First things first - think before you decide

The how, what and who of idea screening

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Abstract
This thesis investigates decision-making activities leading to the initial selection of which new ideas should be selected for further development or rejected. This process, often referred to as idea screening, is described as being one of the most important, but also challenging, tasks to master during the entire innovation process. There are two main reasons for this: Firstly, not all ideas are good and secondly no firm has the resources to develop every single idea proposed to it. Thus, it is important to be careful when initially deciding which ideas are to be selected and developed into future possible innovations in order to eliminate weak ideas and retain those that have a substantial chance of becoming successful.

Two alternative decision-making approaches are explored in the thesis (the intuitive and rational approaches). In the thesis, the concept of intuition during the screening of product and service ideas is demystified. The empirical findings show that decision-makers utilize five main underlying criteria when intuitively assessing ideas. Of these, the findings indicate user-value to be the most important one, or at least the criterion that most assessors emphasize when making intuitive decisions. The findings presented in the thesis increase our understanding of the use of rational and holistic intuitive decision-making when screening ideas during the Front End Innovation phase, as well as questioning the traditional view of intuition, as a decision-making tool that is only reliable if applied by those with a vast amount of experience and expertise. The reported findings indicate that, for example, users with an understanding of the idea context are able to intuitively identify the ideas that decision-making experts identify as the top (best) ones. Hence, managers faced with a situation where they are being inundated with new ideas can turn to non-experts for help.
Acknowledgement

Well hello there!

As you are reading this, you can be categorized in one of the following ways. You might be a person who actually has an interest in what this thesis is all about (hurray!). You might have been forced to read it (hello grading committee, opponent, supervisors and everyone who has discussed my writings with me). You might be a member of my family, needing to prepare for being cross-examined by me, when I check whether or not you have actually read anything. Finally, you might be a person who is only here to read this acknowledgement, desperately trying to pick out your name among those I am now going to say a special thank you to.

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Emma - I dedicate this book to you!

***

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Johan Netz
“Would you tell me, please, which way I ought to go from here”

“That depends a good deal on where you want to get to”

“I don’t much care where”

“Then it doesn’t matter which way you go”

Lewis Carroll, Alice Adventures in Wonderland
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List of Papers

Paper I:

Paper II:

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Paper IV:
Netz (2017) "Exploring the effects of Experience and Responsibilities on idea screening" Submitted to Creativity and Innovation Management Journal (CIM), the paper is currently in the second review round.

Paper V:
Netz, Olsson and Magnusson (2017) tentative title "Frontline employees screening ideas" Intended for submission during the fall of 2017.
Prologue

"It looks like the cleaning people should get in here ASAP"

Alvin, Samuel, Gustav, Isak and Ludvig turned their heads and saw Linnéa in the doorway with her hand pointing at all the bits of candy paper, yellow Post-IT notes containing unidentifiable characters, empty coffee mugs and cookie crumbs on the desk. The rumours that Alvin and his innovation team had been working round the clock for the last couple of days in order to get their new online idea exchange platform up and running might be true after all, Linnéa thought to herself, while walking across the room to the whiteboard opposite the door.

"However, before you start looking at all the new ideas in detail, there are a few things I want you to keep in mind" she said, while standing in front of the group, briefly looking at them individually to make sure she had their full attention. "Firstly, you need to stay focused on the right things, it's obvious that your concept, I mean your idea exchange platform, works. What was the name of it again?"

"ShareIT" said Gustav.

"Yes, ShareIT is the name, anyhow, it obviously works" said Linnéa, while glancing at the screen to her right, which was flashing the text "1416 new ideas collected" in big red letters. "Thus, I'm not interested in getting suggestions as to how to improve the ShareIT platform. Neither am I interested at the moment in how we should further develop some of the gathered ideas, that's something we can discuss later".

She stood silently for a few seconds so that the group could absorb what she had told them, just as she had learned during the countless management training sessions. "What I want to know now is how we should initially evaluate all the gathered ideas, so we don’t mistakenly reject any good ideas, or invest an awful lot of money in projects that nobody wants at the end of the day". Alvin and the others nodded to show that they had understood her.

"Good, I'll make sure you get the time and resources you need to come up with some interesting suggestions regarding how we should work". She then started to walk towards the door, just before she was about to leave the room, she turned around. "By the way, 1416 ideas are obviously too much for my decision-making committee to handle efficiently since there are only four of us, including me". After a short pause she continued; "Naturally, I also want to know who we should ask to help us to evaluate all the ideas. I'm sure that you'll be able to give me a good answer to that as well".

