tools in service innovation process and the decision criteria, requirements and needs for innovation platforms were examined with a holistic perspective.

4.1.1 Methods and tools in organisational innovation process

The empirical study with managers in the mail and logistics company examined the evolution of the organisational innovation processes, as well as the contribution of the methods and tools throughout these processes (Paper 1, Chapter 8). The results showed that methods and tools in innovation processes are characterised by iterative phases and measurable factors. The tools provide support to leaders' decisions and ideas, while the digital mode of tools supports extended collaboration. We mapped the methods and tools according to the innovation phases of the company. It was found that the alignment of the tools with the company's internal innovation processes is critical, while the usefulness of the tools is related with testing in early phases of service development and providing a structured process to innovation. Methods and tools should: a) offer quick and trustworthy results especially in early innovation phases, b) support of both qualitative and quantitative data for multidisciplinary teams depending on the decision processes, c) offer the possibility to be adopted in the short or long development processes, and d) be established in the organisation's culture. Furthermore, two types of innovation, sustaining and disruptive, follow different innovation process and they are supported by different tools. Sustaining innovation is initiated by external ideas, such as customers' ideas either through web-based applications or face-to-face meetings. In disruptive innovation, the ideas come internally from the company, through the innovation platform that gathers employees and other partners ideas. Various methods and tools, such as focus groups, interviews and co-creation workshops, generate value and insights for the innovation processes, however it is believed that the internal innovation platform will lead the innovation process in the future, in terms of gathering, prioritizing and managing ideas for innovation activities.

Our findings extend previous research in the field of innovation management and use of the tools in innovation processes in companies. Our findings contribute to the existing research by identifying the methods and tools in use throughout an innovation process, according to innovation phases and types, as well as user perspective (i.e. design, technical and managerial perspective). Although prior studies examined methods and tools that support innovation processes for knowledge management [95, 175], business innovation management [161, 142], service innovation [35, 15], design and creativity [165, 28], these studies had a limited focus over the entire innovation process. Previously, the focus was on the analysis of a specific tool or phase [95, 15], understanding the use of the tool from a specific perspective, i.e. managers' (e.g. [101]), or designers'

view (e.g. [165]), analysis of a specific organisational context and company size (i.e. small/ medium-sized enterprises [161]), as well as evaluating the impact and benefits of a tool on the projects', firms' or business units' performance (e.g. [193, 101, 175]). Our contribution was to treat innovation process and their corresponding methods and tools as being a coherent process, supported by people with multidisciplinary backgrounds. Furthermore, our findings confirm prior study results first, on the importance of innovation culture when introducing new tools within the organization, and second, on the enabling role of methods and tools for creating strategies, reasoning, insights and communication in companies, although the tools do not assure the success of innovation processes [95, 161].

4.1.2 Organisational requirements for innovation platforms

An innovation platform was examined from the manager's perspectives in the mail and logistics company, within the context of organisational innovation processes (Paper 2, Chapter 9). Our empirical study revealed that the selection criteria for innovation platforms is a combination of organisational, strategic and technical criteria, since the platform is an interrelated part with the entire company's innovation process. The selection of an innovation platform involves managers from various departments who work with innovation activities, such as corporate strategy, customer- relationship management, business and concept development. The selection criteria include mainly technical criteria, like ease of use, cost and security aspects, as well as organisational and strategic criteria, like integration with idea evaluation methods and separation for different user groups. Both short- and long- term perspectives of the innovation platform are reflected in the selection criteria, with cross- platform functionality among other organisational platforms and a community approach to increase user engagement. Managers' goals include the vision to build the organisational culture around the platform and build the company's reputation, with better communication with users and better customer relations. Other goals refer to the implementation of separate innovation platform for internal and external users, with different motivations to various user groups.

Our findings extend previous research in the field of innovation management and highlight the contextual criteria for adoption of innovation platforms. Several empirical studies focused on limited views to employ an innovation platform, for example organisational management decisions (e.g. [67, 40]), decisions related with user engagement in the platform and motivation-related issues for user participation (e.g. [10, 74]), decisions regarding the information technology and specific types of innovation platforms (e.g. [33, 61]). Our study provides a holistic view on the decisions both related with innovation platforms as a service for innovation and as a part of innovation process. Our findings also confirm prior studies regarding the importance of organisation culture around the innovation platform [117, 61], the innovation management and strategy for

leveraging the value of networked innovation.

4.2 RQ2- The user perspective

Second, the user participation in innovation platforms was examined with two user groups- customers and employees. Motivational factors and trust, user interactions and contributions, as well as ethics in user participation present opportunities for involving users in innovation platforms.

4.2.1 Customer participation in innovation platform

The empirical study with the financial services company examined customers' experiences with the innovation platform (Paper 3, Chapter 10). The findings increased our understanding of the relations of trust and motivation with user participation. Specifically, the relations of motivational factors, such as perceived enjoyment, recognition and social presence, and trust dimensions, namely ability, integrity and benevolence, were tested in a model (Figure 4.2). The results showed that trust was more strongly associated with customers behavioural intention to utilize the platform than other motivational factors. Furthermore, perceived enjoyment had a stronger relation with intention to use the platform than social presence. Motivational factors and trustworthiness, as independent variables, and behavioural intention as the dependent variable explained 56 % of the total variance in customers' behavioural intention ($R^2 = 0.558$, $p < 0.001$). Trust emerges as a key factor for establishing customer-company communication in such platforms. Our study showed the firm's ability to handle the innovation platform, its integrity to keep promises, and benevolence to act according to customers' interests significantly influence customers' intentions to use the platform. Customers were primarily intrinsically motivated to contribute with ideas, describing their experience with the platform generally as positive. The positive experience was because of sharing and trying new things, communication with the service provider, making suggestions and attracting attention, having a voice as a customer and watching others ideas. However, customers mentioned as a negative that they received dissatisfactory feedback.

Our findings fill the gap in the literature by examining the relation of motivational factors and trust in the context of innovation platforms. Prior studies examined either motivational factors for user participation, such as fun, learning, monetary rewards, collaboration, peer recognition (e.g. [103, 112, 106, 21, 4]), or trust in online communities, like online banking community [132] and virtual communities [153, 6]. Our results confirm prior studies that intrinsic motivation was more important than extrinsic motivation for user participation (e.g. [106, 4]). Additionally, our findings confirm previous studies where social interaction, shared values and responsiveness from the community found to ensure trust in online platforms (e.g. [132]).

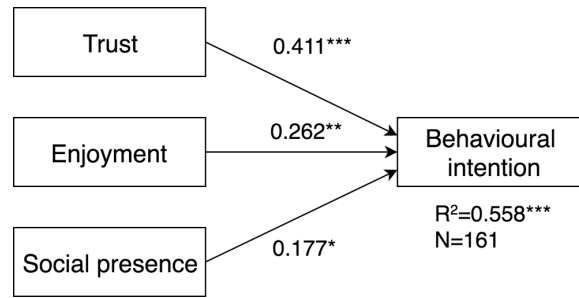


Figure 4.2: Model of motivational factors (enjoyment, social presence) and trust with behavioral intention to participate in innovation platform.

4.2.2 Employee participation in innovation platform

The empirical study with the telecommunications company examined employee participation, meaning the interactions and contributions in their internal innovation platform (Paper 4, Chapter 11). The study findings increased our understanding about the nature of user interactions and contributions, as well as the importance of user roles in innovation platforms. In more detail, the study revealed eleven interaction types, eight contribution types, three collaboration types, and three contribution qualities. The results showed that employees' ideas mainly target to benefit the daily life, they suggest external collaborations and show positive feedback when interacting with other users in innovation platforms. Two user roles were found particularly significant in maintaining interactions and contributions over time: the role of ideas' contributor and the role of community moderator. Both user roles are of high importance to engage and encourage employee participation in innovation platform. Further, we suggest that interaction types affect the idea development with different weights, while the total user interactions in an idea could be used as an evaluation metric for overall contribution quality of the idea. Our suggested types of quality contribution—passive, efficient and balanced contribution—are only indicative of the content of interactions, and they complement other evaluation metrics of the community (Figure 4.3).

Our findings complement and extend existing research in user behavior, evaluation of user interactions and user roles in innovation platforms. Previous research examined individual factors of user behaviour, such as motivation, roles, and personality (e.g. [79, 103, 13]) and measured the quality of user interactions and contributions based on quantitative metrics, such as ratings and votes (e.g. [79, 100, 195]). However, we found that relying only in quantitative metrics of user interactions do not necessarily lead to trustworthy results for a community's contribution quality. Our empirical findings confirm the value of combining qualitative and quantitative methods when exploring user interactions and contributions in innovation communities [94, 100, 79]. Further, our findings fill the gap in the literature by suggesting an evaluation metric of contribution quality for user interactions. Our results also confirm previous find-

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ings on the importance of particular user roles, such as moderators, that ensures a constructive process with the desired outcomes for them and the importance of feedback from moderators (to maintain active and longer participation e.g. [195, 17, 41]).

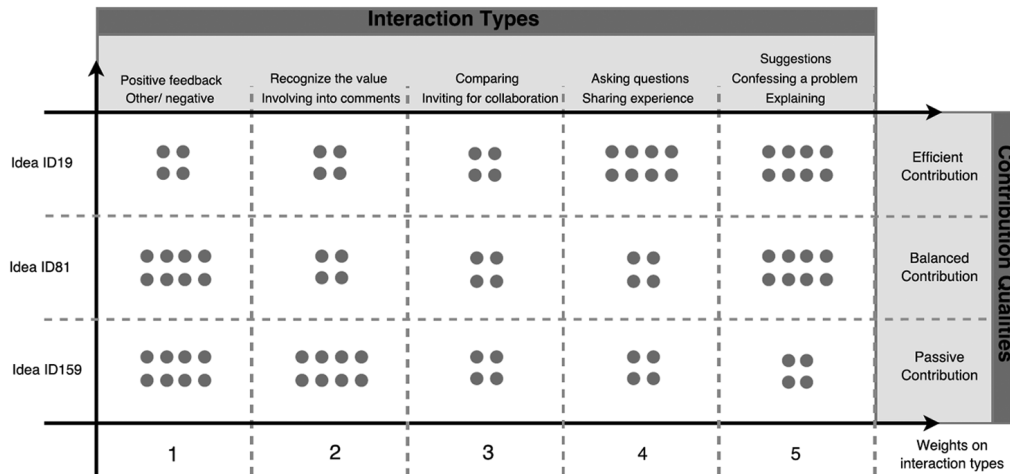


Figure 4.3: Contribution qualities according to weighted interaction types for a sample of ideas.

4.2.3 Ethics for user participation in innovation platforms: addressing the visibility of ethics

The third empirical study examined the design of online innovation platforms, supported by large companies, regarding ethics of participation (Paper 5, Chapter 12). The study findings contribute to a better understanding of the design and ethics of user participation, addressed in innovation platforms. The study revealed four ethical issues that emerged from the literature review as significant: user data protection, user motivation, justification of the company's values, and feedback to users. The term 'visibility of ethics' was coined in this context to describe "the degree to which ethics that are socially significant, is made visible in an innovation platform" [30], where socially-significant ethics can be the common ethics for a company, company associates, and a technology platform. The visibility of ethics in innovation platforms serves to raise awareness of issues important for the fair treatment of users in innovation processes. The results of studying the design of ten online innovation platforms indicate that visibility of ethics can be improved in innovation platforms, in order to better facilitate user participation on a large scale. Finally, we contribute with reflections on design that can help to address the visibility of ethics together with other design guidelines (Table 4.1). We consider design for visibility of ethics a proactive activity and support ethical user treatment and user engagement.

Ethical issues	Design suggestions	Detailed suggestions
User data protection	<i>Clear data protection policies for each process: provide clear and separate data protection policies for the innovation process and for the use of the platforms</i>	<ul style="list-style-type: none"> - Provide the relevant user data protection policies before the idea submission phase - Organize all policy-related links in a separate section - Provide an overview of the data protection document, with titles and subtitles, and provide more details on demand - Highlight the important information through text formatting, such as colour, font size, underlining, etc.
User motivation	<i>Motivations for users: provide clear motivations in the main page for users to participate</i>	<ul style="list-style-type: none"> - Organize a call for innovation - Provide incentive mechanisms, monetary or non-monetary, in a visible position - Provide an easy submission process for users - Gamify the process through the use of various gamification elements
Justification of the companys values	<i>Justify the companys values with innovation: communicate how the companys values and ethics are justified with the innovation process</i>	<ul style="list-style-type: none"> - Organize the companys ethics in a separate section such as company profile, history, vision, or similar - Provide choices for the innovation tasks - Provide an overview of the innovation process, in terms of time, resources, etc. - Provide information on the next phases and communicate the results, such as success stories and implemented products
Feedback to users	<i>Communication with the users: support communication channels with the users</i>	<ul style="list-style-type: none"> - Support user feedback throughout the idea submission process - Keep the user informed about the current state of his/her submissions and the innovation process - Provide communication channels among users, such as contact forms, blogs, discussion communities, or similar - Provide an FAQ section with common user issues

Table 4.1: Suggested design reflections for the visibility of ethics.

Our findings fill the literature gap by examining ethical issues and design of innovation platforms. Our results complement and extend existing research in ethics and design of innovation platforms. Prior studies provided the theoretical background on what ethics in innovation platforms might encompass, such as ethics in organisational innovativeness, innovation communities and digital technologies (e.g. [154, 159, 52, 71, 89]). However, the design studies that address ethical issues provide context-specific results and limited generalizability to innovation platforms (e.g. [26, 45, 143]). Our study also extends the discussion on visibility of ethics from related fields, such as social computing, information technology and other fields [63, 174, 89, 73, 125], and contributes to the application of ethics in designing innovation platform.

4.3 RQ3- The design perspective

Third, a novel design tool for developing motivational systems and its design process were examined. Two evaluation studies support the features of the DEMO tool and its design process, namely the multidisciplinary, artefact-based, user-centred and structured approach, when design for motivation.

4.3.1 Design for motivation: development and evaluation of DEMO 1.0

The study examines a novel tool called DEMO (DEsign for MOtivation) that supports the design of motivational systems (Paper 6, Chapter 13). The findings contribute to a better understanding of how a tool could be used to support the design of motivational systems. Design for motivation refers to the “design practice which is focused on the activation of human motives, with short or long-term effects, to perform an action” [29] in a specific context. The DEMO tool is theoretically grounded in motivation theories and based on existing game-like approaches for the development of motivational concepts, while it has been developed specifically for innovation platforms. The tool incorporates gamification, design elements, and it supports multidisciplinary teams (Figure 4.4). The usability evaluation with the tool showed that the concept of motivation is abstract and complex and it creates significant room for misunderstanding. The participants evaluated the tool as ‘flexible’, meaning that it encourages creativity and discussion around motivation. The DEMO tool was found useful to guide the design process, to generate ideas and discussions in short time, in early design phases. The overall user experience with the tool was evaluated as positive.

Our study fills the literature gap by developing a design tool for motivation, according to the design directions from the literature, as well as by studying its usability problems. Previous studies in related fields, such as in persuasive design (e.g. [70, 181, 188]), game design (e.g. [131, 190]) and gamification (e.g. [47, 109, 127]) identified design problems and suggested design tools for the

development of motivational systems. However, these tools lack of theoretical grounding on existing design problems, and/or evaluation according to usability, performance or other metrics. The development and usability evaluation of DEMO reveals additional design problems and challenges when using tools to design for motivation. Furthermore, the DEMO's process of describing the target users, the aim of the design, the targeted experience as well as the user motivations, seems a coherent and explicit design process to follow. Given the entanglements of the design problems, the individual design activity has been suggested to move to a team-based and structured activity.

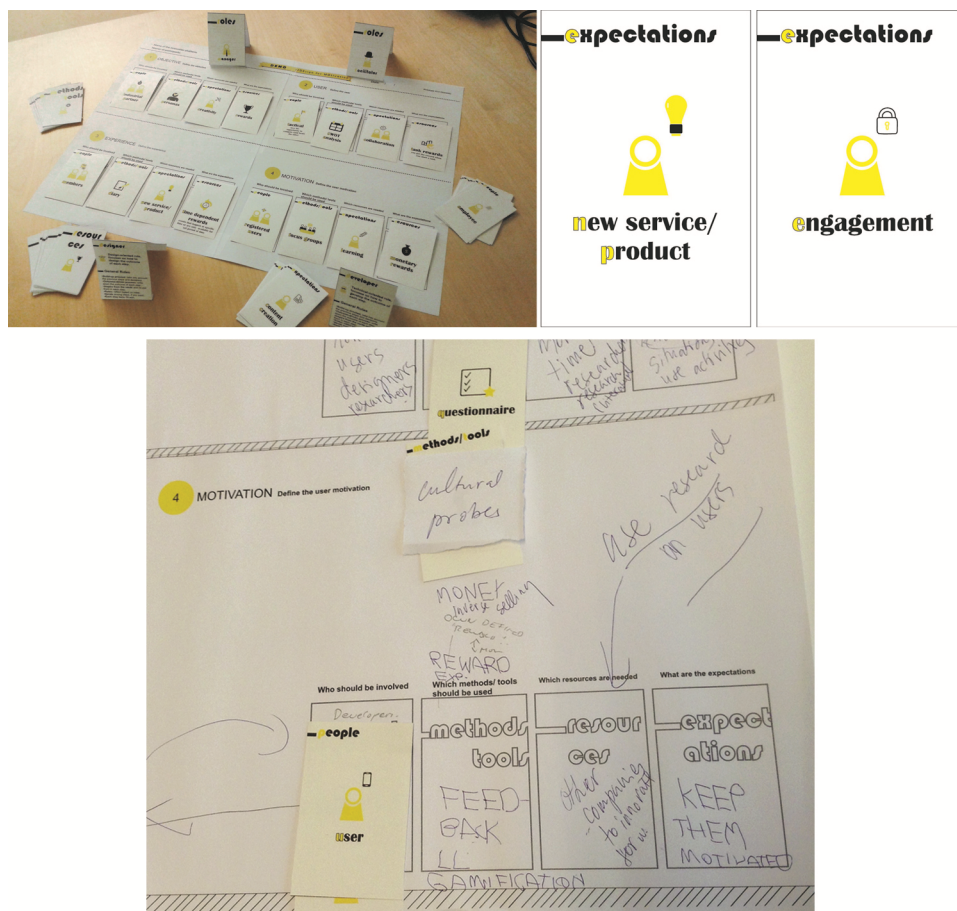


Figure 4.4: (Top) The DEMO board and example cards from version 1.0. (Bottom) Screenshot from a workshop with DEMO 1.0.

4.3.2 Design for motivation: evaluation of DEMO 2.0

The second evaluation study examines the design process with the DEMO tool and how its features contribute to design for motivation (Paper 7, Chapter 14). During this study, the second version of the DEMO was further developed according to the usability study (Paper 6, Chapter 13) and the identified design di-

4. FINDINGS

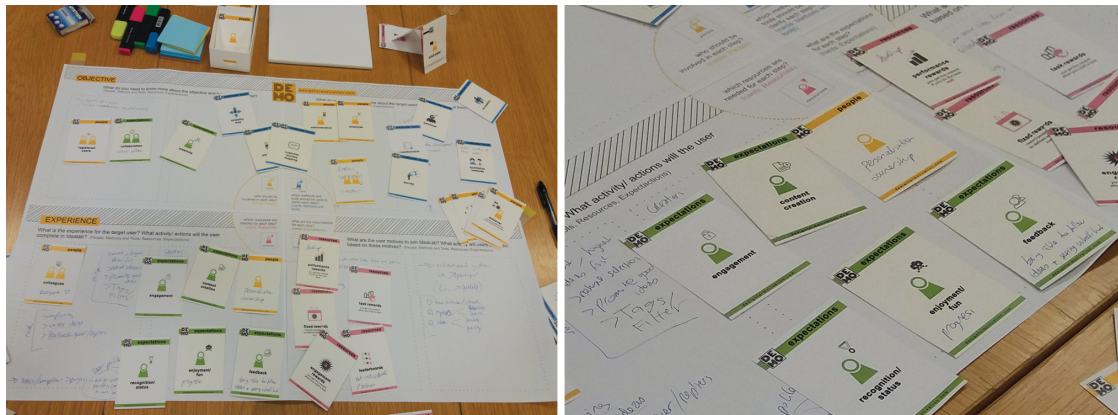


Figure 4.5: Screenshot from the board and cards of DEMO 2.0.

rections. The findings help to better understand the tool-mediated design process and the features of DEMO show promising directions to organise a design process in the field (Figure 4.5). Specifically, the use of artefacts inspires participants' creativity in conceptualising motivation and helps multidisciplinary groups to negotiate the meanings of motivation. Furthermore, structured tools provide creativity and support the creation of a shared vocabulary for multidisciplinary groups. The findings also demonstrate that the full creative picture of designing for motivation emerges when the episodic activity is enriched by the activity of the multidisciplinary group with the tool.

Our results confirm and extend previous studies in related fields, like in persuasive design (e.g. [152, 173, 139]), game design (e.g. [113]), gamification (e.g. [162, 130, 155]), and other design-related studies (e.g. [116, 22]). In the

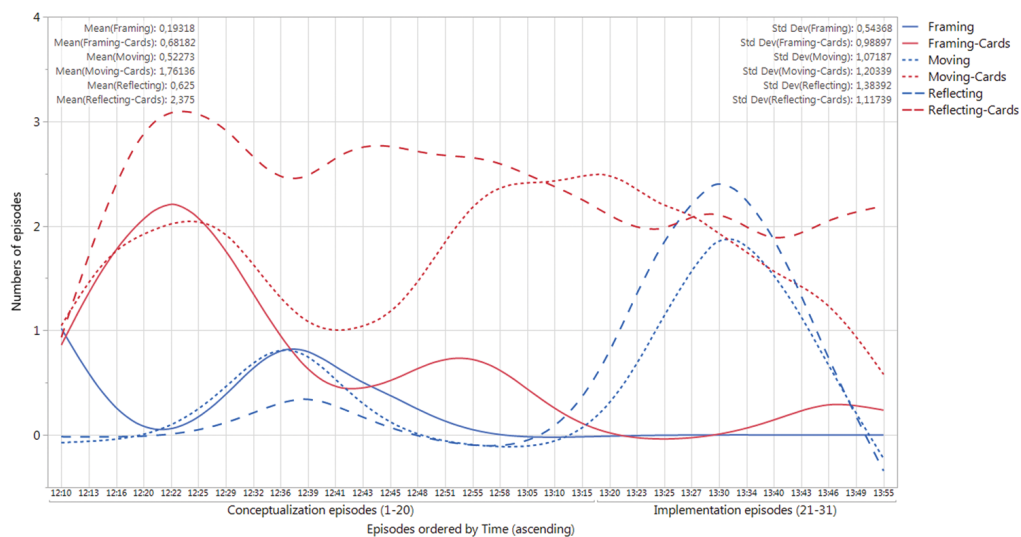


Figure 4.6: Analysis of a workshop according to the use of the DEMO tool.

literature, general challenges and directions were identified for designing motivational systems. However, these design directions haven't been applied in tool development or to empirical studies. The DEMO tool, with its process, were developed according to design directions and present a novel approach for designing motivational interactive systems. DEMO embeds theories, concepts and practices from related fields, making available a wide-spectrum of the existing tools to the users. Figure 4.6 presents that, generally, the DEMO supports problem finding and idea generation in group discussions, while the evaluation of ideas found less support with the tool. Finally, our study confirms the use of mixed-methods approach for evaluation in order to provide a rich and an in-depth understanding of the design process for creating motivational systems (e.g. [53, 130, 162]).

Discussion

5.1 Contributions

The aim of this thesis is to advance the knowledge in innovation platforms and how companies could benefit from their use. Three contributions were made in this thesis. First, the innovation platforms are underscored as tools that can be used in service innovation processes, while their role is much broader than an idea-gathering tool for the fuzzy front-end of innovation. Second, user participation in innovation platforms involves motivation factors and trust, various interaction and contribution types with varied quality of contribution, as well as ethical issues. Third, design for enhancing user participation and motivation in innovation platforms can be achieved by using artefact-based and structured tools and processes that support multidisciplinary and user-centred teams in early design phases.

5.1.1 Theoretical contributions

The theoretical contributions of this thesis are connected to the three research streams discussed in Chapter 2, namely the service innovation, the human-computer interaction and design thinking literature.

The thesis has contributed to the research stream of service innovation and innovation management by answering RQ1 and discussing the role and characteristics of innovation platforms in a company's innovation process. Although prior studies examined the employment of an innovation platform with a limited focus on the entire innovation processes, they were lacking of a holistic view of these processes with the role and characteristics of innovation platforms. By examining the use and role of the tools throughout an innovation process (Paper 1, Chapter 8) and identifying the selection criteria for innovation platforms (Paper 2, Chapter 9), this thesis has significantly contributed to a better understanding of the tools' use in innovation process.

Furthermore, the thesis has contributed to the research stream of service innovation, HCI and design-thinking by answering the RQ2 on triggers for user participation in innovation platforms. Several studies examined what triggers user participation, like user motivation, user behavior and ethical issues, however they were missing important aspects such as the relations of motivation with trust, user interactions with quality of contribution, as well as ethical is-

sues and design. This thesis has significantly contributed to our knowledge base by identifying the relations of motivational factors and trust with the customers' intentions to participate in innovation platforms (Paper 3, Chapter 10), the contribution and interaction types and quality in user participation (Paper 4, Chapter 11), as well as the ethical issues in user participation and the visibility of ethics in design of innovation platform (Paper 5, Chapter 12).

Finally, the thesis has contributed to the research stream of design thinking and HCI by answering the RQ3 and discussing the design process and tool support in the development of motivational innovation platforms. Previous research identified several design approaches and tools, however these tools lack of theoretical grounding on existing design problems, and/or evaluation according to usability, performance or other metrics. This thesis has significantly contributed to our knowledge by presenting and evaluating a design tool for creating motivational platforms. The thesis identified design challenges and directions for the development of motivational systems. This thesis also presented the design tool DEMO with two evaluation studies; one usability study of DEMO (Paper 6, Chapter 13) and one evaluation of the design process with DEMO (Paper 7, Chapter 14). The latter presented the second version of DEMO with an evaluation of its performance in multidisciplinary teams.

5.1.2 Methodological contributions

This thesis proposed a design tool to develop motivational systems. First, in the usability study, a qualitative approach was used to ensure the usability of the tool (Paper 6, Chapter 13). This approach, however, was insufficient to determine whether the proposed tool can be used in multidisciplinary teams (Paper 7, Chapter 14). Thus, a mixed-methods approach combined qualitative and quantitative methods for the detailed analysis of the design process. The protocol analysis method from the design literature [53] provided rich results and an in-depth understanding, both in team level and in individual level, of the design process for creating motivational systems. This thesis has therefore demonstrated that the application of a mixed-methods approach may be useful when the research aim to develop, adopt or test new design approaches in developing motivational innovation platforms.

In addition, this thesis suggested types of quality in user contributions (Paper 4, Chapter 11). A mixed-methods approach combined qualitative and quantitative methods for the detailed analysis of users' ideas. The content analysis method revealed detailed descriptions of the user interaction-, contribution- and collaboration-types. The social network analysis provided insights into interaction patterns and users' contributions, while the combination of methods extracted the quality of user contributions. Thus, the application of a mixed-methods approach provided a trustworthy approach to evaluate the contribution quality of an innovation platform.

5.2 Implications

In order to increase user participation in innovation platform, knowledge in the topics of innovation management, HCI and design is required. Therefore in the managerial implications, two main actors are considered relevant for the employment and design of innovation platforms: innovation managers and designers.

Innovation managers are the main organisers of innovation processes and platforms in companies. When an organisation wants to build or employ an innovation platform, the innovation managers need to make numerous decisions on the platform and how the platform will work in relation with the other processes, methods and tools for innovation. Our findings produced relevant organisational, strategic and technical criteria that managers could consider when selecting an innovation platform (Paper 2, Chapter 9). A number of other platform characteristics should be decided concurrently in relation with existing company's tools and service innovation process. Our findings revealed the roles and connections among innovation platforms with other company tools and methods in innovation processes (Paper 1, Chapter 8). A well-embedded innovation platform will increase the usefulness for companies.

Once the organisational set up is established, the manager needs to take into account the user perspective and the platform's design to increase user participation. This thesis findings revealed three aspects that managers and designers could consider to increase user participation: a) trust and motivation factors, b) interaction types and contribution quality, and c) ethical issues and their visibility in platform design. Trust is a way to establish customer-company communication in the platform (Paper 3, Chapter 10). Trust can be increased by providing feedback and intrinsic motivation, like fun and engagement, among other motivation factors. In addition, it was found that user interactions in the platform result in different contribution qualities and user roles, such as the community moderator, are crucial for the user engagement and participation (Paper 4, Chapter 11). This should be taken into consideration when managers decide on the desired types of user interaction and contribution they want to receive. Additionally, the interaction types can be used as evaluation metrics for ideas' contribution quality, while evaluation metrics of the platform should be defined and complement other existing metrics of the innovation process or platform. Furthermore, ethics of user participation should be considered in the platform design, such as the user data protection, user motivation, justification of the company's values, and feedback to users (Paper 5, Chapter 12). The visibility of these ethics should be embedded in innovation platforms, in order to increase user participation on a large scale. Design for visibility of ethics is considered as a proactive design state to support ethical user treatment and user engagement. Design reflections can help both managers and designers to address the visibility of ethics together with other design guidelines (Paper 5, Chapter 12).

Furthermore, companies can benefit from using design approaches to increase user participation in innovation platforms. This thesis suggests the design tool DEMO to design motivational platforms (Paper 6, Chapter 13). In early design phases, DEMO could guide the design process of platform's development and create discussions in short time on how to increase user participation and how to integrate the desired motivation elements, such as gamification and other design elements. Companies may involve a team to this design process, such as managers, designers, users, customers or other related experts to design motivational innovation platforms. DEMO supports multidisciplinary teams to discuss and jointly decide on the platform design and motivation strategy (Paper 7, Chapter 14). The study findings showed that the use of artefacts inspires participants' creativity in conceptualizing motivation and it helps multidisciplinary groups to negotiate the meanings of motivation. Additionally, the structure of the tool provides group creativity and supports the creation of a shared vocabulary for multidisciplinary groups when design for motivation.

5.3 Limitations

Limitations of the studies we conducted have been discussed in the papers describing these studies. In this section, only the main limitations are highlighted.

First, the innovation platforms are not an independent natural phenomenon, but a contemporary phenomenon which can be studied in collaboration with companies. Since this thesis focused on studying firm-initiated innovation platforms, in two cases the access to the internal innovation platforms for research purposes was highly moderated by companies. In the first case study and given the internal organisational factors at the time of the study, only indirect access was possible, through the descriptions of company's managers and with screenshots of the platform. We believe that it didn't had any effect on the study results since the focus was on organisational perspective, although the accessibility to the company's innovation platform would increase the researchers' understanding and provide more objectivity to the descriptions. Additionally, in the third case study, company limitations allowed indirect access to the innovation platform with screenshots since at the time of the study the platform was inactive. Again, this fact didn't affect the study results, but rather it reflected the research limitations of a contemporary phenomenon within its real-life context and rapid changes in organisational processes.

Second, the external validity or generalisability of the thesis' conclusions may be threatened by the selection of the data collection method in three cases. In the first case study, other methods could be used to increase the external validity such as participatory observations, focus groups or surveys, while in the second case study interviews and focus groups would benefit the generalisability of the results. The fourth case study would also benefit from additional methods, such as ethnographic and experimental methods. Another threat to external validity is related with the design tool and the limited number

of workshops and application fields. Although this thesis evaluated DEMO in innovation platforms, evaluations in other application fields with larger number of workshops would provide higher external validity to the results. The use of self-reported measures in the second evaluation study of DEMO was an additional threat to the validity, while the use of a mixed-methods approach ensured respondents previously reported answers over this common method bias. Overall, the selected methods of case studies were adequate for the purpose of this thesis to examine firm-initiated innovation platforms.

The third limitation is derived from the heterogeneity of the subject of this thesis. Although the focus was on studying innovation platforms with common main properties, meaning the firm-initiated platforms that invite idea generation through an interaction and communication web-based space, other properties of the platforms may be neglected in corresponding study analysis, such as the duration of submissions, interface design, interaction types or other. Thus, a variety of platform features were explored, for example different user groups and interaction types. Furthermore, only innovation platforms from large companies were included in this thesis, and for this reason we are unable to explore if the study results apply to other types of firms.

A last limitation is the lack of usability or other evaluation studies of design approaches, tools or methods and design process for developing motivational systems. To the best of our knowledge and during the time of the evaluation studies, only theoretical studies of the reviewed design approaches were found without evaluation of the tools or the processes. Therefore, there is a risk that our study results are not comparable with other evaluation studies of similar tools.

Conclusions & Future Work

This thesis examined innovation platforms from the organisation, user and design perspective. It was argued that companies use various tools to manage the service innovation process, however the role and characteristics of innovation platforms were found highly significant in this process. Furthermore, the examination of user motivation, user behaviour and ethical issues in user participation could guide the design of innovation platforms, how design tools could support the integration of motivational factors in design of innovation platforms.

6.1 Future work

Our findings reveal several points of departure for future research directions related to organisational adoption of innovation platforms, user participation mechanisms, and design process for developing innovations platforms. First, organisations should have the knowledge how to better integrate innovation platforms in their innovation processes and how to benefit from tools and methods in service innovation. Further research can be conducted in creating a repository of knowledge and a reference to guide platform's adoption and integration, as well as the platform's impact on innovation processes. Second, a large body of the literature focused on identifying important relations among behavioural intentions of use or participation, motivational factors, and components of innovation platforms. A taxonomy of the existing knowledge in user participation can further organise the field according to various types of innovation platforms, application fields, motivation mechanisms and other classification factors. Third, future research should investigate the design process of creating motivational platforms, how to provide guidance and support in design and development teams, as well as design guidelines for the existing tools and approaches. Additionally, more longitudinal studies and use of mixed-methods approaches are needed in the field to study user participation in innovation platforms. To sum up, the field of innovation platforms remains to be rather unexplored in how the findings in user participation and motivation mechanisms can be applied in the platforms' design and how to benefit further the service innovation processes in companies.

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7.1 Bibliography

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Part II

Scientific Publications

Understanding the Role of Design Thinking Methods and Tools in Innovation Process

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Abstract

This paper presents the results of an ongoing qualitative study with employees working with innovation in a Scandinavian company. Using Design Thinking as an approach, the paper analyses how different tools are used to initiate innovation processes. Issues like innovation drivers, team structure, creativity, information flow among teams, usefulness and challenges of using the methods and tools are discussed. The role of different design tools in innovation processes opens the discussion for possible future directions. The results suggest that many methods and tools could generate value in regards with the innovation processes, while there are many challenges that need to be considered. The findings could be beneficial primarily for companies that facilitate DT methods, designers, developers, managers and other involved members in innovation activities could gain insights on how to implement DT methods and tools.

8.1 Introduction

Innovation in companies often has different and complex paths from the idea development until the final product or service, while companies use different types of design methods and tools for innovation. Due to increasing demands of the markets, companies need to react faster in these demands and to innovate in response to the competition. Therefore, the role of innovation becomes a central part of the daily action in companies. Design methods and tools should be assistive for various companies processes, such as from the idea generation phase to the final product/service development phase, and should facilitate the development of innovations. Also, problems with information and activity silos seem to be the norm. This research problem has received little attention from

researchers and practitioners. Our focus is to investigate the existing situation of the aforementioned problems with innovation in large companies, using the Design Thinking (DT) approach [1] as a methodology to understand how different design tools are used.

Our paper contributes with an empirical study where the main contribution of the paper lies into the analysis of how innovation processes are supported by different design tools, and how those tools are related to the different phases in DT when used in the company in the context of reported innovations. Moreover, the study suggests how DT methods and tools could be used most effectively within company's processes.

8.2 Related Work

The process of innovation and the way it is managed constitutes a key strategic issue for companies. For this purpose, a large number of design methods and tools are available to facilitate the DT process and innovations [4]. DT has emerged as a multidisciplinary, human-centered innovation approach inspired by the ways designers think and work [1, 5]. The core idea in DT is that any discipline can take inspiration and learn from the way designers think and work, and apply this to their operations not only in innovation efforts but also in strategy, innovation or organizational renewal (e.g. [2, 1]). In addition, the stages of DT, namely empathy and insight, definition, ideation, prototyping and testing [1], provide a structured step-process for implementation of DT. Innovation is developed when all three perspectives of DT - business, technology and users perspective- are addressed. Additionally, often innovative ideas do not manage to be realized by the company. The flow of information for innovation seems to stop during internal processes [7], and it is questionable how methods and tools will ensure that the elaborating forces of innovation will be more fluid inside the company. The implementation of DT methods and the integration of DT in a company's context have received little attention. Existing knowledge focus on the adoption of DT methods [8], as a mean of strategic governance of innovation, letting out some of the holistic needs inbound in the real DT approach. More studies in organizational settings that provide insights for an optimal implementation and successful use of DT for innovation are needed. A framework to address creativity is also needed to understand better how the design thinking tools can function optimally, and the use of the concept of divergent and convergent thinking is interesting. In fact, both types of thinking are required if creativity shall be obtainable [3].

Group dynamics is also relevant as companies often use different design tools that gather people to work with each other. Although workshops and like produce several outputs, there are several issues needed to be addressed. For example, social loafing in creatives groups can be problematic [6]. In fact one of the possible and undesired outcomes can be the unwillingness of sharing risky and creative ideas as they can be misunderstood [6].

This paper aims to describe the existing status regarding innovation processes in companies and how DT methods and tools facilitate innovation processes. Also, the study aims to explore if the use of the design methods and tools for innovation can be helpful for the information flow and communication among departments or groups.

8.3 Methodology

We organize a case study with Scandinavian companies in order to understand the internal company processes that lead to innovations and change, and the implementation of DT methods and tools. Interviews were selected as a data gathering method, because they reveal rich information and details. The ongoing case study includes interviews with a variety of companies, where at least three employees who work have been involved in innovation related projects are interviewed. This allows us to explore at least three perspectives of innovation processes: one design, one technical and one managerial perspective. In this paper, we report on the pilot study with a Scandinavian company in service sector. The company was selected as a representative case because of its long experience with innovation projects, its capacity to absorb innovation practices and its size.

The study conducted on January 2016, where three employees were interviewed in semi-structure, recorded interviews. The national data protection official for research authority has approved the interview guide. The participants in the study were working in the same projects but having different work positions and roles, where one reflects the managerial perspective of the projects and two are involved with the design-technical perspective. Designers, managers and other employees involved in the innovation projects reflect their views on internal processes, revealing examples of innovation projects and how they work with innovation across departments and groups. More in detail, the interviews lasted 45min and they were transcribed verbatim. We then developed a coding schema consisting of the following main topics: definitions and drivers for innovation, innovation process and phases, assistive methods and tools, team's structure and roles and other involved parties. More detailed themes coding schema was defined during the analysis. Similarities and differences in responses were found and systematized.