Before anyone on the innovation team had a chance to say anything, she left the room. She had no problem just leaving them without a clear agenda; she knew
she could trust them, and that they would make a killer presentation of what to do, how it should be done, and who should be part of it.

**To the reader**
The following scenario not only includes six fictional characters named after my niblings, it also addresses an issue many managers face in their day to day operations, i.e. how to manage the challenging and difficult task of selecting which ideas should be further developed, and thus given the chance to become a future innovation that will be launched in the marketplace. In this thesis, the focus is on expanding current knowledge regarding idea selection at the very beginning of the development process. This thesis contributes to both practitioners and the research community as regards idea selection.
1. Introduction

The focus of this thesis is studying how firms initially decide which new ideas should be selected for further development or rejected. The decision-making activities leading to an initial selection of ideas are highlighted and described as among the most important (Calantone et al., 1999, Cooper, 2007, Markham, 2013), but challenging tasks to master (Barczak et al., 2009), since they have such a huge impact on the subsequent development phases (Cooper, 2014). There are two main reasons this; firstly, not all ideas are good, and no firm has the resources to develop every single idea proposed to it (Kock et al., 2015, Ozer, 1999, Sharma, 1999). Secondly, the development of ideas into finalized innovations is crucial when it comes to gaining and sustaining competitive advantage (Drucker, 2014, Griffin, 1997, Schumpeter, 1934). A firm that is not able to compete against the new innovations introduced by its competitors will likely fail in the long run. Thus, it is important to be careful when initially deciding which ideas to select and develop into future possible innovations in order to eliminate weak ideas and retain those that have a substantial chance of becoming successful (Alam and Perry, 2002, Florén and Frishammar, 2012, Girotra et al., 2010, Hammedi et al., 2011).

In the literature, the term innovation has been assigned different meanings and interpretations. Some argue that it should be seen as a process during which ideas are transformed into, for example, new products used to differentiate the firm from its competitors (Baregheh et al., 2009). Others see innovation as both the process and the outcome of it, while some argue that innovation should focus more on the outcome (Crossan and Apaydin, 2010). Innovative outcome can take several different shapes and forms (Birkinshaw et al., 2011), e.g. as a product or service innovation (Alam, 2006). However, innovations are not only about products or services; Kristensson et al. (2014), for example, describe six different types of innovations in addition to products and services, e.g. process innovation, business model innovation, brand innovation, experience innovation, social innovation and behavioural innovation. Even though I see the concept of innovation as both a process and an outcome, in a wider perspective, the focus in this thesis will be on the actual decision-making activities leading to an initial idea selection (which in itself can be seen as a process), that forms a part of a greater process leading to the final developed innovation outcome.

The aim of initial idea selection is minimizing the risk of accepting ideas that are bad and of rejecting ideas that are good (Cooper et al., 2001). A bad decision at this point in the development process, i.e. the selection of ideas which will ultimately be unsuccessful (e.g. commercially), can lead to huge losses, which will affect the firm’s future in terms of profitability and long-term survival (Cooper, 1993). The selection of bad ideas is known as a type I error, while type II errors are made when good ideas are mistakenly rejected (Baker and Albaum, 1986, Rochford, 1991). When dissecting an idea that is subject to an initial selection activity, it can be conceptualized as consisting of two parts: a problem part and a
solution part. The problem corresponds in part to the actual needs of a potential user, or users. At the opposite end of the idea spectrum is the solution part, which is the solution to the problem. The conceptualization of an idea as constituting a problem and solution is also proposed and discussed by Basadur et al. (2000) and by Kudrowitz and Wallace (2013). Similarly, Magnusson et al. (2016) argue that the problem part of an idea relates to the user’s perspective (i.e. the demand-side), where users express their needs or wants. The solution part, on the other hand, relates to the supplier’s perspective (i.e. the supply-side). Thus, a problem reflects a need and the solution reflects a possible way of satisfying this need. In the end, the solution to the problem is expected to generate value for the customers, and/or the suppliers of the solution. However, if an idea is not specific enough, e.g. by not stating either the problem or the solution clearly, or including too much data, it can be difficult to understand, thus increasing the uncertainty around the decision (Licuanan et al., 2007). Decision-making situations like the one just mentioned can thus be described as a complex situation, as proposed by Hodgkinson et al. (2009).