8.4 Findings

In order to understand the methods and tools that are being used in innovation processes in companies, it is important to draw the context where those methods and tools are applied. Starting from the definition and drivers of innovation, the process of innovation and the team's structure is described, while the

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methods and tools are analysed according to the phases with the corresponding challenges.

8.4.1 Defining innovation and innovation drivers

According to the participants, innovation is regarded as small steps to change the mindset of a company. It is related with the resources, and company's ability to generate and support innovation activities. The participants explained what innovation means for their company, reflecting their perspectives and roles in innovation projects:

"Innovation doesn't need to be a huge idea, I believe that innovation is something that changes the way you do things basically. And that you are able to make it work." (Interview 2)

"Innovation for a company [...], is not only the radical innovation, but also working smarter, and incremental innovation. [...] Innovation happens every day, in every corner of the company. [...] So a big part of innovation is just working smarter, find new solutions to old problems." (Interview 3)

The drivers for innovation are considered both customers and company employees. Company employees who work as department leaders or in other work positions have been identified as key persons to initiate innovation projects in the company. Customers are also driving the innovations. The dynamic nature of customers' preferences affects the company's demands that try to adapt to those changes, and aligned with the market needs. In addition, examples of other companies that focus on a specific area constitute an innovation driver as well. Accordingly, the focus on a specific part of the value chain is considered the main company's focus, and not in the whole value chain.

"We have found some key persons that really like working with these things and everyone is in different departments" (Interview 1)

"Well, I think [...] that the department is the most dynamic area where the customers basically change preferences each month. So, we have to be ready for those changes and adapt." (Interview 2)

In line with the DT approach, the design process can look like fuzzy in the start, and accordingly make the innovation process difficult to monitor and administrate.

"For the moment it is about make it work on the practical level before we organize too much" (Interview 3)

8.4.2 Innovation process

The innovation process in the company refers to two types of innovation: sustaining and disruptive innovation. According to the participants, in sustaining innovation the ideas come from the customers. This is a customer-driven approach and the ideas for innovation come from customers' needs and feedback on existing products or services. For example, the company received more than 10.000 posts from customers who gave feedback through one application. Additionally, feedback that is collected either from face-to-face meetings or through electronic means is used as a basis for both sustaining and disruptive innovation. The innovation process in sustaining innovation starts with customer feedback and data that generate a corresponding concept development that provides value to the customers in regards with this need. After the concept becomes concrete, the available resources and the company's acceptance need to be ensured. The value proposition and the evaluation criteria, such as attractiveness, are established in this phase. The concept should be in a presentable way that allows feedback from others, like partners and colleagues. The feedback helps the concept to be further developed and starts a pilot where the value propositions are tested together with as many hypotheses as possible. Iterations among phases help the company to confirm more hypotheses and to decide whether to invest resources, such as money and time, for the project or not. According to participants, the duration such projects is 3 months approximately.

"We are dividing in disruptive innovation and sustaining innovation [...]. We are looking all the markets around how things are changing, how we can take a role in everything that's out there. [...] We get a lot of ideas from both customers, internal, sales people, everything they stuck it up and prioritize what they seems to have biggest value and test it to customers to see if they respond the way we think they will respond. [...]" (Interview 1)

In disruptive innovation the ideas come internally from the company. A digital platform that target to gather employees and other partners ideas supports this type of innovation. As a market-driven approach, the ideas for innovation come internally from the company, for example the department leaders, based on the market-driven needs, specify the needs for innovation. The corresponding departments develop concepts that answer the calls and prioritize what will generate the most value for customers. Many iterations in early phases help to establish the main path for innovation and focus on the concept that will generate the most value, both for the company and the customers. The disruptive innovation should be based on small, iterative steps and specific metrics, such as the cost reduction. For example, the duration of such a project is approximately 1 year.

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"We want to have a quick time to market we do not want to spend resources without knowing whats out there so we want to try things fast, test it and put money to that as it goes." (Interview 2)

"In disruptive is more like Employee X and his position that something about the market and changes and we help him developing concepts that answer the needs in the markets." (Interview 1)

8.4.3 Team structure and external parties

The collaboration across company's departments and teams depends on the projects, where the department that is responsible to develop the concepts leads the team building in most of the cases. Resources such as involved people, costs, and other external, involved parties are defined in order to develop the project. Depending on the projects' topic, people from corresponding departments lead the project after the team building. The collaboration and the involvement of people from other departments in innovation processes is considered a necessary step for sanity check, where the realization of innovation is ensured. Departments have also their internal, smaller teams for innovation with specific needs and innovation segments.

"So I have to find people in each division [...] and then make sure that they are onboard with what we are doing." (Interview 1)

"We all have to check if any innovation or idea it can be easily [...]. So, we always have to involve people in the process early." (Interview 2)

Other external partners are involved in innovation processes, such as developers, following the process from the early phases until the launch of the product or service. The external partners become part of the decision team, where the project team as a whole decides on the solutions and delegates the tasks among project members.

8.4.4 Design thinking methods and tools

We described the innovation processes in the company, according to participants' views. Many methods and tools were mentioned that are actively utilized in the company, and some of those methods or tools are used for research, design, management or presentation purposes. In order to understand how the DT methods and tools are used in various phases, we mapped them according to the DT phases: empathize, define, ideate, prototype and test.

8.4.5 Empathize and insight

Empathy is a central phase in the human-centered design approach. The empathy step refers to understand the users and their needs within the context of a design challenge. The participants replied that methods for understanding the

Table 8.1: Overview of the methods and tools in use.

Phases	Methods and tools
Empathize	Observations, Personas
Define	Brainstorming, Surveys, Co-creation with customers, Interviews, Workshops, Customer Journey Map, Prototyping, Design scenarios, Focus groups
Ideate	Surveys, Co-creation with customers, Interviews, Workshops, Observations, Focus groups, Personas
Prototype	Prototyping, Design scenarios, Storyboards, Personas, Co-creation with customers, workshops, Focus groups, Scenarios, Stakeholder Map
Test	Design scenarios, Storyboards, Co-creation with customers, Prototyping, Workshops, Focus groups, Stakeholder Map

users include observations that are utilized mainly during other phases, such as to get user insights and test prototypes.

“We use observations each year [...] first we get user insights, that people say “were you able to do what you came to our website to do” and then we ask 5-10 people in our lab when they do the tasks and we observe.”
(Interview 1)

Other methods to understand the users include the personas method, to understand the target user, either in the beginning or in later phases, for example in ideation phase. According to participants, three main sources are used to collect customer data, through online survey tool (Questback), direct feedback with customers, and focus groups. As mentioned in the introduction, insight and how the information flows inside the company can make innovation difficult to happen. Information can be sticky [7] in one department, making more expensive and difficult to enact innovation. In the first phase of the creativity, divergent thinking needs to gather as much insight as possible. The participant mentioned different ways they worked with this topic, whilst several alternative possibility of improvement was requested.

“There should be a system where you can collect and where people could place [...] like the e-lab or discuss with me [...] or an open innovation platform.” (Interview 3)

8.4.6 Define

The phase of problem definition refers to the focus on specifying the problem, while a problem addresses the need for a change. For the company, the need for a change is generated from two main sources, as it was discussed above, the customers (sustaining innovation) and the company (disruptive innovation). The

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participants replied that methods in use for this phase include brainstorming, surveys, co-creation with customers, interviews, workshops, customer journey map, prototyping, design scenarios, and focus groups. One example is customer journey maps that are used in early phase to define a problem and find the pain points of a product or a service. Other examples are interviews and workshops.

(Participant talks about the co-creation with customers) “[...] Well, we have used it to define and get user insights, and in the project where I am the project leader they will create and test the prototypes with the customers. “
(Interview 2)

Digital tools are used for gathering ideas from any source. A digital platform is used internally for company's employees to submit and/ or discuss ideas, while other digital tools - such as Trello and Slack - have been utilized as a digital space for managing and prioritizing ideas, but also to generate discussions for a topic.

8.4.7 Ideate

The ideation concerns the generation of ideas and its a creative phase among participants. The participants commented about ideation that it could be part of the previous phase the definition phase or any of the next phases such as prototyping and testing. Several methods are used to generate ideas for the company, but not necessarily answering the previously defined problems. Methods for ideation include survey, co-creation with customers, interviews, workshops, observations, focus groups, and personas. Additionally, participants reported that other methods to generate customer-driven innovation include a forum and an advisory board, where important customers and partners provide input to ideas. A sub-step of this phase is to ask for feedback on ideas. For example using interviews, participants get user insights for concepts or ideas and prioritize them, although it is considered challenging to predict future activities. This happens especially in disruptive innovation. In addition, the need to get user insights varies among company's departments. For instance, participants mentioned that in one department they use a forum and an advisory board as tools to get feedback on ideas. The internal digital platform for gathering ideas is believed that will lead the innovation process in the future, in terms of prioritizing and managing ideas and innovation activities.

“So this platform will be lead most of the innovation in the company hopefully in the next years.” (Interview 1)

In this phase, other tools for gathering ideas in a digital space, such as Trello and Slack, are considered very important project management tools for managing ideas. Either using some kind of tools or discussing ideas face-to-face, the company's culture is believed to be open for ideas.

8.4.8 Prototype

This phase refers to the creation of prototypes, by any means that visualize ideas, created in the previous phase. Depending on the project, prototypes could be presented either in paper format or as tangible artefacts. The participants reported that they use methods such as prototyping, design scenarios, storyboards, personas, co-creation with customers, workshops, focus groups, scenarios, and stakeholder map. One prototyping tool for sketching is InVision that was used after a workshop to put ideas in an online space. The prototypes have assigned hypotheses and metrics that will be used in the next phase of the testing. Hypotheses and metrics assume that a prototype will work, for instance:

“We would like to test X by doing this and in order to understand if it will be accepted we measure this and if this metric is above X or Y is accepted.” (Interview 2)

Examples of metrics refer to the value proposition for the company, the customers and/ or the partners. For end users, different prototypes are created, for example when launching new actions in a webpage and there is a need to create a non-fully functional buttons, without any action behind.

8.4.9 Test

Testing is a part of the iterative process, where the purpose is to learn and iterate if it's needed. Prototypes are evaluated according to value propositions that were developed, for example the value proposition for customers, the company, partners, etc. According to the participants and in relation with methods and metrics for prototyping, the testing will provide explanation to what will be developed, what should generate, and how it will be measured. Prototyping testing with end-users of the company requires different approaches, such as experiments and hypotheses testing. The participants reported that methods for prototype testing include design scenarios, storyboards, co-creation with customers, prototyping, workshops, focus groups, and stakeholder map. An additional method for testing is a digital panel with 150 users, registered to test out ideas. Other methods that were used to test the hypotheses include the Lean Startup method, which supports a quick approach to get products into the market.

“So we are working on a method called Lean Startup how we can to get products out in the market, to test before use a lot of money and develop it. (Interview 1)

The selection among various prototypes could be achieved with methods such as A/B testing, during the first iterations and before the full development of a product or a service. Depending on the cost, multiple prototypes might be developed.

8.4.10 Usefulness and challenges of the methods

The participants discussed the usefulness of the methods in relation with testing in early stages of the product development. Meetings with partners and long discussions might be time consuming, focusing on the wrong direction. For example, the use of methods in early stages might help the fast development of the projects in terms of time, resources and focus on the important things. Furthermore, structured processes are considered appropriate for specific phases, for instance when presenting ideas and in order to convince other people, but not for the idea development where there are various needs depends on the project. For example, workshops was mentioned as a method that is hard to follow due to lack of structure and it does not provide detailed analysis.

"[...]I have hard time to get something valuable with workshops [...] but I don't think that create as much value as others." (Interview 2)

The Lean Startup method is considered a good example of method that helps participants to get quick results, as well as the hypothesis testing which provides clarity of results and suggests the right direction. Focus groups is considered a method that was used for presentation purposes to other partners, but it depends on what it is tested.

According to the participants, there are many challenges related with the alignment of the methods with the company's internal processes to innovate. One challenge is to utilize methods and tools that offer quick and trustworthy results. Especially in early stages of the product development, the company decides on the projects that fulfil certain values and finding specific methods for this purpose is often a challenge. The participants discussed that the Lean Startup method provides quick results for companies in an innovation process. Second, there is a challenge to find methods that support both qualitative and quantitative data, as both types of data are important for the decision processes with multidisciplinary teams. As it was mentioned, finding methods that support convergent and divergent thinking with multidisciplinary teams is also a challenge. The third challenge can be found in the organizational processes, where the application of the methods should be adapted to the short or long development processes. For example, there is a challenge to utilize methods when bureaucratic processes of a company interfere the application of the methods. Forth, there is a challenge to establish the same methods and tools in the organization's culture. Different departments or teams work with different tools that are a personal choice at some extent. Lastly, it depends on the individual skills how to make the utilization of the methods beneficial for the project or a team. For some projects, the use of methods and tools is considered as a way to convince other people for the value of an idea or a project.

"If you have an idea will most likely get the answer "ok define it" [...] that's the culture in here. But after it is defined, there is more bureaucratic

process, so if its cost you have to have it through, an investment committee and those things.” (Interview 2)

8.5 Discussion - Conclusions

In this paper, we presented the results from an empirical study with a company and how various methods and tools are being used in their internal innovation processes. The DT approach served as a methodological and analytical tool for mapping the applied methods in various design phases. The results suggest that many methods and tools could generate value in regards with the innovation processes, while there are many challenges that need to be considered.

Innovation processes are characterised by iterative phases, measurable factors, leadership, digital space. Accordingly, we believe that the utilization of DT methods and tools should adapt to these characteristics. The DT methods should allow many iterations, especially when they are applied in early phases. In other words, the methods of the early phases should generate rich data that will be used in later phases, in every direction. Additionally, the DT methods and tools should incorporate some kind of metrics that will help the decision processes. Metrics are important for innovation processes and DT methods should combine qualitative and quantitative results. Various kind of data are useful to different partners, in order to decide on the development process. Furthermore, methods that support convergent and divergent thinking allow the communication of people with different backgrounds. Regarding the leadership of innovation processes, bottom-up and top-down methods should be combined. The bottom-up methods, where the department leaders utilize to support their decisions, and the top-down methods, where everyone in a company could utilize in order to support the ideas/projects, should be jointly affect the innovation processes. Also, DT methods could be applied easier in a company when the methods work in a digital space as well. This allows to share the working space with other partners, but also to have everything online, in one place. Especially in big departments where it is up to individual skills to develop and present his/ her ideas, a digital space gives visibility to everybody’s voice. Learning barriers of the digital tools should be limited. For example, simple digital tools for project management are considered very important for innovation processes and accordingly, DT tools could be more functional if they are online. Lastly, building organizational culture for the use of the DT methods and tools, it will eventually generate value. The company will have access to every innovation activity that is growing and how it is developed.

“We don’t know of everything that happens in the company. In many departments, they have their own innovation team [...] As I said we will never get control of everything.” (Interview 1)

The findings could be beneficial primarily for companies that facilitate DT methods and want to get insights from other companies. In addition, design-

ers, managers and other involved members in innovation activities could gain insights on how to implement DT methods and tools. Finally, designers and developers could benefit and inform the design of these tools and methods or suggest combinations of methods and tools for the DT phases.

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Introducing Open Service Innovation Platforms: A Case Study

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Abstract

This paper presents the results from a qualitative study that examines managers' perspectives on open innovation platform (OIP) selection, focusing on their main criteria, requirements and needs. Six managers of a large company were interviewed about their experiences. This paper shows that platform selection is a combination of factors, and the creation of a company culture around OIP is very important in users' minds. Based on the results, we propose a list of selection criteria and dimensions for OIP classification. Selection criteria include ease of access, ease of innovation process, ease of integration and compatibility, as well as cost, fast, secure, differentiation for various user groups and the method of evaluating ideas. These results can be useful to support managers in their decision-making processes when selecting OIPs, in addition to helping platform designers and researchers.

9.1 Introduction

Increasing the quality of services is of vital importance in the service economy. Companies worldwide are exploring new ways to involve their customers in finding innovative ideas for new and better services and products within the open innovation (OI) paradigm [7]. Open innovation platforms (OIP) can be defined as "a virtual environment that offers digital services, with the aim to allow the creation of innovations by facilitating time and location-independent, voluntary interaction of innovators" [6]. As innovation is allegedly becoming more democratic - coming from almost anywhere and anyone [10] - OIPs are used for sharing, collecting, co-creating and commenting on ideas.

Many service providers have adopted OIP to invite entrepreneurs, institutions and users to contribute with ideas through innovation tasks. Several OIP

are available, such as Imaginatik¹ and Napkin Labs², which fit different companies' needs. Open Service Innovation (OSI) platforms are characterised by various features, including their reward system, interface design and innovation strategy. Choosing the most appropriate system for facilitating OSI is therefore challenging.

This case study examines the manager's perspective on OIP selection, focusing on their main needs, criteria and requirements. The rest of this paper is organised as follows. Section 9.2 continues with related studies on applying OIP in companies. Section 9.3 presents the theoretical basis and methodology, followed by the findings, in Section 9.4, based on the theoretical framework. Finally, the discussion and conclusions are presented.

9.2 Related Work

Companies using OSI face several challenges. These include maximisation of returns for internal innovation, incorporation of relevant knowledge in innovation activities and motivating employees to contribute to internal innovation processes [11]. Several empirical studies have focused on OI adoption and OI platforms. Gassmann, Enkel and Chesbrough [4] give an overview of the future of OI and find that certain tools, such as third-party intermediaries, are required when opening up the innovation process. Stoetzel and Amberg [9] proposed that the platform's operator and the platform's purpose are two key differentiating dimensions of OIP classification. Ghazawneh [5] reports on how OIP can enhance and support innovative practices and discusses the supportive roles of platforms and "platform thinking" in innovation networks. Battistella and Nonino [1] examine the motivators and drivers for knowledge sharing in innovation platforms, in a qualitative study. Moreover, the study by Frey, Lüthje and Haag [3] explores how motivation and knowledge diversity correlate with users' contributions to innovation platforms. Lüders [8] conducted interviews with nine middle managers in a large service company, exploring their experiences of an OI portal within their company. The results show that realising OIP benefits goes beyond merely motivating users to participate. It also demands an elaborate and reliable method of idea and innovation management and a strategy for leveraging the added value of networked innovation.

The above studies focused mostly on the user's perspective, exploring motivational factors for users and - in the evaluation of OIP - reporting differentiating factors. One study focused on the company's perspective. However, understanding is still lacking of how companies select OIP. This understanding would not only help practitioners planning to use OIP and designers of such platforms but also contribute to the development of OIP taxonomy. This leads us to the following research questions:

¹Imaginatik: service innovation firm, last updated April 2014, imaginatik.com

²Napkinlabs: software platform for innovation, last updated April 2014, napkinlabs.com

- RQ1 What are the main criteria for the selection of OIP? In other words, what are the requirements and needs of companies in OIP?
- RQ2 What are other expectations companies have regarding OIP?

9.3 Methodology

To answer the above research questions, we conducted a case study within a large service-sector company. The company is piloting an OIP, after which a decision will be made regarding the OIP. The company was selected for this case study because of its size, capacity to absorb innovation practices and previous experience with innovation and innovation platforms. The pilot study was conducted on January 2014, where two managers were interviewed in a semi-structured, recorded interview. The interview protocol covered questions regarding their previous experiences with innovation platforms, their selection criteria and the company's current strategy. Based on the pilot study, we refined the research questions and the interview guide. The participants in the pilot study proposed four other managers who met our criteria and were willing to participate in interviews. The main case study included six interviews with middle managers who are involved in OIP management and/or the innovation strategy of their company. The consent form and a short questionnaire, covering their involvement in OI activities, were sent out before the interviews. The updated interview protocol focused on managers' needs, requirements and selection criteria for OIP, as well as general, strategy-related questions. The interviews, conducted on March 2014, were recorded and lasted 30 minutes. First, these interviews and the pilot interview were transcribed verbatim. We then developed a simple coding schema consisting of the following main topics: selection criteria, requirements, needs, strategy and users. We used these to code the data in NVivo10. A more detailed theme-coding schema was defined during the analysis, so that similarities and differences in responses could be found and systematised.