The fact that decisions regarding which ideas to select for further development are often made on the basis of limited information while pressed for time further increases the uncertainty of decision-making (Cooper, 1981, Hammedi et al., 2013). In order to reduce uncertainty while judging ideas, knowledge relevant to the problem and the solution description is desirable to have. Knowledge of the problem (the needs and wants) is associated with product lead-usership (Ozer, 2009) or use-knowledge (Magnusson et al., 2016) and corresponds to the demand-side. This is due to the problem part of an idea triggering an understanding of how the users or customers benefit from using it. Thus, it consists of knowledge of the user’s needs and wants, paired with an understanding of how the service or product idea creates value for that user, which Vargo and Lusch (2004) describe as value in use. Knowledge of the solution part is linked to Ozer’s (2009) discussion about product expertise, or to the term technology knowledge, as discussed by Magnusson et al. (2016). This type of knowledge (i.e. supply-side knowledge) gives the decision-maker the ability to assess ideas in terms of their technical feasibility, or the opportunities and limitations of a specific service or product solution. In the remainder of this thesis, I will use the terms technology-knowledge and use-knowledge, since they are more clearly divided compared to Ozer’s (2009) counterparts. The term product lead-usership as proposed by Ozer (2009), corresponds, namely, to both knowledge of the user’s needs (i.e. demand-side knowledge) and supply-side knowledge, which can be confusing. The reason for this is that Ozer (2009) discusses knowledge held by so-called lead-users, who are assumed to have both demand- and supply-side knowledge (see e.g. von Hippel, 1986).

**The problem is not about getting new ideas**

With the introduction of IT-based Open Innovation (OI), concepts for generating new ideas such as IBM’s *Innovation Jam* (Bjelland and Wood, 2008), Starbuck’s *My Starbucks Idea* (Sigala, 2012) or Dell’s *Idea storm* (Bayus, 2012), the
challenges associated with the initial idea selection increase. Henry Chesbrough, who introduced the term OI, essentially argues that firms should not only rely on internal ideas, from employees, but should also include external ones, e.g. from users, customers or partners (Chesbrough, 2006). By paving the way for anyone to contribute new ideas, a firm can potentially end up being flooded with new ideas (Bjelland and Wood, 2008, Pisano and Verganti, 2008, Ringo, 2007). Hence, collecting new ideas is not the problem for most firms; rather, how to select is the most interesting thing to develop (Magnusson et al., 2014, van den Ende et al., 2015). OI can thus be seen as both a possibility (i.e. getting new perspectives on ideas) and a threat (i.e. the increased numbers of ideas make the initial idea selection difficult).

In the quest to manage the above-mentioned challenges, which naturally include economic risk-taking, and also in the attempt to reduce the uncertainties associated with innovation work (i.e. developing an idea into a finalized innovation), most firms utilize some sort of innovation process (Barczak et al., 2009, Crawford and Di Benedetto, 2008). The innovation process can be described as a roadmap used to guide projects forward, and to also enable firms to keep track of different projects in terms of both cost and time. This helps both the development team (i.e. the individuals responsible for developing the idea) and higher management to highlight the different phases or stages, after which an idea should be evaluated with the aim of reducing the uncertainty of the project, and to make sure that the project is going in the right direction. Throughout the innovation process, a firm will obviously make several decisions about either supporting or withdrawing individual development projects.

However, in this thesis, the focus will be on the decision-making activities leading to an initial selection as regards which ideas should be accepted for further development or rejected. During an innovation process, the initial idea selection takes place at the so called the Fuzzy Front End (FFE) (Reinertsen, 1999), or during the Front End Innovation (FEI) (Koen et al., 2001) phase of the innovation process. The difference between the two concepts, according to Koen et al. (2001), is that the former "… implies that this portion of the innovation process is mysterious, and this often results in a lack of accountability and difficulty in determining who is responsible to manage the activities in this area" (p 46). Thus, it suggests that whatever happens within the FFE cannot be managed since it consists of "mysterious" factors. In contrast, and even though FEI is also frequently described as chaotic, unpredictable and unstructured, it is never portrayed as something mysterious (Koen et al., 2001). Thus, although FEI is challenging to manage, it is still seen as something that can be done. In practice, however, the terms FFE and FEI are often used synonymously since they both refer to the initial events that come before the formal and better-structured implementation, testing, and launching phases during the innovation process (Reid and de Brentani, 2004, Florén and Frishammar, 2012). For the remainder of this thesis, the initial innovation process phase, during which the idea selection activities under study take place, will be referred to as FEI.
Two approaches to selecting ideas