9.4 Findings

As a theoretical framework for the results analysis, we used game theory. Game theory is used in analysing strategic interactions between two or more decision-makers, called players [2], and can help to understand processes within a company selecting OIP. The essence of the game theory model in this study is to describe conscious, goal-oriented, decision-making processes involving one or more players. Common features in game models are players, choices, desired outcomes and strategic interactions.

9.4.1 Players: defining OIP

The players in this context are the managers who work in different areas, such as business and concept development, corporate strategy, customer-relationship management. They are all involved in innovation and OI activities, with an average of five years of experience. Within innovation platforms, they have worked on implementing the platform, involving the partners in innovation, managing the project of testing the platform and collecting ideas. They are all informed about other managers' work but use different definitions for OIP, reflecting their perspectives, which vary from user-oriented to tool-oriented.

"An OIP is when you have internal and you also have external users."
(Interview 2)

"It is a platform for communication and idea sharing for employees, customers, customers' customers and partners." (Interview 1)

"It's a communication and customer-relationship management tool."
(Pilot)

9.4.2 Desired outcomes: building a reputation

One of the desired outcomes in using OIP is to get a more open view into the future, the market and the external environment. Other desired outcomes are building the company's reputation, better communication with users and better customer relations. Furthermore, the managers hope to inspire and show internal users the benefits of OIP.

"By listening to them, we get these ambassadors that spread the positive work (...)." (Interview 6)

"So obviously, there is a huge potential for the rest of the company to use a system like this (...). I hope we can influence the rest of the company."
(Interview 5)

9.4.3 Strategic interactions: organising OIP strategy and corporate culture

The interactions between players are grounded in a common vision, while their opinions tend towards implementing OIP on many levels, differentiating between internal and external user groups and aligning OIP with corporate strategy. As reported by two managers, internal strategic goals concerning OIP are to connect and share responsibilities within departments and to organise a working group for the OIP. Motivating employees to participate in the OIP, through regular meetings and other processes, is an easier task than motivating external users. External strategic goals are empowered by the need to follow

a fast-moving market, embrace new perspectives and establish communication channels with external users.

"It is a kind of win-win situation because we get a lot of new ideas (...), and the users will eventually be given better products." (Interview 2)

Another strategic goal is to build company culture around the OIP. This is reflected in the company's management and customer-centric logic. In addition, the preparation phase of learning through piloting OIP and sharing experiences on OIP with other companies and partners creates a long-term effect on the company's culture, according to three managers.

"Culture is very important, and that needs to come from the top-management and down (...)." (Interview 1)

9.4.4 Choices: requirements and needs for OIP

The majority of reported requirements and needs in reference to OIP focused on three aspects of the ease of use. The first aspect is user access, where a user-oriented OIP is defined as a visually attractive, intuitive and accessible system.

"The visual is really important (...) inviting the user to start to use it and for me to work in it. The user's experience should be well organised. They won't spend a lot of time in a system that is not really easy to use and doesn't invite you to use it." (Interview 3)"

The second aspect concerns the innovation process, which is determined by the automated distribution of incoming ideas to the corresponding departments/people, by a transparent backing of follow-up and handling of ideas and by gamification methods with competitions and rewards. The third aspect is integration and compatibility with the company's existing IT systems and responsive OIP, which are flexible enough to use on different platforms.

"It has to be suitable for mobile use (...). We have to have different sources and not just a webpage." (Interview 6)

A fourth requirement is the ability to create community through OIP, as reported by two managers. User engagement, auto-reminders for login, gathering and stimulating discussion on ideas, and the use of a social-media approach can be achieved more effortlessly through a community.

"(...) because of the overall goal, we would like this to be a community. (...) because if there is nothing more, we always have to invite and motivate people." (Interview 4)

Finally, the need for separate OIP for internal and external environments, as reported by two managers, is considered necessary for the company's protection and for testing ideas in the two environments.

9.4.5 Choices: selection criteria for OIP

The most frequently reported selection criterion for OIP was the ease of use, meaning easy access for the users to the platform, an easy innovation process for both company and user, and easy integration and compatibility with other existing company systems. All managers reported this criterion as the most important.

"First of all, it was technical criteria. It needed to be fast and reliable and easy to log in. (...). It needed to be very easy to use, like Facebook (...) and definitely needed to have a good price. " (Interview 2)

The ease of the innovation process for the user refers to the simplicity of submitting ideas and getting feedback. For the company, the ease of the innovation platform relies upon a limited number of features for it to be easily managed. Moreover, the scalability and the integration of OIP with other company's systems were considered valuable. The economic criterion was the second most important for players, as reported by three managers. They believe that they have to examine "what drives the cost". An economic model of OIP that focuses on the number of user accounts is not regarded as viable for the company.

"If they have a small fee (for every user) every month, the costs are enormous if you have a lot of users." (Pilot)

An interesting criterion reported by three managers was the feature of differentiating between various user groups.

"If it is possible to differentiate between different groups () business-consumer-partner, how we can twist those different criteria, we don't know yet." (Pilot)

"But I think also it needs to have an external platform and an internal platform, I don't think you can mix those (...).That would be chaos." (Interview 2)

The importance of fast and secure OIP was mentioned by two managers. In addition, the criterion of the method of evaluating ideas through OIP was reported to a significant degree. According to two managers, they want to eliminate the waiting queue of incoming ideas into their OIP, during the initial phases of processing and testing.

Table 1 summarises the study's findings, categorised by the contextual factors of general technical, organisational and strategic criteria.

Table 9.1: Summarised findings.

Context	Selection criteria	Requirements & needs	Strategic Interactions	Desired Outcome
Technical	Ease of use	Ease of use		
	a. Ease of access b. Ease of innovation process c. Ease of integration and compatibility	a. User-oriented b. Automated processes c. Flexibility Cross-platform functionality		
	Cost			
	Fast and secure			
Organisational and Strategic	Different platforms for different user groups	Community creation Different platforms for different user groups	Shared responsibilities within departments Working groups for OIP	Inspiration for the company Building a reputation
	Method of evaluating ideas	Rewards system	Embrace new perspectives	Communication with users
		User engagement	User engagement	Better customer relations
			Establish communication channels	
			Culture	

9.5 Discussion

This paper contributes with an empirical study suggesting factors for selecting an OIP, the requirements and needs of managers and other strategic interactions. The study described shows that platform selection is a combination of factors and an interrelated part of a company's overall innovation strategy.

Our results show that a preliminary list of criteria should include the following: ease of access, ease of innovation process, ease of integration and compatibility, as well as cost, fast, secure, differentiation for various user groups and the method of evaluating ideas. The requirements and needs (Table 9.1) reveal another perspective on the same question, perhaps reflecting a more department-

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oriented view of OIP. We expected a similarity between this list of criteria and needs and requirements, to provide us with feedback on a structured managerial opinion of OIP and the different needs of departments. These needs may be more directly reflected in the list of criteria for future OIP selection. Another explanation of these differences between criteria and needs is short- and long-term perspectives, whenever managers think of OIP. We believe that they have adopted a "platform thinking" [5] in OI and that they are going to commit to OIP.

The use of game theory provided a theoretical framework for analysing the interrelations of a group of managers. Our findings support game theory and thinking in business as an insightful way of gaining feedback on complex decisions involving many parties. The use of game theory could also provide managers with insights into other managers' goals and strategies regarding OIP. The players examined are six managers from various departments engaged in a co-operative "game", as they make choices jointly to achieve the best outcome. The strategic interactions and the desired outcome (Table 9.1) highlight a need for collaboration and a shared best outcome from using OIP. The choice of OIP is defined by companies' strategies, available knowledge and agreements between companies. We think that this choice should also be a product of the learning experiences shared by managers, employees or other companies.

We believe that there is a need for a structured selection procedure, where companies can test several OIP using pilot programmes, recommendations and support teams. In addition, an evaluation and classification is needed of available innovation tools and OIP. Potential dimensions of this classification include the degree of openness, relating to the number of external and/or internal users that are allowed to participate - depending on their needs - and the degree of scalability and flexibility. It is also defined by the cost of the platform, the ability to handle a growing number of incoming ideas and the method of reward - specifically, gamification methods of rewarding user participation. When comparing these dimensions with Table 9.1, we chose to include mostly strategic and organisational criteria for OIP. Openness represents the criterion of differentiation for various user groups. The degree of scalability and flexibility merges the criterion of method of evaluating ideas and shared responsibilities within departments. The methods of reward support previous related studies of motivational theories and gamified OIP. These dimensions need to be tested in future research across a number of OIP.

To conclude, because it is a time- and resource-consuming process to select and implement an OIP - mainly for how it integrates with users' minds and creates a company culture around OIP - this process should include a dedicated group. The findings of this study can be useful to managers making decisions about which OIP to use, as well as platform designers identifying user needs and requirements. Our list of criteria can shape thinking about platform design, from the conceptual level to platform development. Finally, the findings also contribute to research on OI by proposing useful dimensions for OIP taxonomy.

9.6 Acknowledgements

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The Visibility of Ethics for Open Innovation Platforms

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Abstract

Open innovation platforms (OIPs) are applied to service businesses and aim to increase service innovation, by engaging users and encouraging them to submit ideas, share content, and invite others to participate. The employment of OIPs raises several ethical issues, such as fairness, ownership, and privacy. One approach for addressing these issues is to raise the visibility of ethics on the platform. Following a systematic approach, this paper explores the topic of the visibility of ethics in OIPs, by reviewing related ethical issues and evaluating the application of ethics by OIPs in practice. We conclude with reflections on design and suggestions for practitioners. The visibility of ethics is seen as a proactive design state, and we argue that it can both improve service innovation through OIPs, and improve the fairness of relationships between customers and companies.

12.1 Introduction

Involving customers in the innovation process is of increasing importance in the delivery of new services and creation of radical innovations [21, 20]. In a survey by Eurostat, more than 70% of all companies have named customers as the most common source for innovation¹. Companies are attempting to open their innovation processes by employing the involvement of customers and technology platforms. Following this direction, Open Innovation (OI) aims to open up the innovation process of a company and encourage the inflow and outflow of knowledge and information [3, 2]. OI is based on the premise that organizations cannot innovate in isolation, and relates to organizations that engage with different types of collaborators, such as customers, to acquire ideas and resources from the external environment to stay competitive [5, 3]. One way to achieve

¹http://ec.europa.eu/eurostat/statistics-explained/index.php/Innovation_statistics

customer involvement is by utilizing technology platforms and online tools for OI, namely Open Innovation Platforms (OIPs). A technology platform for OI is an online communication portal for company associates, such as customers, employees, and other company partners. OIPs enable companies to create innovations for services by engaging users and facilitating user activities, such as idea submission, discussions, and competitions. OI applies to services and service innovation by employing an “outside in” or “inside out” approach. The first approach refers to a company that uses external ideas and technologies in its own business, while the “inside out” approach refers to a company that allows some of its own ideas, technologies, or processes to be used by other businesses [4]. Both approaches are supported in OIPs for service businesses, and allow them to increase innovation by engaging users and encouraging them to both share content and invite others to participate.

Involving users in the innovation process raises several ethical issues, such as fairness, ownership, and privacy. OIPs enable involving users in a larger scale and thus make this issue even more relevant. A study by Franke et al. [11] found that “potential contributors not only want a good deal, they also want a fair deal” and “fairness expectations impact the likelihood of participation beyond considerations of self-interest.” Ethical considerations have been addressed in many related areas (e.g., [6]) and many studies suggest general guidelines for dealing with ethical issues. However, there is a lack of systematic understanding of how design can support the ethical treatment of customer contributions in OIPs. One approach to the treatment of ethics in online platforms is to raise the visibility of ethics. In OIPs, addressing the visibility of ethics is seen as a proactive design state, complementary to the application of ethics, that supports the ethical treatment of customers, maintains their participation in the online platform, and make the ethics of the platform visible on a large scale. Visibility has been described in other areas as the “degree to which socially significant information is made visible in the system” [19]. We argue that design for the visibility of ethics can benefit OIPs and support the ethical policies encompassed by OIPs and the companies that employ them.

The paper explores the visibility of ethics in OIPs. The next section presents related work regarding ethics in design, innovation communities, and platforms, and the visibility of ethics that can be applied in OIPs. The discussion of related work concludes by clustering these ethics into four emerging themes. We then present a study of ten corporate OIPs, focusing on their application and visibility of ethics. The following section provides reflections on design for the visibility of ethics, based on the emerging themes, with examples from popular OIPs. Concluding remarks and future work are presented at the end.

12.2 Related Work

This section reviews the related work in three parts: for design related ethics, ethics for OIPs, and the visibility of ethics. This is not an exhaustive list of

studies, but it is representative of the existing work. There are many conceptual levels discussed for the related work, however this is necessary to gain a holistic understanding of ethics in OIPs.

12.2.1 Ethics and design

Ethical considerations for design have been addressed by researchers in many fields, who have sought to provide an understanding of how ethical issues can be framed in the design of these corresponding areas. One widely- applied framework for this purpose is Value Sensitive Design (VSD) [12]. VSD concerns a theoretical and methodological framework that seeks to account for human values in a principled and comprehensive way throughout the design process. The framework was developed by Friedman et al. [12] and is used to guide designers and enable them to systematically address human values, such as privacy and autonomy, throughout the design process. Key features of the framework include its integrative methodology, which gives attention to both direct and indirect stakeholders, and its iterative tripartite methodology, which combines conceptual, technical, and empirical investigations. Friedman et al.'s study concludes with practical suggestions for using VSD.

Many researchers have studied the ethics of a particular domain. In service design, Carlsson (2012) [1] studied the ethical issues following an ethnographic approach, to explore the ethical design ecology of the field. According to Carlsson,

[...] service designers approach ethical problems in an implicit and consequentialist way and that when ethical situations are dealt with explicitly they are often of a nature in which the consequences of the proposed design solution easily can be foreseen. [1]

In addition, he discusses the ethical perspectives that can be adopted by designers, for example, sustainability in design. Furthermore, in the field of persuasive computing, Davis [6] discussed design methods for ethical issues throughout the process of technology design. The methodological frameworks of VSD and Participatory Design were examined in terms of how they can support the analysis of ethics in persuasive technology. Davis [6] argues that such frameworks support the designer in engaging stakeholders to uncover and address ethical issues in the design of persuasive technology.

Other studies have focused on a particular ethical issue, such as [16], in which the principle of “privacy by design” in technology is discussed. Privacy by design refers to a preventive design, whereby data protection should be viewed as a proactive rather than a reactive term. Pagallo [16] argues that:

[...] privacy by design should encourage people to change their conduct (e.g. with user-friendly interfaces), or limit the effects of harmful behaviour (e.g. with security measures) by strengthening people's rights and broadening the range of their choices. [16]

Furthermore, it is argued that some relevant problems for data protection hinge on the information revolution and the lack of clear legal boundaries in digital environments.

12.2.2 Ethics and open innovation

As a corporate initiative, OI embeds corporate ethics in the technology platform. However, OIPs should be aligned with user and technology ethics as well. In practice, an online OIP typically includes information about the company and their vision, the innovation process, how the customer can participate, the registration process, potential rewards, etc. In order to delineate the ethics for OIPs, we review ethical issues raised by its component parts: the company, users, and technological platform. Ethical issues exist in every field, with many similarities, and they can provide insights for ethics in OIPs.

Ethics related with OIPs include businesses ethics, such as organizational and strategic communication ethics. One example of business ethics concerns organisational innovativeness. A study by Riivari et al. [17] suggested that three organisational virtues can most effectively enhance organisational innovativeness: congruency of management, discussability, and supportability. Congruency of management depends on managers and the supervisors who clearly act according to the organisation's normative expectations.

Discussability refers to employees' opportunities to raise and discuss ethical issues, and supportability concerns how the organisation helps its employees to meet normative expectations. A second example of business ethics concerns strategic management, where findings indicate a gap between the implementation of strategy and the moral and ethical obligations of companies [15]. The discussion of ethics in the 2011 study by McManus [15] focused on the stakeholder perspective and the issue of trust. Regarding the stakeholder perspective, it is argued that companies should be run for the benefit of a range of stakeholders, who perceive benefits in different ways. Additionally, trust in managerial terms could be described as the belief that the company's stakeholders will avoid harm, by applying ethical principles in addition to more conventional economic criteria. The study suggests that the use of ethical principles promotes the decision maker (i.e., companies) in a long-term effect, as well as the development of society in a short-term effect.

Additionally, ethics for online and innovation communities can be applied to OIPs as well. Living Labs (LLs) is one type of innovation community, and it can be defined as: *"[...] an environment for innovation and development where users are exposed to new ICT solutions [...] targeting evaluation of new ICT solutions and discovery of innovation opportunities"* [9]. Ethical issues raised in LLs concern privacy and security, personal freedom, autonomy, and responsibility [18]. Privacy and security issues refer to the access to the community, to other users, or to information, while personal freedom is concerned with psychological and social considerations regarding participants' positive and negative emotions. Auton-

omy is concerned with the possibility of unwanted disclosures of information, conflicts, and other imbalanced decisions that should be considered. Finally, responsibility is concerned with the processes of data collection and reporting. Other ethical issues for LLs include intellectual property issues, reliability of the content, and many more. Another example of an innovation community is crowdsourcing communities. The ethical issues of remuneration and visibility are discussed in a report by Dolmaya on a crowd-sourced linguistic project [7]. The dilemma relating to remuneration concerns the issue of whether it is ethical for an organisation to seek volunteers or to offer non-monetary incentives for this work. Visibility is considered a type of recognition for users' efforts and promotes the activity, making it more visible and valuable for the community.

Lastly, the ethics of OIPs could also refer to the ethics of digital technologies and to software-related ethics. The first example is from the digital communications technologies field, where a study by Fortner & Fackler [10] discusses ethical issues of the field in relation to the problem of trust and ownership. Trust becomes a critical point in monitoring and transmitting a message, because the speed of information production is high, and both gatekeeping and even copy editing are rare. Moreover, problems of ownership in the online world make it difficult to control the reproduction of content, which raises challenges for the issue of fair use in contemporary copyright law. The second example is related to software ethics. In the field of Open Source Software (OSS), three ethical issues were identified in a study by Grodzinsky et al., namely, autonomy of OSS developers, quality of software, and accountability [13]. Autonomy of OSS developers refers to the ability of developers to work as volunteers, and to join or quit an effort strictly on their own initiative. Quality of software refers to the ethical responsibility to develop solid, well-tested code. Accountability refers to the problems of ownership and the fixing of bugs, among others. Grodzinsky et al. [13] concluded with support for the positive ethical force of OSS in the world of computing, and discussed how many corporations have disappointed the public with their lack of ethical behaviour.

12.2.3 The visibility of ethics

The concept of visibility has been addressed in many fields. In social computing, Erickson and Kellogg [8] defined visibility within the context of "social translucence," as *"the degree to which socially-significant information is made visible in the system"*. They also described the concept of "social translucence" as an approach for "designing systems to support communication and collaboration among large groups of people over computer networks" [8]. Social translucence concerns ways to build social technologies that support social life, where online social behaviour should become visible to facilitate awareness, ultimately creating social spaces [8]. Additionally, another relevant term for ethics in OIPs is "transparency," which is employed in different ways. In information technology, Turilli & Floridi [19] studied the ethics of information transparency and ar-

gued that “transparency is not an ethical principle in itself but a proethical condition.” In other fields, such as in collaborative networks, transparency refers to “shared rules, roles and responsibilities” [13], while in the media and communication fields, transparency is defined as the “revelation of someone’s identity” [11]. Finally, in information systems, McBride [14] referred to transparency as “the extent to which the derivation of content and process in an information system is made clear.”

Adopting the perspective of Erickson and Kellogg [8], in this paper the term “visibility of ethics” will refer to *“the degree to which ethics that are socially significant, is made visible in an OIP.”* Socially-significant ethics in OIPs can be the common ethics for a company, company associates, and a technology platform itself. Three additional dimensions can further define the visibility of ethics-related information in OIPs: context, location, and time. The first dimension refers to “which” context an ethical issue relates, for instance, in an idea submission phase, in communication with a customer, etc. Location refers to “where” the information is displayed, such as at the main page, secondary menu, external link, etc. The time refers to “when” the information is revealed, for instance, before the innovation call, after the idea submission, etc. Using an example of a customer who visits the online OIP to participate in an innovation call, the customer goes through the idea submission process, the customer submits an idea in the submission form (context), and afterwards, a business ethics-related document (“terms and conditions”) regarding the innovation process is revealed in the last step (location), after the customer has already described his idea (time).

12.2.4 Emerging ethical themes

To summarize this section on related work, ethics in design are mainly discussed in a specific area, with limited focus on providing design guidelines and limited generalizability to other fields. Ethics from relevant areas provide a general view on what the ethics of OIPs might encompass. The ethical issues discussed in this section can be categorized as, but are not limited to, one of four emerging themes. The themes refer to the content of online OIPs:

User data protection refers to the content that concerns the protection of user information in OIPs, i.e., how the company will collect, treat, or share the user data. Privacy, security, ownership, and intellectual property are some examples of ethics for this theme.

User motivation refers to the content that can provide a motivation for users to utilize an OIP, i.e., rewards for user contribution. Examples of ethical issues include remuneration, autonomy, visibility, collaboration, and free expression.

Justification of the company’s values refers to the content that reflects a company’s ethics in an OIP, e.g., a description of a company’s profile and potential impact on society. Examples of ethical issues include trust, stakeholder management, and responsibility.

Feedback to users refers to the content that establishes communication chan-

nels with users through an OIP, such as online chats through customer support channels. Discussability, supportability, and reliability are some example here.

These emerging themes can be helpful in recognizing ethics and their visibility in OIPs. In order to explore how the ethics' themes are addressed in practice, we will evaluate the existing state of ten OIPs.

12.3 Method

Ten corporate OIPs were selected to explore how the emerging themes of ethical issues are addressed. The OIPs in our sample are supported by large companies, have been active for years, and attract a large number of participants. Ten web-based OIPs were employed, with diversity in ethics presentation, i.e., in visual information, interfaces, and feedback channels. The emerging themes defined above guided the evaluation of ethics presented across webpages, sub-webpages, links, and menus of the OIPs. Following a content analysis method, we evaluated in a systematic way the broad range of media content in relation to the ethical issues. The content analysis was performed by the authors during the third quarter of 2015, and notes and screenshots from every step were taken. Table 12.1 presents an overview of the results. The first column shows the four themes, and the next four columns correspond to additional dimensions in the web content analysis (context, location, and time), followed by the corresponding activities involved in this evaluation. In every cell, we included example notes from all OIPs. The generated notes were analysed based on the themes, while additional notes from the interaction history were taken. Based on our results, many similarities in the way that ethics are applied and presented in OIPs were found. We list hereafter examples from the findings.

Ethics related to user data protection were found mainly in "terms and conditions," "terms of use," and "privacy policies" documents. Usually, user data protection is embedded in a separate document, either included in a separate link or a subpage, and these documents vary greatly in content, formulation, and length. Also, in some cases, the legal-related links and documents were organized under the same menu (e.g., Dell's OIP). It was common for OIPs to include legal documents or links for both the innovation process and the use of the online platform. One example is Philips' OIP, which has documents named "Terms of use" and "Privacy notice," although another "Terms and conditions" document is included for the innovation process.

Ethics related to user motivation were mainly communicated as calls for innovation (e.g., Statoil's OIP has a call for "Open campaign" in the main page), questions to provide motivation (e.g., PG's OIP main page has the question "Could your innovation be the next game-changer?"), visual communication of featured ideas (e.g., Dell's platform includes featured ideas with images, in the main page), rewards (monetary and non-monetary, e.g., LEGO's platform has on their "Project Guidelines and House Rules" page a sub-section for "Prizes and Rewards"), etc. Other motivational elements are the use of success stories

Table 12.1: Example of content analysis, with notes from all OIPs.

Dimensions→ Themes↓	Context	Location	Time	Activities in OIPs
User data protection	In the submission process → terms & conditions (Philips ²)	Menu: Our approach → terms & condition (AkzoNobel ²)	Always visible in a menu (Unilever ²)	Check web-links, related documents, submission process
User motivation	In Welcome page → Lists with submissions (Starbucks ²)	Main page → Open Campaign (Statoil ²)	Under menu "How it works" → Prizes & rewards (LEGO ²)	Check pages, menus, images, related documents
Justification of the company's values	Vision for innovation (Beiersdorf ²)	Main menu → About Co-creation Lab (BMW ²)	Always visible in a menu "Why Choose Pearlfinder" (Beiersdorf ²)	Check company profile, menus, related documents
Feedback to users	Communication with users → Browse Directory (P&G ²)	Main menu → Read our blog (Dell ²)	Always visible in a menu: "Corporate information" → Contact us (Starbucks ²)	Check contact options, submission forms

and implemented products (e.g., Beiersdorf's OIP main menu has the "Success stories" option), and gamification elements such as points, badges, and leaderboards. One example is for LEGO's OIP contributors, who are encouraged to gather support from a certain number of "supporters" in order to continue to the next phase, within a time-limited period.

Justification of the company's ethics and values was communicated through the description of a company's profile (e.g., BMW's OIP has a link "About Co-creation Lab"), activities such as current trends in innovation (e.g., Dell's OIP main page has a list of "trending ideas"), corporate responsibility (e.g., Dell's OIP includes one link for "Corporate responsibility"), justification of the innovation process with an implementation plan (e.g., Starbuck's OIP includes in the main page one section called "Ideas in Action"), future activities (e.g., LEGO

² See Philips: <http://www.simplyinnovate.philips.com/index.php>, AkzoNobel: <http://www.akzonobel.com/openinnovation/>, Unilever: <https://oiportal.yet2.com/>, Starbucks: <http://mystarbucksidea.force.com/>, Statoil: <http://innovate.statoil.com/pages/default.aspx>, LEGO: <https://ideas.lego.com/>, Beiersdorf: <http://pearlfinder.beiersdorf.com/about-pearlfinder>, BMW: <http://www.bmwgroup-cocreationlab.com/home>, P&G: <http://www.pgconnectdevelop.com/>, Dell: <http://www.ideastorm.com/>

provides an overview of how their innovation process works, with options such as "Project guidelines," "Review periods," and "Acceptable project content").

Feedback to the users is addressed through communication channels, such as contact forms (e.g., AkzoNobel's OIP provides contact options for specific company departments). In addition, feedback can be addressed through comments, for example in the evaluation process for user submissions (e.g., Starbucks' OIP users can comment on ideas and vote for them), discussion communities (e.g., BMW's OIP filters user characteristics and preferences in order to categorize them into suitable discussion and co-creation groups), blogs (e.g., LEGO's OIP has a blog with posts regarding interviews from creators, process deadlines, and other news), and social media (e.g., AkzoNobel's OIP has a link to follow the company on online media channels, such as Twitter, Facebook, YouTube, and others).

To summarize our results, the four emerging themes have been addressed in the examined sample of OIPs in various ways, and we found that the visibility of their ethics varies more in context than in location and time.

12.4 Reflections on Design

We conclude with reflections on design for OIPs. The reflections on design are grouped based on the corresponding themes above, and follow the same structure: a title with a short explanation, detailed description, suggestions for designers, and examples of OIPs with screenshots, highlighting both good and bad examples.

12.4.1 User data protection

Clear data protection policies for each process: Provide clear and separate data protection policies for the innovation process and for the use of the platforms.

An ambiguous element of the OIPs we studied is in their user data protection policies and other privacy policies. The existence of more than one document for or link to these policies raises questions of how the policies are related or applied to the innovation process, the platform itself, and the company. Clarity and separation of these policies could help users to identify the requested information in the correct policy document. Moreover, the clustering of those policies could provide additional visibility for the user.

Suggestions for designers:

- a) Provide the relevant user data protection policies before the idea submission phase.
- b) Organize all policy-related links in a separate section.

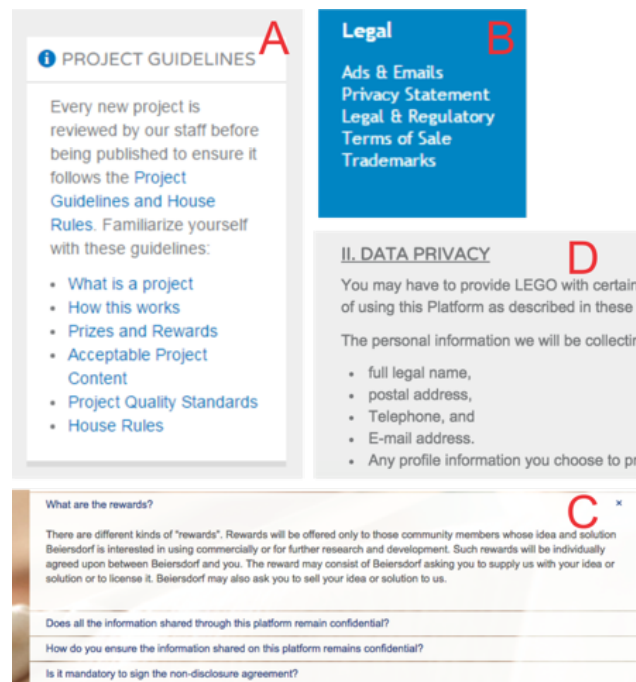


Figure 12.1: Screenshots of OIPs from LEGO (A), Dell (B), Beiersdorf (C), and LEGO (D).

- c) Provide an overview of the data protection document, with titles and subtitles, and provide more details on demand.
- d) Highlight the important information through text formatting, such as colour, font size, underlining, etc.

Examples: LEGO's OIP includes all the project guidelines, with data protection policies visible before the submission process (Fig. 12.1, A). The example from Dell's OIP provides a visual cluster of all legal-related links, placed in the bottom of the main page (Fig. 12.1, B). The Beiersdorf platform uses a smart way to keep the user focused on the overview of the project details, and also provides information on demand with wrapped text (Fig. 12.1, C). In addition, many platforms use various means to highlight text, especially with long legal documents. A similar example is LEGO's platform, which presents content using readable text formatting (Fig. 12.1, D).

12.4.2 User motivation

Motivations for users: Provide clear motivations in the main page for users to participate.

A driving factor for the success of an OIP is user motivation. Various motivations are addressed to captivate the interest of users. Monetary rewards de-

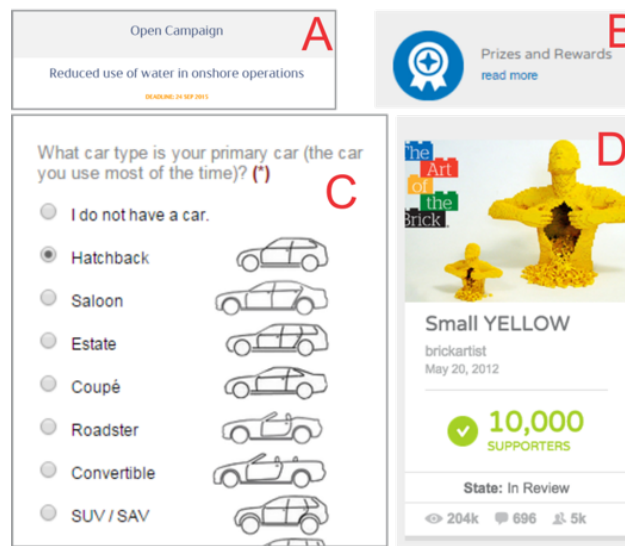


Figure 12.2: Screenshots of OIPs from Statoil (A), LEGO (B), BMW (C), and LEGO (D).

livered after an idea is adopted, such as in LEGO's innovation process, will gain the attention of other users. Very few OIPs use monetary rewards, and they strive for intrinsic user motivation. The OIPs primarily rely on a call for innovation, sometimes in the form of a question in the main page. In addition, the use of gamification elements, for example in Dell's, LEGO's, and Starbucks' platforms, provide a more visible motivation for users.

Suggestions for designers:

- Organize a call for innovation.
- Provide incentive mechanisms, monetary or non-monetary, in a visible position.
- Provide an easy submission process for users.
- Gamify the process through the use of various gamification elements.

Examples: Statoil's OIP communicates in the main page a call for their open campaign, with limited time for user participation (Fig. 12.2, A). In a central position in the main page, the call is visible immediately. On the other hand, the area for "Prizes and rewards" in LEGO's platform is organized in a separate section, although it is not visible from the beginning because of its position under a menu item (Fig. 12.2, B). Furthermore, an easy submission process, such as in Starbucks' OIP, could be a motivation for users. BMW's platform utilizes a welcoming form for filtering user characteristics (Fig. 12.2, C), and provides an easy submission process. Lastly, gamification was a visible way

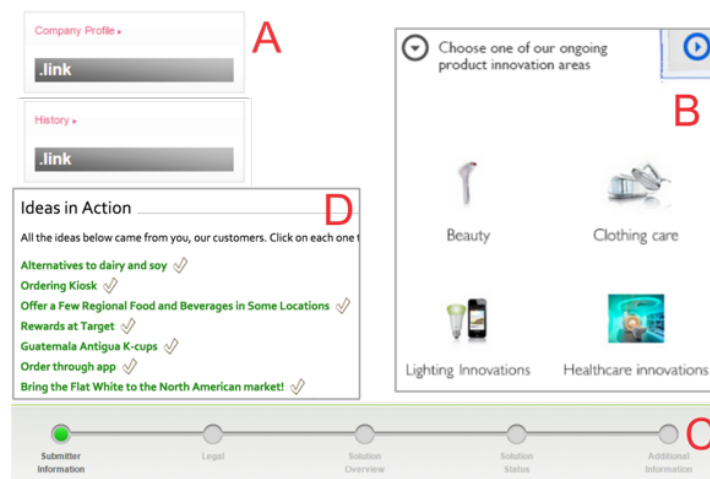


Figure 12.3: Screenshots of OIPs from AkzoNobel (A), Philips (B), Unilever (C), and Starbucks (D).

to attract users to participate in innovation campaigns, such as in LEGO's OIP (Fig. 12.2, D), which allows users to visualize the number of supporters, votes, comments, and other project details.

12.4.3 Justification of the company's values

Justify the company's values with innovation: Communicate how the company's values and ethics are justified with the innovation process.

The OIP, as a part of the company, carries the company's values and ethics. However, these were not visible in the majority of the examined OIPs. Clear communication of the company's vision, values, and ethics help the user to recognize and justify the innovation process. An example here is the platform of Beiersdorf where a video is included, describing how the platform works and the benefits for the platform members, among other information. The structure and communication of the innovation process might be significant for user motivation as well.

Suggestions for designers:

- Organize the company's ethics in a separate section such as "company profile," "history," "vision," or similar.
- Provide choices for the innovation tasks.
- Provide an overview of the innovation process, in terms of time, resources, etc.

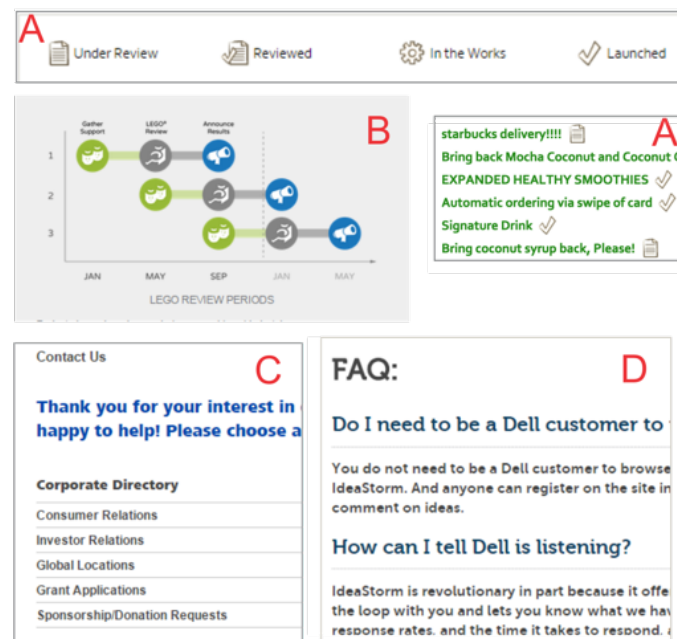


Figure 12.4: Screenshots from Starbucks (A), LEGO (B), P&G (C), and Dell (D).

- d) Provide information on the next phases and communicate the results, such as success stories and implemented products.

Examples: The platform of AkzoNobel provides an example of structured information about the company: their profile, history, fascinating facts, and more (Fig. 12.3, A), in order to justify the company's value and set the context of the call for innovation. In addition, Philips's OIP includes nine categories for user contributions, such as beauty, healthcare innovations, oral healthcare, and more, providing a great variety of choices for user submissions (Fig. 12.3, B). Similar to Philip's platform, Unilever's OIP includes a visual overview of the innovation process, with a five-stage graphic that can be followed throughout the process (Fig. 12.3, C). Finally, Starbucks communicates the list of all ideas that are "in action" or in other stages, providing information on how the company progresses through user-developed ideas (Fig. 12.3, D).

12.4.4 Feedback to users

Communication with the users: Support communication channels with the users.

User communication through the company's OIP should be supported before, during, and after the submission process. Usually, OIPs include general contact details, but a more targeted communication channel is needed. Along with a dedicated group who work on the innovation process or the call for innovation, it should be visible how, when, and who the users should contact for direct communication with the company.

Suggestions for designers:

- a) Support user feedback throughout the idea submission process.
- b) Keep the user informed about the current state of his/her submissions and the innovation process.
- c) Provide communication channels among users, such as contact forms, blogs, discussion communities, or similar.
- d) Provide an "FAQ" section with common user issues.

Examples: LEGO's platform provides descriptions of the review phases, keeping the user informed about his submissions (Fig. 12.4, A). Also, during the submission phase, there is dialogue with the user in case of any incompatibility with the submissions in LEGO's OIP. Thus the user can improve the ideas and submit them again. The Starbucks platform uses different icons to visualize the current state of each submission, and provides a message informing the user about the current stages in the idea-submission process (Fig. 12.4, B). The P&G platform provides various options for user communication, such as choosing from a corporate directory (Fig. 12.4, C). Lastly, the Dell platform (Fig. 12.4, D) provides a list of Frequently Asked Questions (FAQ) for further support of the users.