As regards practitioners deciding which ideas to accept for further development during the FEI phase, essentially two different decision-making approaches are described in the literature; the rational and intuitive approaches. The rational approach can be described as an analytical process (Sadler-Smith and Shefy, 2004) during which the idea is assessed against various predefined criteria (Hart et al., 2003, Magnusson et al., 2014, Wheelwright and Clark, 1992). An intuitional approach, on the other hand, can be described as a holistic hunch about the idea (Akinci and Sadler-Smith, 2012, Miller and Ireland, 2005). The rational criteria assessment approach is portrayed in the management literature as the mainstream approach to selecting ideas for further development (Crawford and Di Benedetto, 2008, Koen et al., 2002). Advocates of this approach argue that rational criteria analysis is superior to intuitively-based decisions since rational decisions are seen as more elaborated (Behling and Eckel, 1991, Meehl, 1954) and also enhance the overall innovation success rate (Eling et al., 2016). However, at least three challenges exist when applying a rational criteria decision-making approach. Firstly, rational criteria decisions are assumed to be substantially more time-consuming compared to intuitive decisions (Akinci and Sadler-Smith, 2012). If a firm, for example, uses two or more criteria, which is common (see e.g. Carbonell-Foulquie et al., 2004, Hart et al., 2003), then the final decision will take longer time to complete compared to a single intuitive decision. Second (2) comes the issue of what criteria to use since no general guidelines exist (Balachandra and Friar, 1997). Third (3) comes the issue of how to aggregate and weigh the various criteria (Magnusson et al., 2014, Soukhoroukova et al., 2012) before the final idea selection.

Based on the three difficulties mentioned, interest in using intuitive assessments as an alternative decision-making approach has been growing in recent years (Burke and Miller, 1999, Dane and Pratt, 2007, Eling et al., 2014, Khatri and Ng, 2000). Intuitive decision-making is a more rapid decision-making technique than using the rational approach (Akinci and Sadler-Smith, 2012). It is based on the decision-makers prior knowledge, acquired over time in a certain domain or context (Sadler-Smith and Shefy, 2004, Salas et al., 2010). Agor (1986) argues that the use of intuition is preferable when facing; (1) uncertainty; (2) the absence of precedent; (3) being required to use limited or ambiguous data and information; (4) the existence of equally plausible alternatives, or (5) time pressure. Thus, when confronting huge or insufficient amounts of information during a limited timeframe (as dissussed by Hodgkinson et al., 2009), intuitive decisions seem preferable. However, comparative studies of the possible differences, similarities or connections between the two approaches as regards the idea selection outcome is scant (Eling et al., 2015, Magnusson et al., 2014, Pétervári et al., 2016). Hence, clear and evolved recommendations regarding which decision-making approach to use when selecting ideas during the FEI phase are lacking. Therefore, since general interest in intuition has been growing considerably in recent years, research into this field is highly relevant. According Pétervári et al. (2016), future research efforts regarding the use of intuition when selecting ideas
should be given special attention. In the end, use of the different decision-making approaches might have an effect on the actual decision-making outcome i.e. idea selection. In the next section, the focus is on the activities (and the different concepts) that lead to the initial decision regarding which ideas to select for further development or to reject.

**Idea-screening, assessment, evaluation and selection during FEI**

When discussing the activities leading to an initial idea selection during the FEI phase, four different traits are frequently mentioned in the literature. These are, *Idea Selection* (Hansen and Birkinshaw, 2007, King and Lakhani, 2013, Rietzschel et al., 2006), *Idea Screening* (Cooper, 2014, Magnusson et al., 2016, Toubia and Florés, 2007), *Idea Assessment* (Feldmann and Kohler, 2015, Magnusson et al., 2003, Riedl et al., 2009) and *Idea Evaluation* (Eling et al., 2015, Licuanan et al., 2007, Soukhoroukova et al., 2012). The concepts mentioned are often used as synonyms and, throughout my time as a Ph.D. student, I have frequently used them interchangeably. However, based on my currently greater experience, I now argue that the different concepts have nuances and should be differentiated. I see idea screening as the actual decision-making process that leads to an outcome, i.e. idea selection. Furthermore, I see the idea screening process as consisting of two activities, i.e. idea assessment and idea evaluation. Depending on which decision-making approach (rational or intuitive) is used, I see the two activities as either individual events (rational) or as one simultaneous activity (intuition). Using a rational criteria assessment approach, idea assessment, to me, is linked to the different criteria, whereby each criterion is judged by the decision-maker. The individual criteria assessment is then evaluated by, for example, merging all criteria assessments into one measurement unit using different weights. Based on the evaluation, the decision-maker makes his or her final decision (i.e. idea selection) as regards which ideas should be accepted for further development or rejected. If an intuitive approach is used, I then see the assessment and evaluation activities as one simultaneously performed activity, based on the argument that intuition is defined as "affectively charged judgments that arise through rapid non-conscious and holistic associations" (Dane and Pratt, 2007 p. 40). Non-conscious thought is thus the reason for my view of assessment and evaluation being done simultaneously.

However, while specific criteria are used to make a rational decision, knowledge about what an holistic intuitive decision is based on is scant (Magnusson et al., 2014). It is argued that there is a connection between rational and intuitive decision-making (Epstein, 1994, Epstein, 2003, Snowden et al., 2015). Yet, regardless of which decision-making approach is used, the assessments and evaluations lead to a decisive moment, i.e. idea selection as regards which ideas should either be rejected or accepted for further development. Furthermore, the individual or individuals in charge of idea selection should have proper knowledge that corresponds to the two parts (i.e. the problem and solution) of an idea (Magnusson et al., 2016). In the coming section, the focus will thus be on
individuals assigned the responsibility of deciding which ideas should either be selected or rejected, and on which practical challenges they experience.

The practical challenges
Most firms have some sort of decision-making committee or review board (Koen et al., 2014), consisting of the executives (Montoya-Weiss and O'Driscoll, 2000), senior management (Cooper, 1994), or experts (Toubia and Florès, 2007) responsible for FEI idea screening. In the remainder of this thesis, individuals who are on a firm’s decision-making committee, and thus responsible for idea selection, will be referred to as decision-makers. These decision-makers are assumed to have the relevant use and technology knowledge to enable proper judgments regarding an idea’s proposed problem and/or solution. However, when assuming that numbers of responsible decision-makers at a firm are fairly constant, it becomes possible to see the emergence of a potential bottleneck during the screening process. If, for example, a firm applies an OI concept when collecting new ideas, as previously described, it will most certainly obtain a vast amount of new ideas to screen, leading to a situation whereby the decision-maker’s possibilities of screening all ideas comprehensively will likely decrease (i.e. the time/idea ratio). Thus, despite possibilities of collecting large numbers of new ideas, one key problem relates to the time and effort decision-makers need to put in (Westerski et al., 2013).

In the above scenario, three practical challenges can be highlighted, which are also traceable in the sections above. The first (1) challenge is linked to the rational decision-making approach and the use of criteria, since it is described as the established way of working when screening ideas during the FEI phase (Crawford and Di Benedetto, 2008, Hammidi et al., 2011, Koen et al., 2002). Two issues relating to the use of criteria are (as previously mentioned), (a) knowing which criteria to use, since no established guidelines exist (Balachandra and Friar, 1997, Hart et al., 2003, Carbonell-Foulqué et al., 2004) and (b) how to weigh and evaluate the different criteria assessments (Magnusson et al., 2014, Soukhoroukova et al., 2012).

Second (2) comes the question of which decision-making approach to use (a rational or an intuitive approach). From the above scenario, of being overwhelmed with new ideas, it could, at a first glance, seem legitimate to recommend that an intuition-based approach would be more useful in than a rational approach. This is based on the argument of Hodgkinson et al. (2009) regarding the suitability of using intuition when encountering a complex situation. However, and as previously mentioned, comparative studies of the differences and/or similarities between intuitive and rational criteria decision-making during FEI idea screening are scant (Eling et al., 2015, Magnusson et al., 2014, Pétervári et al., 2016), although it has been argued that a connection does exist between intuitive and rationally-based decisions (Epstein, 1994, Epstein, 2003, Sowden et al., 2015). Thus, further studies relating to this topic are needed.
in order to produce sound recommendations as to which decision-making approach to use (Björk et al., 2016).

The third (3) challenge relates to the above-mentioned bottleneck situation. One way of addressing this issue is to involve an additional number of individuals to help in screening all new ideas. These additional assessors (labelled non-decision-makers) could assist by reducing the number of ideas that decision-makers should focus on more thoroughly. The non-decision-makers could, for example, make an initial rough selection in order to sift out the worst ideas; they could be potential users (Mahr et al., 2014, Magnusson, 2009, Prahalad and Ramaswamy, 2004) or employees (Feldmann et al., 2013). However, even though research into this topic is growing, the question of whether or not it would be appropriate to involve non-decision-makers during FEI idea screening, and also if they can act as proxy for decision-makers is in need of additional research (Magnusson et al., 2016).