12.5 Conclusion

The visibility of ethics in OIPs serves to raise awareness of issues important for the fair treatment of users in innovation processes. Because the success of these platforms depends on customer participation, we argue that more attention should be paid to the design of OIPs. By addressing ethical issues in OIPs, such as user data protection, user motivation, justification of the company's values, feedback to the users, and other issues, companies can design for the visibility of ethics as one way to engage user participation. Our results indicate that the visibility of ethics can be improved in OIPs, in order to better facilitate customer participation on a large scale. However, ethics need to be clearly communicated with explicit design. First, the selection of "socially significant" ethics for an OIP needs to be decided upon and clearly communicated to customers. Our reflections on design for OIPs can help to address the visibility of ethics, in connection with other design guidelines, although this is only one approach to the ethical treatment of customers. We also encourage researchers to apply design suggestions from other areas, such as in digital service design, and to invite users or HCI experts for evaluation. Furthermore, interaction designers and platform designers can also use the design suggestions. The application of design suggestions in similar types of platforms needs to be studied as well.

The study had a number of limitations. The research area of ethics is very broad, and we therefore selected representative studies to review, while trying to treat ethics in OIPs in a holistic way for the customer, company, and platform perspectives. The heterogeneity of the studies and definitions of ethics, and their many conceptual levels, was a barrier for the literature review, and we focused only on the studies with clear formulation of ethical issues. From these, we extracted four general themes of ethics. In addition, the use of the content analysis method was an insightful way to gain understanding both for the application of ethics and their visibility. However, a long-term commitment to and active participation in those platforms, probably with an ethnographic study (e.g., netnography), are needed in order to examine in depth the ethical issues. Additionally, a larger number of OIPs would provide rich examples of design practices. Future work includes the application and evaluation of the design suggestions in various OIPs, and the utilization of other methodologies for the evaluation and long-term studies of ethical issues, with both HCI experts and users, as part of an iterative design process.

We believe that ethical issues should not be seen as constraints for customers or general users that limit participation in OIPs. Design for visibility is considered a proactive state that can support the ethical treatment of customers and engage the customers. Companies should communicate their socially-significant ethics and make them visible. Socially-significant ethics in OIPs can be the common ethics for the company, company associates, and technology platform itself. We argue that designing for the visibility of ethics can improve service innovation through OIPs, and promote fairness in customer engagement with companies.

12.6 Acknowledgements

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Design for Motivation: Evaluation of a Design Tool

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Abstract

Design for motivation constitutes a design practice that focuses on the activation of human motives to perform an action. There is an increasing need to design motivational and engaging systems for voluntary systems, such as innovation platforms, where user participation is a key target. When designing for motivation, a challenge of the early design phases is the selection of appropriate design tools and the formation of a reliable design strategy. The current work presents a design tool, namely DEMO (Design for MOTivation), and evaluates its design process. The tool provides multidisciplinary teams with a user-centred, structured method to ideate and ultimately develop a consistent design plan to engage the users of innovation platforms. The evaluation study analysed the tool's contribution to the design of motivational innovation platforms. Three data collection methods were utilised: a protocol analysis, interviews and questionnaires. The results discuss the experiences of 32 users, the development of motivation concepts, the group activities, the creativity aspects, and the user activities across disciplines. Structured processes and artefacts were found to be productive practices in the early design phases. The results also highlighted the importance of multidisciplinary and user-centred teams that can enhance collaboration and communication during the design process.

14.1 Introduction

Design embraces many ways to affect the use of interactive systems and to motivate end-users to perform an action or adopt a specific behaviour. Strategies of design that lead to user engagement may differ depending on the use context, the nature of the targeted interactive systems, the use purpose and the utilised extrinsic and/or intrinsic motivators (e.g. [21, 5, 20]). As the need for creating motivational and engaging systems increases, especially for voluntary systems

(e.g. [6, 1, 2]), it is important to efficiently adopt and employ techniques from related fields, such as persuasive design, gamification, game design, motivational design, and instructional design [19, 48, 10, 17, 26]. Design for motivation constitutes a “design practice focused on the activation of human motives, with short or long-term effects, to perform an action” [11] and originates from the recent increasing interest in the development of systems that target behavioural change, persuasion and engagement.

When designing for motivation, a challenge during the early design phases is the selection of tools. A number of studies on design tools have focused on the presentation of these very tools (e.g. [24, 37, 49, 36]); however, there is no dedicated process for selecting the appropriate tools, no clear description of the design process and no specific instructions regarding how to apply the tools [11]. Designing for motivation could benefit from a design tool that operates at a higher level than current tools, thus constituting a design meta-tool which utilises the related theories to produce a detailed design plan for the early stages. Furthermore, employing design processes with stages, provides guidance related to the content of communication as well as a specific focus for the decisions at each stage, leading to design solutions [38].

The current work presents and evaluates a design process with a design tool, namely DEMO¹ (DEsign for MOTivation). DEMO is a design tool used during the early design stages that targets the development of design plans for motivating and engaging users of interactive systems. The meta-tool qualities of DEMO provide multidisciplinary teams with a user-centred, structured method for ideation related to motivational design. The tool has previously been evaluated in a usability study [11], leading to the tool’s current second version.

The tool was primarily developed according to the identified design directions [11, 42, 34, 46, 37, 41, 40] for specific interactive systems, namely innovation platforms (e.g. [20, 1, 29]). Innovation platforms are a representative example of voluntary interactive systems that urge user motivation. When developing innovation platforms, it is important to determine which factors trigger user participation [1]. Previous research on innovation platforms and other similar research communities have identified a number of participation motives[21, 22, 29, 5, 6, 1, 20, 25, 2]; however, the design processes involved in developing motivational innovation platforms are still unclear[29, 21, 22].

An evaluation study was organised to examine the design process in the case of innovation platforms and to better understand how the DEMO tool supports the design process of developing motivational platforms. The contribution of the paper is threefold. First, the paper describes the design process in detail, as well as how the tool is utilised during the process. Second, the combination of methods used to study and analyse design processes in this context to provide rich results are discussed. Third, the presentation of results can be useful in other contexts and tools when designing motivational systems.

¹More information about the DEMO tool: www.designformotivation.com

14.1.1 Design challenges and directions

The systematic development of motivational systems is limited by a number of challenges [34, 42, 11]. Four main challenges have been discussed in the literature of gamification, game design and persuasive design for existing design approaches. First, the existing tools refer to designers, such as game designers and experience designers, as their target group that utilises these tools [34]; however, the suitability of designers in developing motivational systems has been questioned due to the complexity of the design task, as it requires expertise from diverse areas and knowledge of various aspects of technology [46, 41]. Second, the theoretical foundations of motivation have been interpreted and applied in different ways in the literature [37, 42]. The majority of applied research lacks a theoretical connection and practical use for the existing design approaches in the systems' designs. Moreover, the dialogue with end-users should influence the design process from the beginning. Communication between the developing team and the end-users and their involvement are central to the design process [30, 40]. Finally, the design of motivational systems is an activity that designers need to acknowledge, explore and understand as they design things [40]. The challenge in this case is to create dialogue within the design team that differs from a traditional communication process and to use artefacts in a material form, which could influence ways of thinking and acting when designing for motivation [30, 40].

To delineate the complexity of design for motivation, key design directions have been suggested. Given the intricacy of the design problem, it has been suggested to focus on optimising design as a team-based activity [40, 46, 11, 38]. A *multidisciplinary team* of professionals, such as game developers, experience designers, and psychologists, could discuss how design, use and objects are related to create motivational systems [40, 38]. Discussions based on *artefacts* is suggested as a means of dialogue generation for multidisciplinary teams, which surpasses traditional communication processes [39, 14, 4, 40]. Furthermore, the use of a *user-centred approach* ensures that users' needs, motivations, and goals are considered during the early design phases [42, 40, 38]. A user-centred design could be used to define the area in terms of methods and approaches rather than as a specific type of design [40]. Finally, the motivational design process could benefit from *structured* approaches with steps to guide the design team to a solid outcome [11, 38, 33]. Existing motivation concepts, theories, instruments, design methods, game elements and other existing tools should be available to the target group in order to make informed decisions to achieve a common outcome [11, 33].

The DEMO tool was developed based on the directions discussed, addressing an *artefact-based, user-centred, structured* design approach for *multidisciplinary teams*. A specific description of DEMO is presented in the following section.

14.2 DEMO: A tool to design for motivation

The concept of developing a tangible tool emerged while working with industrial partners, who wanted to increase user participation in innovation communities. Therefore, DEMO (DEsign for MOTivation) was introduced as a design tool used during the early development stages of innovation platforms, ultimately targeting an increase in user motivation and participation in such platforms [11]. The tool was built according to the design directions (Section 14.1.1), while it is theoretically grounded on motivation theories and incorporates design concepts for motivation through a stepwise process. The novelty of the DEMO tool and its process lies mainly in three aspects. First, the tool is considered a ‘meta-tool’, as it offers an overview of the existing tools, methods and related theories that lead to efficient communication during early-phase, limited-time sessions. Similar tools were not previously available. Second, the tool has been evaluated before its use during projects. The first version of DEMO was evaluated by experts for its usability performance [42, 11]. This paper discusses the second evaluation of motivation-related tools based on empirical studies. The existing tools have been applied without previous evaluation on their usability. Third, the design of the tool incorporates the design directions that are discussed in the literature. The characteristics of artefact-based, user-centred, structured and multidisciplinary teams are embedded in DEMO’s design. In previous approaches, only the characteristics of user-centred and structured processes were usually discussed.

The DEMO tool consists of three main parts: the *DEMO cards*, the *DEMO board* and the *team roles*, which are utilised during a semi-structured, *workshop-based design process*. The board and the cards are utilised as artefacts that serve as partial or complete representations of the process that is being produced [28]. In other words, DEMO offers a bottom-up approach to the design task, focusing on developing the activities and the process for a ‘*motivation plan*’, i.e. an early-phase plan of a design task.

14.2.1 DEMO cards

The DEMO cards are designed to inspire group discussions and to suggest specific activities related to design, management and research. Collaborative card-based techniques and game-like approaches already have a long tradition of use in participatory design, serving as communication tools between members of the design team and users to initiate design discussions and to accelerate the refinement and iteration of ideas [3, 50, 35, 16]. The cards are inspired by previous card-based design approaches [13, 23] and incorporate terms from related theories.

In DEMO, four card categories, namely *people*, *methods and tools*, *resources* and *expectations*, aim to further clarify the activities for each step. The cards display an icon with a term from motivation (motivation theories, gamification, game elements), design (interaction design, user experience), management



Figure 14.1: The DEMO cards positioned on the board.

(needs, material) and research activities (research methods, tools). Figure 14.1 presents examples of the cards.

- *'People' cards*: Specify who (e.g. industrial partners, users or administration) should be involved in a particular step.
- *'Method and tools' cards*: Specify which methods and tools (e.g. personas, qualitative data or surveys) should be used in a step.
- *'Resources' cards*: Specify which resources (e.g. the platform, policies or points) are needed to complete a step.
- *'Expectations' cards*: Specify what the expectations (e.g. feedback, learning or new product/service) are for each step.

14.2.2 DEMO board

The activities on the cards are structured on a table board. The DEMO board is used as a design and information space that supports the structure of the design process and the collaborative reflection through the steps. In design literature, empirical studies have showed that applying methods based on structured methods produces the most useful outcomes [12, 31]. The board and the cards assist the team members in navigating through the process of developing

a *motivation plan* and help them to include all information essential to the group discussion. The DEMO board triggers the identification of important aspects of the design process through four phases with titles and suggested questions underneath that the team can use as discussion-starting material. The phases include:

- *Objective*: The team describes and clarifies the objective of designing to motivate the user, i.e. increase participation or quality of participation.
- *User*: The team defines the characteristics of the target user and the subject of the design process and utilises the innovation platform.
- *Experience*: The team discusses and specifies the targeted user experience that should result from the innovation platform to motivate the user and reach the objective.
- *Motivation*: The team chooses the motivational mechanisms that will be employed by the innovation platform to motivate the user.

14.2.3 Team roles

The target group of DEMO is a multidisciplinary team that collaborates in a participatory workshop. The team may consist of designers, non-designers, end-users and other experts, where each participant has a 'role' according to his/her background. The roles have two primary purposes within the design process: a) they support the participants' engagement in a 'gamified' role-playing process, and b) they ensure the inclusion of several perspectives during the workshop [11]. The team roles are inspired by previous work on design tools [45], design thinking research [9], participatory design approaches [8], and game-like approaches [7]. The roles are described as follows:

- *Manager*: This is a management-oriented role that focuses on how to organise and deliver an optimal solution to a problem. Managers, such as project and/or innovation managers, are characterised by a high level of practice and they are comfortable working with a wide variety of different tasks [11]. The project manager can also be the workshop facilitator and may apply the DEMO tool.
- *Designer*: This is a design-oriented role that focuses on design-related activities (sketches, drawing, implementation) and contributes to the designs artefacts throughout the process. Designers, who may be interaction designers, service designers or interface designers, must be able to communicate and define concepts for the other roles [11].
- *Developer*: This is a technical role that focuses on how to develop the suggested solutions. Developers, who may be computer scientists, or software engineers, contribute to the feasibility of the suggested solutions/designs [11].

- *Psychologist*: This is a role that requires experience and/ or a background in psychology, motivation, and human factors. The psychologist contributes to the analysis through discussions regarding motivation and human factors as well as suggestions regarding how to address the platform's users more effectively.
- *End-user*: For a user-centred process, this role is necessary to gain user insight. The end-user has experience or is familiar with the problem and contributes to the applicability of suggestions, designs and solutions from a consumer/ customer perspective.

14.2.4 Design process

The design process consists of pre-workshop preparation and the workshop (Fig. 14.2). The preparation for the workshop refers to the selection of participants and their familiarisation with the DEMO tool, the processes of the workshop and the design task. It is not mandatory for participants to have any experience in workshop participation or in using design tools. Pilot sessions can also be arranged to familiarise participants with the tool.

The workshop begins with a short introduction to the design task, the roles and the tool, thus ensuring a shared understanding of the process and its desired outcome. The DEMO tool suggests a step-wise process that works iteratively between these two stages. The duration of the introduction should be limited to ten minutes. The workshop consists of two stages: the *conceptualisation* and the *implementation* stages.

Conceptualisation: The goal of this step is idea generation and concept building on how to solve the design task. The DEMO tool suggests a step-wise process that works iteratively. There are no set rules for turn-taking, and cards may be combined in the way the participants deem productive; however, it is useful to begin by clarifying the objective and the user, as they are described in the board. Managers control the design process and the discussion flow, following the board's suggestions and asking questions. All participants contribute to idea generation, problem finding and/ or the evaluation of ideas by suggesting and combining the cards on the board and through argumentation related to their choices. The psychologist and the end-user play central roles. This stage lasts approximately one hour. At the end, the participants summarise the

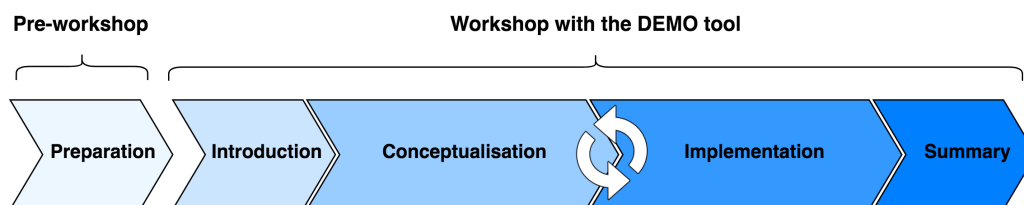


Figure 14.2: The design process of the DEMO tool.

concluding concepts, reflect on the resulting design concepts and take a short break. This stage ensures a common understanding of the motivation concepts, rather than an evaluation of concepts in terms of whether they are appropriate or realistic.

Implementation: The goal here is to determine how the previously suggested concepts could be implemented. Again, this is an iterative process that uses the same phases of DEMO. At the implementation stage, the experience and motives are the central discussion topics; therefore, the developer and the designer play central roles. All participants contribute to idea generation, problem finding and/ or the evaluation of ideas. Other techniques, such as drawings and sketches, are employed. This stage lasts approximately one hour. At the end, the participants summarise how they will implement the motivation concepts into designs and reflect on the resulting designs. This stage ensures a common understanding of the connections between conceptualisation and implementation, as well as the in-between activities. After the workshop, a plan for future activities is developed and the workshop is repeated, if necessary.

An evaluation study was conducted to examine the tool's features and performance in design processes, which is described in the following section.

14.3 Evaluation of the design process with DEMO

The above design process was applied and evaluated, as part of an ongoing research project. The objective of this study was to provide an in-depth understanding of the design process of motivational innovation platforms, while the process was supported by the DEMO tool. The research question was: *How do the features of the tool (artefact-based, multidisciplinary, structured, user-centred) support the design process of developing motivational innovation platforms?*

The research question was examined through an exploratory case study that is generally used to gain an in-depth understanding of the concerned phenomena in a real-life setting [51]. The case study was conducted over the span of three months (January-March 2017).

14.3.1 Participants and study setup

Participants were recruited during January and February 2017, and they were assigned to one workshop. In total, one pilot study and six workshops took place during this time in a Scandinavian research institution. Each workshop consisted of 4-5 participants with a background in one of the following disciplines: design, computer science, psychology or project management. The selection and delegation of the participants in workshops were based on their backgrounds and expertise. The team composition were reflected newly grouped teams of people with multidisciplinary backgrounds, though it is beyond the scope of this paper to make a definitive causal connection between group members and familiarity levels within the group; however, it is of interest to investi-



Figure 14.3: Participants working on the design task during the workshop.

gate the effect of the members' backgrounds on their contribution to the design process. During the workshops, the researcher of this study participated as an observer and performed appropriate interventions (through discussions) when requested or considered necessary. Participants signed an informed consent form and were informed of the data collection process in advance. The total duration of each workshop, including pre- and post-sessions, was approximately three hours.

14.3.2 Measures and study procedure

The study examined participants' practices and perceptions regarding the use of the DEMO tool during the design process, their motivation practices and creativity. Several data collection methods were utilised: (a) before the workshop: a pre-questionnaire, (b) during the workshop: observations with field notes and video-recordings and (c) after the workshop: a post-questionnaire and audio-recorded interviews.

Before the workshop, participants completed a questionnaire using both a Likert scale and open questions. Questions were asked regarding basic demographic information, such as age, gender, and field of expertise, as well as prior experience in design tools, workshops, and creativity capacity. In addition, participants were asked to describe any motivation techniques and rewarding mechanisms they utilised in the past. The purpose was to identify general concepts related to how users think and act in response to motivation. Questions about creativity concerned the self-rated creativity capacity, which was adapted from an existing questionnaire on creativity styles [27].

The workshop began with a short self-introduction and introduction to the

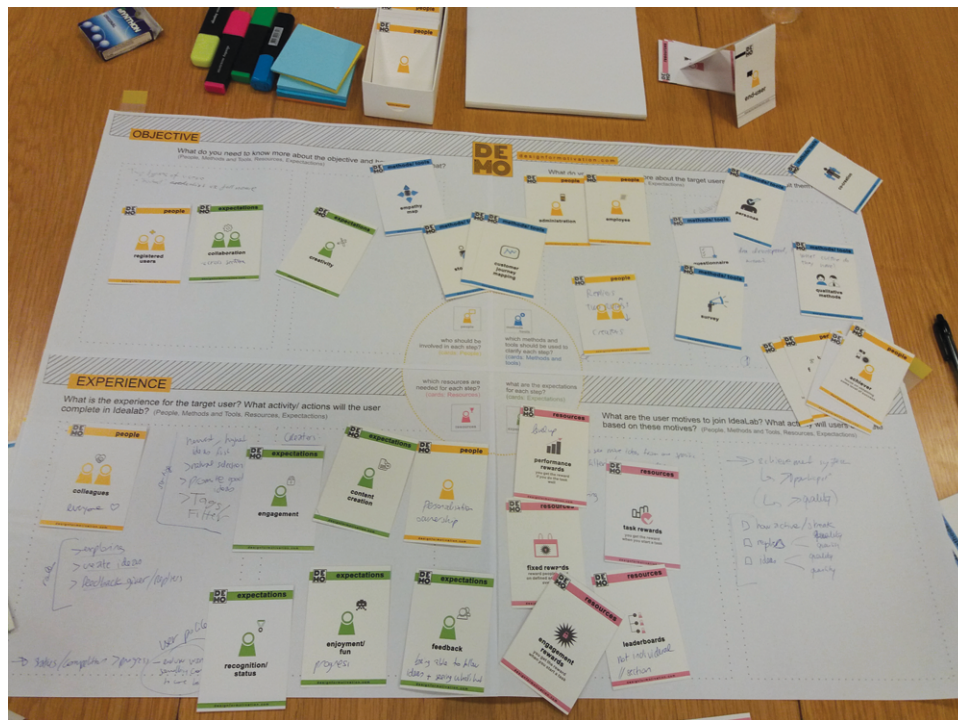


Figure 14.4: The design cards and the board of the DEMO tool after a workshop session.

DEMO tool, and an online manual of the tool had been sent to participants beforehand. The design task and the participants' goal was to develop a motivational plan for an innovation platform that would increase voluntary user participation. During a two-hour workshop, the participants worked on the design task while they interacted with the tool (Fig. 14.3). The workshop included two phases of teamwork: concept development and the implementation phase, where concepts were transformed into designs and sketches of the platform. Figure 14.4 shows a screenshot of a workshop with a completed motivation plan and other generated materials.

During the post-workshop session, the participants completed a questionnaire about their experience with the DEMO tool, collaboration with other people and satisfaction with the final design. Both a Likert scale and open questions were applied. In addition, all participants were invited to individual interviews. The semi-structured interviews focused on their experience with the DEMO tool, satisfaction with the final design, and group work experience. Selected questions were repeated during the interview to evaluate or complement their replies from the pre- and post-questionnaires. The study was approved by the Norwegian Centre for Research Data. All data were anonymised, and personal identifiable information was removed from the study results.

14.3.3 Data analysis

To enhance the rigour and analysis of the empirical data, additional verification methods were employed, such as data triangulation [44, 51]. The data from the workshops (video recordings and other generated materials) were used as a primary data source, while both the questionnaire and interview materials were used as secondary sources to compare and complement the data. The method followed for each dataset is described in the next sections.

14.3.3.1 Workshop analysis

An existing protocol analysis method [18] was employed to examine 14 hours of video recordings of the workshops and to examine the participants' behaviours and performance in detail. The design process was captured and represented as a sequence of events in time. These events were organised into creative episodes, which include the segmented verbal utterances that contain a series of transactions among participants about a theme with the aim to move the discussion forward and to achieve the goal [18]. Episodes were qualified as 'framing-moving-reflection' cycles. 'Framing' refers to an action in which a participant frames a (sub) problem or (partial) solution as a context for further activities (problem finding), while 'moving' is considered a problem-solving exercise and refers to actions such as generating ideas, making an inventory, sorting information, combining ideas or comparing concepts. 'Reflecting' refers to actions that lead to a complete reconsideration of the design task and involves the critical thinking of the team and their actions. Table 14.1 (Appendix) presents examples of the 'framing-moving-reflecting' coding for the workshops. The creative episodes were used to capture two instances: user activities with the DEMO tool and without it. Additional information used to analyse the video recordings was included, such as the time and duration of episodes, the participants involved in each episode, discussion topics and details of episodes. Other data from the workshop, such as field notes and generated materials, were merged to understand the context of the design process. Initially, the analysis was conducted by two researchers to discuss the data, gather feedback and make changes, if necessary. Later, one researcher continued the retrospective protocol coding. JMP software was used for data visualisation and the analysis of the behavioural patterns during the design process.

14.3.3.2 Interview and questionnaire analysis

The interviews were audio-recorded and transcribed verbatim. In total, 10 hours and 45 min of interviews were transcribed. Data were coded using the software NVivo 10 to better organise, browse and manage the data. The grounded theory was used for the qualitative analysis of the data [15]. Using open coding, basic codes and then themes were identified, by grouping previous codes and classifying them under higher-order headings. For the final step of the

content analysis, a general description of the research topic was formulated by generating categories (and sub categories), and selective coding was integrated to represent the central phenomenon of the data. Furthermore, two questionnaires were used to assess the participants' backgrounds, creativity and experiences with DEMO. Using a qualitative analysis method, the questionnaires were analysed into codes and themes. Data were coded using the software NVivo 10, while the SPSS Statistics 24 was used for the statistical analysis.

14.4 Results

The study generated rich results for the research question. First, the participant demographics are reported. Then, the results are organised into four subsections: a) user experience with the DEMO tool, b) group activities and communication, c) motivation concepts and thematic activities, and d) creativity and user activities across disciplines.

14.4.1 Demographics

A total of 32 participants, 21 males and 11 females, voluntarily participated in this study. All workshops consisted of a minimum of four and a maximum of five participants, with a mean age ranging from 25-43 years old. The participants were coded according to their roles, i.e. manager, designer, developer, psychologist and end-user. All participants were invited to adopt the roles in the workshops according to their professions, apart from end-users, who were invited as end-users. Specifically, designers had expertise in service design, interaction design and user experience design, while developers had expertise in computer science, software engineering and information technology development. Furthermore, managers had expertise in research and marketing, service science, software and data management. Psychologists' backgrounds focused on psychology, work and organisational psychology, motivation and learning, while end-users had expertise in interaction design, human-computer interaction (HCI), and service design. The expertise level was self-reported. The mean years of expertise was quite high, especially for managers (M=11 years), developers (M=10 years) and designers (M=6 years).

The participants also reported previous experience with design activities and design tools. Nineteen participants (60% of the total) had previous experience in design activities during workshops, in which almost half of them (48%) participated in workshops more than six times, while the remainder participated in up to five similar workshops (26% 1-2 times, 26% 3-5 times). The participants mentioned that the purpose of these workshops was to define a problem, to design and create solutions, user testing and evaluation, to gain insights or to engage participants.



Figure 14.5: Screenshot from a workshop with generated material.

14.4.2 User experience with the DEMO tool

In the post-questionnaires, participants reported how they utilised the tool during the workshop, while in interviews, the participants confirmed and expanded their answers with specific comments about DEMO's components. The overall user experience with the tool underscored the usefulness and fun as the most important characteristics of the DEMO tool according to the post-questionnaires. The importance of fun and usefulness was confirmed during the interviews, in which participants provided 61% positive comments and 24% negative comments, as well as 15% suggestion comments for the tool's future improvements. Positive comments referred mainly to the general experience with the tool and were less specific regarding the components of DEMO. According to the participants, the general experience with the tool was fun and game-like (22%), structured (16%), inspirational (14%), easy to use and a beneficial approach (10%). The fun and game-like aspects were explained in terms of the group-based, board-game like and time-limited activities. The structure of the tool was highlighted as a positive feature in terms of the process, design task, project and groups' backgrounds. Inspirational aspects of DEMO mainly referred to the role of the cards, whereas the beneficial aspects of the tool were described in terms of the process or the components of the tool.

"I think it's fun to use; it becomes like a game and that probably shaped the discussion and focus towards the idea". (End-user)

"The tool was helpful, partly for organising the work - Okay you should look at the objective, you should look at the users, motivation and so on. And this set up with these steps also worked as a checklist and inspiration."

Also the cards sometimes work when things don't run so smoothly. We picked up a card and looked at it and continued working". (Developer)

The important factors of user experience with DEMO were prioritised differently across disciplines. For example, designers considered the tool primarily fun to use and useful, while developers favoured the fun and simplistic aspects when using DEMO. End-users considered the tool primarily fun and satisfactory to use. Managers and psychologists considered the tool primarily fun to use and useful. Furthermore, some negative experiences with the tool were reported. The DEMO was argued to require time to learn (24%), while the learning threshold was perceived differently across disciplines. Also, in general, the process of using DEMO was found to be confusing (22%) due to the lack of strong guidance, and also it was also indicated that it limits participants' creativity (6%) due to the previous use of open-ended practices in work.

"I took some time to understand how to use the board, how to use the cards, when, if there was an order. I thought the way to use it was quite random, but later, I understood it". (Psychologist)

"When we had the cards, we didn't try to think. On the other hand, when we ran out of ideas, we could use the cards for inspiration. It is both positive and negative. Maybe it would have been easier to be creative if we didn't have the cards". (Manager)

Lastly, the interviewees suggested design and instructional improvements for DEMO regarding the design of components, such as the improvements on the content and physical size, and the structure of the design process, such as including training time, navigation through the process, justification of the participants' roles and suggestions for application domains. Figure 14.5 shows a screenshot from a workshop with generated materials.

14.4.3 Group activities and communication using the DEMO tool

The groups worked intensively during the workshops on the design task for approximately two hours to create a motivation plan for innovation platforms. To better examine the group activities, the design process was segmented into episodes that were qualified as 'framing-moving-reflection' cycles [18]. The problem finding (Framing-F), idea generation (Moving-M) and idea evaluation (Reflecting-R) episodes were mapped for the workshops, with fluctuating numbers of episodes across time. Also, the episodic activities were represented under two conditions, with cards and without cards. For the purpose of this study, each workshop was coded as W1-W7, including the pilot workshop that fulfilled the aim and standards of the study. This analysis produced a total of 213 episodes for the 14 hours of data (Fig. 14.6). The lengths of the episodes

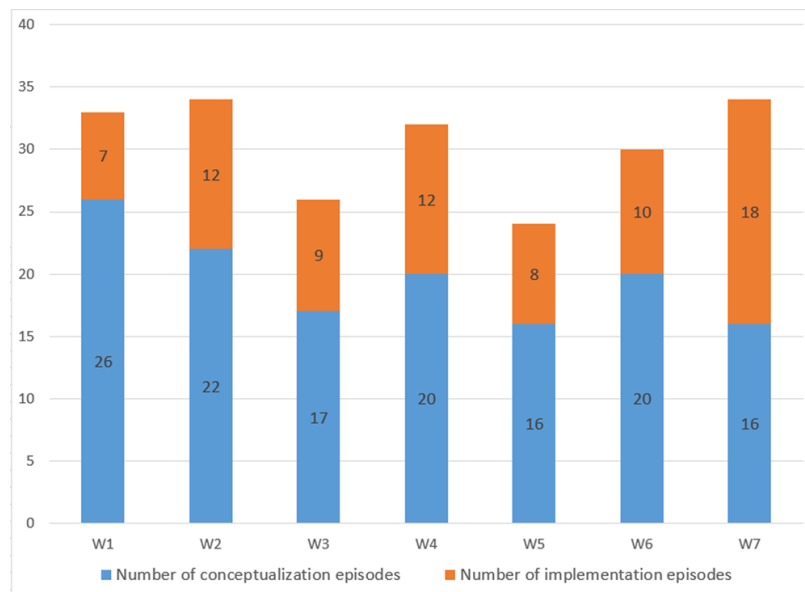


Figure 14.6: Number of conceptualisation and implementation episodes across workshops.

varied from a total of 1 min to 11 min. The workshop activities were divided into conceptualisation and implementation episodes. On average, 20 episodes of conceptualisation and 10 episodes of implementation activities represented a typical workshop.

Then, the workshops were examined based on the use of DEMO. Figure 14.7 presents the overall episodic activities of the workshops. The mean value for the episodic activity (number of episodes) was mapped for both conditions on the timeline: with and without cards. The time corresponds to the actual time of the workshops that took place from 12.00 PM-14.00 PM. Some interesting patterns emerged. The episodic activity was quite balanced in the workshops. The problem finding (framing) and the idea generation (moving) activities presented higher mean values when the team used cards. The evaluation of the suggested ideas (reflecting) had higher values in general for the same condition, but not in all workshops separately. Problem finding (with cards) always began more intensively in the first phase of conceptualisation and faded out in the late phase. The idea generation and evaluation (with cards) usually began later in the design process, with fluctuating values. It was observed that problem finding presents a complementary effect between the two conditions, where the activity with cards seemed to increase when the activity without cards decreases.

According to the secondary data sources, DEMO was useful during concept formulation, to inspire creativity, to negotiate the meanings or the concepts and to better describe the process, from conception to implementation. The use of the cards is primarily connected to the generation of ideas, similar to brain-

storming processes, which promote group discussions on the topic and involve everyone in the group. The cards were seen as reminders of the existing literature, meaning the motivation theories, gamification and other design and research methods. Similarly, the board helps to create discussion and generate ideas for relevant topics on motivation, which lead to defining and clarifying the meanings and concepts, understanding the relations among themes and documenting and providing an overview of the discussions. Furthermore, the group communication was associated with the tool's characteristics. Overall, the group work was evaluated as good and constructive collaboration with friendly people and useful discussions. Specifically, the participants built on each other's ideas and obtained feedback from different disciplines. The majority of participants (91%) reported that the DEMO tool supported the group communication and indicated that the tool acted as an intermediary or boundary object:

"It supported the communication with the tool, yes. I think just as a sort of, like I said, not just communication with the tool, but sort of just creating a space for noting ideas and having them, being present in some categori- esthat kind of is useful to getting a high-level overview of what is going on in this meeting. Rather than having everything completely invisible. There is something that is visible on the table". (Designer)

"We had great conversations, no interruptions; the participants had diverse backgrounds. So, people approached the project from different angles, having different understandings. I liked listening to other points of view, such as the psychologist's perspective". (End-user)

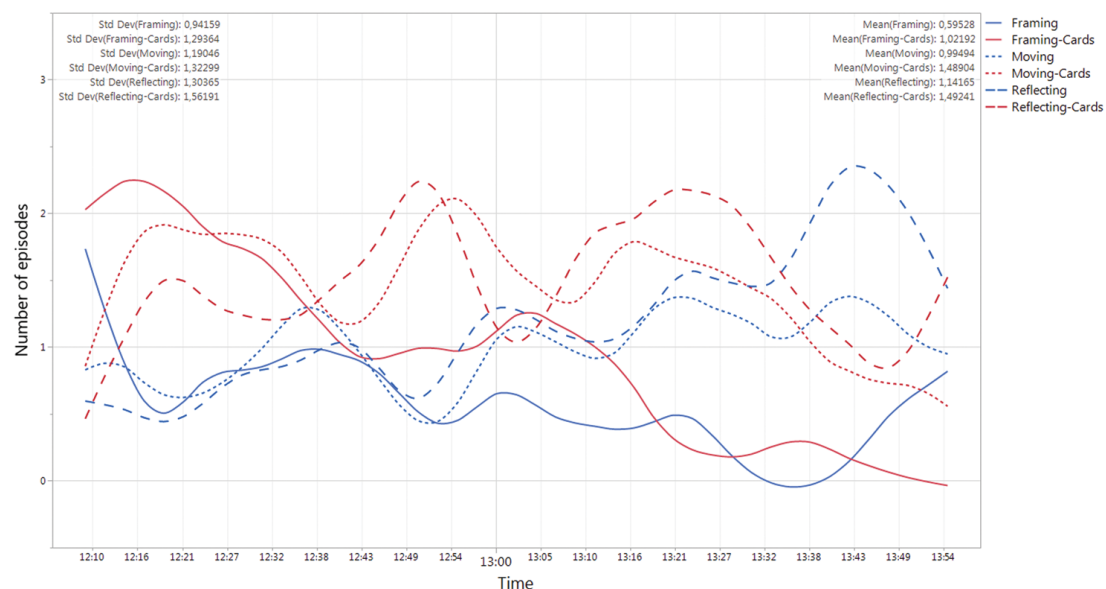


Figure 14.7: Summary of episodic activity for all workshops.

14.4.4 Motivation concepts and thematic activity

In the pre-questionnaire, participants briefly described some examples of how they motivated other people to perform an activity, mainly from their work environments. Participants mentioned the steps of motivation processes, such as explaining the benefits, revealing opportunities, providing relevant examples and peer discussions. Specifically, 81% of participants had previously used non-monetary rewards, such as learning, while 19% of them used monetary rewards.

“As a part of several projects at the university, I have needed help from users to evaluate products or concepts in development. We have briefly explained the goal of the project and why we have needed external persons as part of the evaluation. Their motivation has usually been helping a friend out and getting a glimpse of what interaction design is about”.(Developer)

In general, all workshops suggested a combination of intrinsic and extrinsic motivations, which are implemented in various ways in innovation platforms. The conceptualisation of motivation began at the beginning of the workshops. The discussion on motivation was a continuous negotiation of the meanings that capture motivation in relation to the board's phases and cards, such as the user type, community type, interaction type, host environment of the community, community's target and users' target. For example, the selection of user types was also connected with motives, such as the 'socialiser' user type (W1), and influenced the description of the experience (fun and engaging platform). The motives were then discussed accordingly. During the workshops, the presence of end-users assisted the team in defining the users' needs and describing the motivation concepts. Any concept that was related to psychological, cognitive, social or emotional needs was discussed in relation to the components of DEMO, the cards and the board and how that could support the design task and users' motivation in the innovation platform. Examples of motivation concepts that were suggested for implementation include entertainment and fun, community support, social interaction and personalisation, positive reinforcement, creativity, peer recognition and feedback from experts. From an implementation perspective, motivation concepts were addressed as interface elements, a series of online user activities or long-term strategies.

“We got a bit too stuck on the anonymity as a motive and ended up with a small check box, but I think that it reflected what we had in mind in the first part”. (End-user) (suggestion for an interface implementation)

“We used achievements, to get some kind of reward for participating in a platform that has one main motive. And the other was the personalisation of the platform. We wanted people to get attached to their ideas, the platform and using it. So, we suggested a personal space where they could comment, look at other people's work and start to make it a little more personal and

meaningful". (Designer) (suggestion of motivation concepts as series of online activities)

"The short-term motive is peer recognition and experts' reviews. The long-term motive is the possibility to work on and develop your idea within a real project with funds, and a team". (Manager) (suggestion for motivation concepts as part of the long-term strategies)

Furthermore, an analysis of the discussion topics during the workshops was conducted to examine the content of discussions. The analysis of all 213 episodes showed that 10 discussion topics occurred in the workshops. Specifically, the four phases of the board (objective, user, experience, motives) were complemented by additional topics, such as user-objective, user-experience, motives-objective and experience-motives among other topics. Two main discussion topics that were more intense and therefore are considered the most critical in this study are the discussions on the 'objective' and the 'experience-motives'. Examples of cross thematic topics in the workshops, between the 'experience' and 'motives' phases, refer to the gamification of user interface elements with a user profile ranking, the visibility of achievements and locations in the user interface, rewards based on a future commitment and receiving funding to develop an idea. During all workshops, considerable time was spent discussing one of these two topics; for example, W1 focused more on the objective-motives, while W4 focused more on discussing the experience-motives. One exception is W5, where the topics were discussed equally. In total 145 episodes involved the cross-thematic topic of experience-motives. This illustrates that the transformations of motivation concepts to an online activity stimulates discussions.

At the end of the workshops, all participants evaluated the outcomes and the suggested motivation plans, both in questionnaires and interviews. The majority of participants (84%) was satisfied with the concluded motivation plans, and many commented on their potential improvement (42%); however, some participants (16%) were not satisfied with the outcomes due to the perceived mismatch between the conceptualisation and implementation phases, a lack of innovative suggestions or disagreement on the selected motives.

14.4.5 Creativity and user activity across disciplines

The pre-questionnaire measured the self-rated creativity capacity of the participants, according to which designers and end-users considered themselves more creative than other participants. Designers and end-users reported that they are involved in creative types of work on a regular basis, while end-users' backgrounds also involved design activities. Developers considered themselves creative and regularly involved in creative work. Interestingly, managers also considered themselves creative with regular involvement in such activities, while it was expected that psychologists would rate lowest in their creativity capacity.