**Purpose and research areas**

Based on the above discussion, this thesis aims to expand current knowledge of the use of rational and holistic intuitive decision-making during the FEI phase. In this thesis, I will start out from the three identified practical challenges mentioned. These challenges are in line with the corresponding literature discussed above, highlighted as an important area for further investigation (Björk et al., 2016, Eling et al., 2014). The focus of the thesis also relates to the general call to expand current knowledge regarding FEI activities (Boeddrich, 2004, Koen et al., 2001, van den Ende et al., 2015). The purpose of this thesis is as follows:

*To contribute towards better understanding the use of rational and holistic intuitive decision-making approaches when screening ideas during the front-end innovation phase, and to explore the involvement of non-decision-makers in the screening process.*

In the thesis, I will thus be discussing three broader research areas connected to the above purpose. Initially, (A) the focus will be on exploring rational decision-making and the criteria used during FEI idea screening and their weighting, justified by the common use of rational criteria assessment during FEI idea screening (Crawford and Di Benedetto, 2008). In connection with this, I will also (B) investigate and discuss the differences, similarities or connections between using rational and/or intuitive decision-making approaches (see e.g. discussion by Eling et al., 2015, Magnusson et al., 2014, Pétervári et al., 2016). Finally, (C) I will explore the involvement of non-decision-makers, since this is put forward as a practical solution to the increased difficulty of finding the time to properly look at all incoming ideas (van den Ende et al., 2015, Westerski et al., 2013). In the theory chapter, the three research areas will be further elaborated into more specific research questions corresponding to the respective areas. The three research areas are thus relevant, both from a practical and a theoretical perspective.
The five papers appended to this thesis feature specific research questions and aims, which individually contribute towards increased understanding of three different areas. The five papers thus correspond to different parts of the three research areas. Taken together, the papers’ combined contribution is intended to increase our overall understanding of idea screening during the FEI phase, as addressed above. In Table 1 below, the main contribution made by each paper, as well as its connection with the different research areas, is briefly summarized. An uppercase letter indicates the main research area of the paper, while a letter in brackets indicates that the paper is also linked to one of the two remaining research areas.

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<table>
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<td>I</td>
<td>Comparing rational and intuitive decision-making approaches among decision-makers.</td>
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<td>Identify a statistical connection between intuitive and rational decision-making among decision-makers, and identify criteria used by decision-makers screening ideas.</td>
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Table 1. Contributions made by the appended papers

The starting point of the thesis is a practical problem experienced by many firms, i.e. the difficult task of selecting which ideas will be rejected or accepted for further development during FEI. The thesis will contribute to the existing literature on idea screening by expanding current knowledge of the use of different decision-making approaches as well as the involvement of non-decision-makers, in order to minimize the risk of making type I and II errors. The thesis thus contributes to several academic fields, e.g. product and service development, product and service innovation, and innovation management, as well as to practitioners responsible for the selection of ideas during the FEI phase.

Structure of the thesis

The remainder of the thesis is structured as follows. Initially, in Chapter two, theory relevant to the three research areas is presented and, based on these, specific research questions are presented. In the third chapter, the research process concerning each appended paper is presented, as well as the three different studies that the papers are based on. At the end of the third chapter, the quality of this thesis are also discussed. The five papers are then briefly summarized in Chapter four, after which the findings relating to the three
research areas are analysed in the fifth chapter. In the final chapter, the findings are discussed together with the managerial implications and the limitations, and then possible future research directions are highlighted.
2. Frame of reference and previous research

In this chapter, a frame of reference that defines the important concepts of the thesis is presented. This chapter is divided into three main parts relating to the three research areas introduced in the previous chapter. Research concerning the rational decision-making approach constitutes the first part, which includes a review of the literature regarding criteria connected to idea screening during the FEI phase. This is followed by a presentation of the intuitive decision-making approach, while in the third part, focus is on research into the involvement of non-decision-makers during the FEI idea screening process. Based on these three different parts, a set of four research questions, and how these correspond to the appended papers, is presented at the end of the chapter.