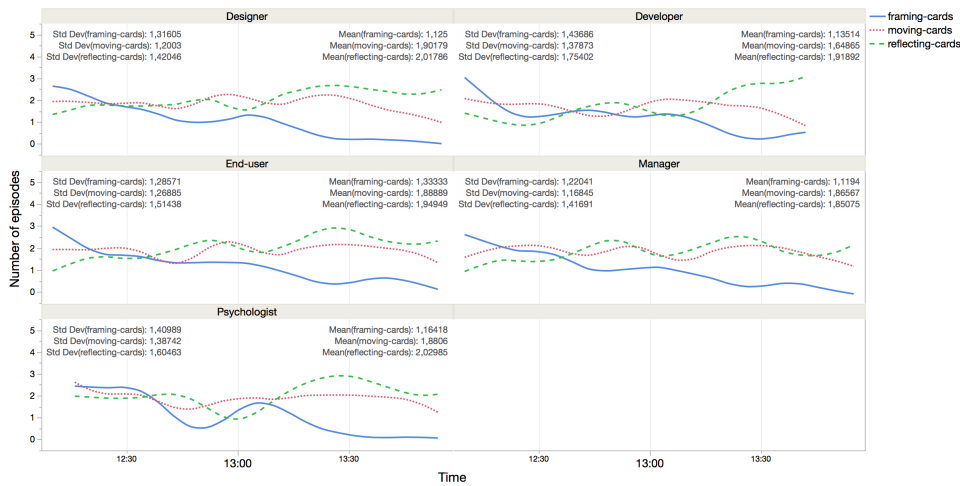


Figure 14.8: Episodic activity across disciplines, with cards.

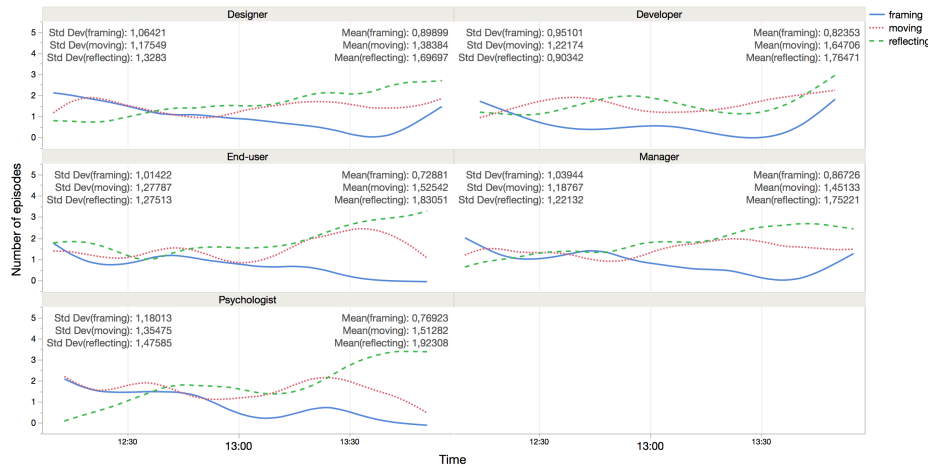


Figure 14.9: Episodic activity across disciplines, without cards.

During the workshops, the episodic activities across five disciplines of our study were mapped to examine the level of participation and contributions during framing-moving-reflecting activities (Figures 14.8 and 14.9). Overall, when using cards, the end-users spent more time on problem finding (framing) compared to other disciplines, while designers spent more time on idea generation (moving) and psychologists on the evaluation of ideas (reflecting). Furthermore, in the second condition without cards, designers spent more time on the framing activity compared to other disciplines, while developers spent more time on the moving activity and psychologists on reflecting, without cards. Nevertheless, all disciplines spent a considerable amount of time on framing-moving-reflecting activities, although the focus was on different activities.

“It was hard work individually. The other people had many good ideas and

worked faster than I do. I followed them. I am not a creative person when I work alone; I need a team to be creative. Very good to be a part of the team".(Psychologist)

All participants argued that they were more creative while working in a group setting with the tool rather than working alone with the tool. In the interviews, it was confirmed that all participants liked the group work with the tool, while two participants preferred a combination of individual and group work. Negative remarks on group communication involved the lack of familiarity with the group members, perceived lack of contribution (e.g. psychologists) in the discussions compared to other participants (e.g. managers) or perceived lack of a significant role in the design process. The roles in the group work were important for group communication, while some roles, such as the role of manager, were perceived as more significant than others. Therefore, participants' suggestions referred to the equal involvement of the group members, training time for managers or facilitators and a division of the design task to subtasks. In addition, the use of motivation techniques during the design process varied across disciplines. For designers, developers and psychologists their main technique was to modify and combine existing ideas. Managers mostly combined existing ideas and worked on evaluating ideas, while to a larger extent, end-users combined ideas. Finally, the perceived inspiration source was measured. The perceived inspiration source was considered by designers to be associated with the cards, while other participants argued that the board inspired them. Other inspirational sources were mentioned in addition to the tool, such as social media, personal experience with similar projects, psychology theories and group work.

14.5 Discussion

The results indicate that the design process of creating motivational innovation platforms is supported by the features of the DEMO tool. The use of DEMO was considered to inspire creativity, to assist in concept formulation, to negotiate the various meanings and to assist in the process description from conceptualisation to implementation. Figure 14.10 shows the implementation sketches of motivation concepts from two workshops. Hereafter, the main findings are discussed according to the results.

14.5.1 The use of artefacts inspires creativity in the design process for motivation

The use of artefacts during the design process, such as the cards and the board in this case, is a common practice to scaffold ideation and concept development in the early phases of design [13, 32]. First, the use of artefacts created a game-like activity that triggered creativity among multidisciplinary teams. The

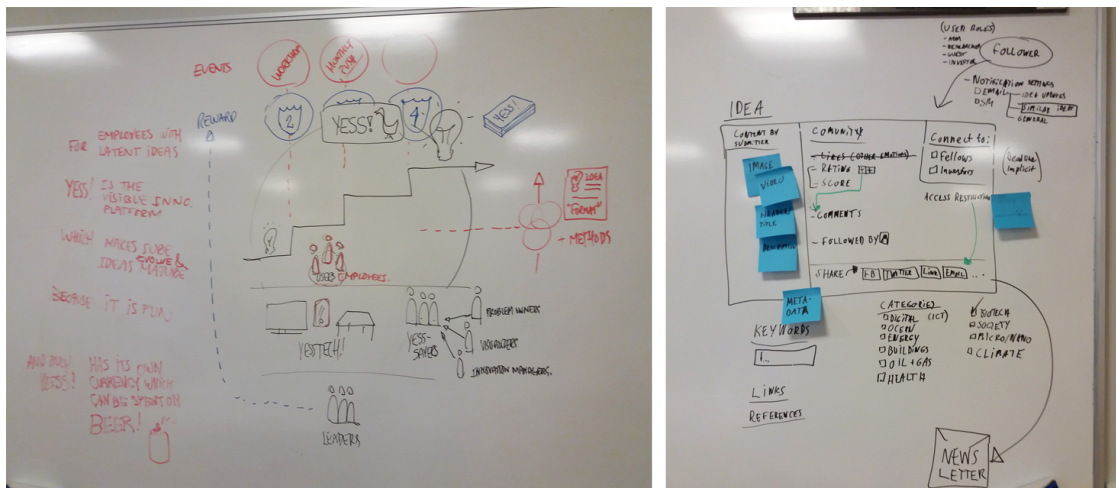


Figure 14.10: Implementation sketches from two workshops.

game-like activity was the strongest factor in the participants' experience with DEMO that maintained their interest and focus on the design task. In particular, it was found that when working with a complex topic, such as motivation, a game-like activity provides structure for concept building. Usefulness was also considered an important factor for utilising the tool, and this was also reflected in the workshops' episodic activities.

"It was a lot of fun. I learnt a lot from not using it, so that when we didn't use it, it was more messy. It was less structured at least because it will be messy in a way". (Manager)

Second, the components of DEMO inspired the design process in different ways. The cards helped initiate a group discussion on a topic and involved everyone in the group. The majority of episodes were triggered by cards, while cards were mainly used for problem finding and idea generation. The evaluation of ideas with cards showed mixed results among the workshops, as it was dependent on qualifications, such as critical thinking, personal experience and the backgrounds of participants. Consequently, participants elaborated on the evaluation of ideas according to their professional backgrounds and experiences.

The use of the cards was primarily connected with the generation of ideas. The cards seemed to function when creativity and idea generation decreased, while the introduction of cards generated new activities. The cards were viewed as reminders of the existing literature of motivation theories, examples and related work, which are essential when working with the complex topic of creating motivational platforms. Similarly, the board focused the discussion and ideas on relevant topics of motivation, such as the objective to design for motivation and the targeted user, leading to the definition and clarification of mo-

tivation concepts as well as to understanding the relations among themes, to document and obtain an overview of the discussions.

14.5.2 Multidisciplinary groups negotiate the meanings of motivation using artefacts

The results confirmed the value of using artefacts for argumentation and dialogue generation in multidisciplinary teams in this field, as previous studies suggested, e.g. [13, 40]. The detailed analysis of all 213 episodes (Fig. 14.6) revealed that the discussion topics of the workshops covered a cross thematic area, usually involving two main topics, such as ‘user-objective’ and ‘experience-motives’; however, one discussion topic was considered the most critical for this study: the negotiation of experience-motives. In total 145 episodes included the cross-thematic topic of experience-motives. One explanation is the lack of shared conceptual models and the lack of standardised structures or processes for motivation concepts.

The roles of the artefacts, cards and board, were perceived as similar to the boundary objects, in which standardisation is a key component. The negotiation of meanings for experience-motives created a common understanding of the content of the motivation plan at the end, satisfying the informational requirements of all group participants.

“I think having something to work with functions as a boundary object between us; its a good starting point instead of starting from nowhere. Also, it helped us to get to know each other. We as a group had to negotiate the meanings of the board, and thats actually to start using the board”. (End-user)

“It’s always good to use tangible elements in a discussion [...] If the discussion froze, its important to have cards. When you need them, they can be really valuable, and the cards are like boundary objects”. (Designer)

The role of the artefacts as boundary objects indicates why the level of participation and contribution during the design process was significantly higher when using cards, compared to not using cards. Using the artefacts, team members contributed in negotiations in different ways. For example, managers and psychologists contributed more in evaluation of ideas using cards, while the contribution from designers, developers and end-users was concurrent in problem finding and idea generation using cards.

Given the fact that designers are not necessarily trained to design motivational systems, other professionals are also involved in this design process[41, 46, 40]. Therefore, the design process would benefit from alternative types of interactions that create a dialogue among professionals relevant to design for motivation.

14.5.3 Structured tools support the creation of a shared vocabulary to design for motivation

When designing for motivation, the development of shared mental models is critical. During workshops, psychologists analysed motivation concepts from a theoretical viewpoint, offering related theories and explaining relevant study results, while end-users were mainly concerned with their own needs and desires from the innovation platform. All groups spent considerable time during the workshops in clarifying the objective from different perspectives.

“For me, with psychology as a background, my main concern was ‘why are they supposed to do this?’ [...] I think we locked down on the reward quite early, and I don’t know if that was the most advantageous [...] But many studies show that if you feel like you have control and are part of the decision in your everyday work life, you have greater motivation”. (Psychologist)

The differences across disciplines in describing approaches to motivation were also evident from the different techniques used to work with ideas during the workshops. The technique of modifying and combining existing ideas was used by designers, developers and psychologists, while end-users mainly combined ideas. Managers mostly combined and evaluated existing ideas to move the process forward. The use of a structured tool with explicit phases prompted the participants to define and build their meanings for the motivation plan. The study revealed that each participant had his/her own definitions; therefore, the creation of a shared vocabulary was a necessity for building a motivation plan. According to participants, DEMO had a dual role in this: it created a shared vocabulary through the cards and organised the process through the board.

“It created a shared vocabulary first of all. Also, it allowed us to focus on certain areas - ‘Okay we start from here.. and then we discuss this..’. As I said, motives and experience are interdependent and objectives and users are clear. If I had to summarise, it created a structure and provided a shared vocabulary”. (Manager)

In this study, the structured process during the early design phases was appreciated by the majority of the participants, while it was found that structure is needed to begin an unknown process and to establish the basic elements of a motivation plan. Thus, during the implementation phase the participants used more intuitive and less structured ways to design their solution.

14.5.4 User-centred and multidisciplinary groups are more creative with structured tools for motivation

The workshops generated high numbers of episodes in a short time period with the use of the tool, while high numbers of episodic activities during workshops

suggest that the process and the tool support a high activity pace (Fig. 14.6). The user-centred approach contributed to efficient group activity. The group discussions began with end-users' needs and experiences with innovation platforms, especially during the conceptualisation phase. Overall, the end-users spent more time on problem finding compared to other disciplines. The end-user helped the group frame the problem and the objective quickly, while they were active participants throughout the design process and supported idea generation as well.

"Basically, we used the board the entire time, trying to separate thoughts and ideas [...] We went a bit back and forth. So, I think it helps shape how you present ideas and how you discuss them, and it also helps you to focus on different aspects". (End-user)

Other disciplines assisted in the discussion in different areas. For example, designers spent more time on idea generation (moving) and psychologists on the evaluation of ideas (reflecting). The presence of different disciplines and backgrounds had a positive effect in regards on creativity. Two types of creative behaviour were observed in our study: a) structuralists who follow an orderly method with steps and b) inspirationalists who favour familiar structures to be creative [43]. The structured process of the board and the structure of the tool were appreciated by all participants, supporting the group creativity and inspiration when needed. During the workshops, managers, psychologists, developers and some end-users behaved like structuralists, while designers and end-users with a design background displayed the behaviour of inspirationalists. Psychologists and managers required sources of insights to be inspired and generate ideas, and they used the board more often than other disciplines. On the contrary, designers used fewer sources of insights, such as the cards, for problem finding compared to other disciplines (e.g. end-users, psychologists). This can be explained by the dominance of end-users on problem finding; however, designers provided support for end-users' problem-finding efforts through questions. In the beginning of the workshops, designers were focused more on active listening, while in later phases, they were focused on drawing and sketching during group discussions. Therefore, their episodic activities focused mainly on idea generation and idea evaluation, when using cards. At the end of the workshops, all disciplines provided feedback on the suggested designs, while designers, developers and managers played a more active role in determining the implementation details. This is indicative of the different needs during the structured processes based on the differences in professional background and work practices.

14.5.5 Study limitations and future work

One limitation of evaluating DEMO is related to the group dynamics during the workshops. Apart from the negotiation processes among the participants, other

interactional processes occurred, such as persuading and educating others. This was perceived by some participants as a negative factor regarding their active participation in discussions. On the other hand, politeness among participants was perceived as a non-productive factor for the delivery of high-quality outcomes, leading to the 'groupthink trap' [47].

Another limitation for group creativity involves the dominant viewpoints that were likely adopted by the group without the critical examination of other alternatives. Therefore, if there is no facilitator, the role of the manager is of great significance to balance the group dynamics, to achieve the best possible outcome. Although all managers had extensive experience in managing group dynamics, a new design process often requires more training time. Regarding the roles within the multidisciplinary teams, they were assigned based on participants' background, but during the design process the participants were not restricted to their roles and participated more openly in the discussions.

From a methodological point of view, a limited number of relevant studies on design tools, was found to justify the results. Given the lack of similar studies and evaluations of frameworks, part of the results are interpreted based on design literature.

In future work, it is suggested that DEMO could be applied in other domains and contexts, such as education and learning, health and wellness, online communities and social networks that lack of user motivation. In these cases, DEMO should be tailored to a specific context to be efficient, with an embedded domain-specific vocabulary and theories on the cards. In any application context, a longitudinal study of the design process using DEMO should be organised to examine the evolvement of the design process throughout a project based on user motivation. In addition, the exploration of other artefacts and materials in relation with the application domain may be relevant.

14.6 Conclusion

This study examined the design process of developing motivational innovation platforms and analysed the contribution of the tool's features to this process. Structured and artefact-based design tools, i.e. DEMO, show promising design directions in the field to organise a design process. Also, multidisciplinary and user-centred processes are essential to developing well-defined motivation concepts.

The use of artefacts inspires participants' creativity and helps multidisciplinary groups to negotiate the meanings of motivation, while structured tools stimulate creativity and support the creation of a shared vocabulary for multidisciplinary groups when designing for motivation. The findings also demonstrate that the full creative picture of designing for motivation emerges when episodic activities are enriched by the activities of the multidisciplinary group using the tool. Furthermore, the evaluation study showed that DEMO encourages creativity in conceptualising motivation and suggesting implementation

techniques in a time-efficient workshop. By analysing the design process using various methods, the sequences of episodic activities and events were captured, as well as the actual use of the tool and participants' contributions. Most importantly, the study indicates 'how' the participants negotiated motivation concepts, 'which' topics these negotiations involved most and 'who' among the team was responsible for each activity during the design process.

The DEMO tool presents a novel approach to designing motivational interactive systems. Design for motivation, as a design practice, embeds theories, concepts and practices from related fields and makes available a wide-spectrum of the existing tools to the users. The findings of the current study highlight several implications for designers, practitioners and researchers who work with motivation issues in interactive systems. First, the DEMO tool can be applied and tested in other contexts as well with appropriate modifications of the terms on the cards, if needed, according to the context-specific literature. Examples of use contexts could be any interactive system or community, such as social media communities and online communities of practice. Second, the methodological approach based on episodic activities provided an insightful approach and highlighted some of the more salient design factors regarding the use of the tool in practice and it can be employed by similar studies. Lastly, the workshops' procedure, including the conceptual and implementation phases, provided an efficient way to quickly extract design concepts during the early design phases, revealing the consensus of the development team.

14.7 Acknowledgments

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14.8 Appendix

Table 14.1: Examples of “framing-moving-reflecting” activities during the workshops.

Episodic activity	Code	Description	Utterances
Framing	FRA	Identify design problem	a “From a design stand-point when we are talking about motives and experiences, you mentioned that the culture of the workplace maybe impacted on we should create this platform, while if there is a lot of competition style in the workplace, then we should build on that. Or if there is other aspect that influences the culture, we should focus on the platform as well”(Designer).
Framing with cards	FRA-C	Identify design problem based on cards	a “We have two kinds of different aims in a way, these (cards) are more like friendly themes, against competition, not like who is the first?. So, we have to decide if we want to go towards competition or something that is more collaborative”(Manager).
Moving	MOV	Proposed explanation of components for the design task	“If the work environment is not on competition, and count on collaboration then we can reward the group instead of a person”(End-user).
Moving with cards	MOV-C	Proposed explanation of components for the design task, based on cards	“I was thinking about these two cards: users and registered users, because the idea is to get more people to use it. So, if we want to improve it, we need experiences from the users of the platform. So, it should be, maybe one of our stakeholders I guess” (Designer).

Episodic activity	Code	Description	Utterances
Reflecting	REF	Evaluate or judge the explanation in moving regarding components of the design task	"I actually liked the idea you proposed, considering that you use your real name. But what we could do if people are afraid of posting ideas because they don't want their manager to pick them up is to give them an option" (Psychologist).
Reflecting with cards	REF-C	Evaluate or judge the explanation in moving regarding components of the design task, based on cards	"If the goal is to produce high quality ideas, we need to give them some sort of reward for it. We can give them rewards and feedback but that's going to be enough" (End-user comments on the 'rewards' and 'feedback' cards).

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