Focus on rational and intuitive decision-making

When screening ideas during the FEI phase, two alternative decision-making approaches are mentioned in the literature, the rational and intuitive approaches. These two approaches are often described on the basis of the dual-processes theory (Evans and Stanovich, 2013, Sowden et al., 2015). Evans (2003) summarizes this as "... two minds in one brain" (p. 458). Dual-process theorists have argued that humans rely on two underlying cognitive systems when reasoning, in turn leading to a final decision (Evans, 2008). These systems are called System-1 and System-2 (Stanovich, 1999), where System-1 is described as the intuitive system and System-2 as the rational system. The dual-process theory was developed in order to distinguish between rational and intuitive (i.e. unconscious) thought (Kahneman, 2003, Epstein, 1994, Evans, 2003, Sloman, 1996, Stanovich and West, 2000). Based on the numbering of the two systems, it would be easy to see the logic of initially departing from the intuitive System-1. However, since the rational decision-making approach is described as the most established way of screening ideas during the FEI phase (Crawford and Di Benedetto, 2008, Koen et al., 2002), the initial focus in the coming sections is on research into rational decision-making before turning to the intuitive decision-making approach.

Rational decision-making

A rational System-2 decision is based on analytical reasoning (Evans and Stanovich, 2013). It permits a human (as opposed to an animal) to conduct abstract reasoning and hypothetical thinking (Evans, 2003). In System-2, thoughts occur consciously, meaning that they are deliberative and thus slow compared to the rapid unconscious thoughts conducted in the intuitive System-1. Thus, System-2 permits us to analytically reason around a certain matter, e.g. when assessing and evaluating ideas during the FEI phase. The rational assessment approach when screening ideas is often portrayed as an idea assessment technique based on the use of pre-determined criteria (Cooper et al., 2001, Rochford, 1991). The use of a rational (or "analytical") approach when assessing ideas thus share similarities with the classical, albeit debated, economic theories concerning Economic Man or Homo Economicus (Sen, 1977).
economic man portrays humans as self-interested agents who usually pursue their subjectively-defined goals in the most optimum way (Vriend, 1996). The concept of Homo Economicus or Economic Man can be ascribed to someone who attempts to rationally maximize his or her utility. In this regard, a rational criteria-based decision would thus yield the highest possible rate of return. Advocates of the rational decision-making approach argue that the quality of the final decision is higher than if an instituted approach had been used, see, for example, the discussions by Behling and Eckel (1991), Grove et al. (2000), and Meehl (1954). Baker and Albaum (1986) go as far as to argue that every idea should be screened on a rational basis in order to ensure that only good ideas (in terms of their potential market success) are retained for further development. In addition, rationally-made screening decisions during FEI are also argued to enhance the overall innovation success rate (Eling et al., 2016).

**Screening ideas using a rational approach**

Several different practical methods exist for screening ideas using a rational approach, e.g. scoring models or checklists (Cooper et al., 2001). However, a form of rational criteria assessment portrayed as a funnel, in which ideas are evaluated stepwise (Wheelwright and Clark, 1992), is argued to be the mainstream approach to screening ideas (Crawford and Di Benedetto, 2008, Koen et al., 2002). The use of criteria when assessing ideas makes it possible to quite simply compare different ideas with each other. However, depending on how a decision-maker chooses to work, some differences in the outcome of the assessment may appear. According to Baker and Albaum (1986), the criteria used can be applied in different ways by a decision-maker. These researchers identified and empirically-tested four different models for idea screening on 86 different decision-makers. The four different models are labelled Conjunctive, Disjunctive, Lexicographic, and Linear, each being restrictive to varying degrees in terms of the rejection of ideas.

In the (1) Conjunctive model, ideas have to reach a specific minimum threshold value in order for each of the criteria used to pass. The (2) Disjunctive approach allows ideas through if they meet the minimum values (threshold) of the criteria seen as "key". Thus, ideas do not have to be accepted as regards all criteria used under this model. Using the (3) Lexicographic approach, the different criteria used are instead ranked according to their perceived importance. Ideas are then compared criterion-by-criterion until one is found to be superior to the others. Using the (4) Linear approach, the score that an idea gets on each criterion is multiplied by the respective weights that the different criteria are assigned. Based on the aggregated score, the ideas with the highest accumulated score are selected for further development (or alternatively ideas meeting a predefined cut-off point or threshold).

A rational criteria approach can thus be seen as a tool that helps and guides the decision-maker's assessments and evaluations. On the other hand, ideas can risk being neglected if they do not match the specific criteria set by the firm, even
though they might have certain qualities that could be of interest in a broader perspective, which may not be captured by the criteria used. In the end, Baker and Albaum (1986) suggest that a fairly simple assessment (i.e. using a few predefined criteria) would be useful when assessing ideas during the FEI phase, regardless of which of the four models is applied. One benefit of using a rational approach is that the ideas are assessed on the basis of analytical reasoning in relation to a predefined benchmark (Eling et al., 2015). Using this approach thus gives the decision-maker the possibility of checking for specific characteristics that are important to the firm.

Criteria used during FEI idea screening

Even though it is argued that having well-defined decision-making criteria, when assessing ideas, is very important (Cooper, 1999, Griffin, 1997), knowledge of which criteria to use when assessing ideas during FEI is under debate. In recent years, the use of rigid "go/no-go" decision-making criteria has been questioned; instead, it is argued that the criteria used should be flexible (Cooper, 2014, Cooper, 2009). An idea could, according to Cooper (2009), still be given a tentative "go decision" even though the outcome of assessment and subsequent evaluation may not be satisfactory at the decisive moment. Thus, the idea could still move forward to the next development stage while awaiting additional information, instead of being terminated immediately. If the missing information is not gathered in time for the next decision gate during the innovation process, then the project should be terminated (Cooper, 2009).

However, no unified or uniformly-accepted list of criteria exists which can simply be applied by decision-makers (Balachandra and Friar, 1997). Instead the selected criteria should be chosen with regard to the given context, and also on the basis of where during the innovation process they are being used (Balachandra and Friar, 1997, Hart, 1993, Hart et al., 2003). In a literature review, Balachandra and Friar (1997) identified 72 different success factors (i.e. criteria) used during various part of the innovation process. These can be categorized into four overarching themes: market, environment, organization, and technology. The market domain relates to the issue of whether or not there is a potential market for the initial idea upon being transformed into a final innovation, with environmental factors being used to assess the aspects of, for example, whether or not social acceptability would affect the potential outcome of the idea. The market and environment themes thus relate to matters external to the firm. In contrast, the organizational and technology aspects relate to a firm’s internal resources and capabilities. Organizational aspects relate to the question of the ease with which a firm can develop a specific idea into a final innovation, while the technology aspect relates to the innovativeness of the idea. Furthermore, the use of various criteria should, according to Balachandra and Friar (1997), be decided using three contextual variables: firstly (1), the nature of the innovation, i.e. whether the idea is incremental or radical; secondly (2) in respect of the nature of the market (is it a new or existing idea); and thirdly (3) relating to the nature of the technology (i.e. whether it is an idea that is low- or high-tech).
Based on a qualitative interview study that included 120 managers from four American (Fortune 500) high-tech firms, Ronkainen (1985) found that market-related criteria were given the highest weights during the initial FEI phases. The "market criteria" are simply translated into the question "whether there is a market for the idea", similar to the findings of Balachandra and Friar (1997) almost a decade later. On the other hand, Lynn et al. (1996) noted that market-related criteria can be difficult to use (especially when looking at more radical ideas), since the uncertainty regarding the future potential of a new product or service is very hard to predict during this early development stage. O'Connor (1998) also argues, in a similar vein, that the use of market-related criteria depends on whether the idea is classified as incremental (e.g. a product improvement) or seen as radically new, with the potential to become a disruptive (i.e. game-changing) innovation. For the latter, market criteria are argued to be almost impossible to use during the early FEI screening phase (ibid).

In a survey study from 2003, which included 166 managers, Hart et al. (2003) found that the criteria used when assessing ideas differ depending on whether an idea was undergoing its early FEI screening phase or had passed on to its later development stages. Technical feasibility, Product uniqueness, Market potential and Customer acceptance were identified as criteria used by the participating managers during FEI idea screening. It was also of interest that intuition was emphasized in terms of being used by the participating managers during the FEI stage. However, the authors do not discuss why intuition was used by the participants. One possible reason for this could be (as stated in the introduction) that the intuitive approach is useful when the available information is either overwhelming or missing simultaneous to decision-makers being pressed for time to get projects initiated.

Using a compiled list of 16 criteria (based on the works of Cooper, 1999, Griffin and Page, 1993, Hart et al., 2003, Ronkainen, 1985), Carbonell-Foulquie et al. (2004) tested which criteria were seen as the most important ones during the idea screening stage. The data, which was based on a survey that included 77 Spanish manufacturing companies, revealed that Strategic fit and Technical feasibility were used during the FEI screening phase. Interestingly, they also found that financial performance was used as a criterion throughout the entire innovation process, thus contradicting somewhat the notion that financial criteria should be used with caution when assessing ideas during the early FEI phases, due to the difficulties of making accurate estimations of financial outcomes at this point (van Riel et al., 2011). Boeddrich (2004) argues, for instance, that it is impossible to know the final outcome (in terms of an ideas final success) of a developed idea when looking at it for the first time.

When examining 90 papers focusing on idea creativity, Dean et al. (2006) propose that ideas should be assessed against four different dimensions, novelty, workability, relevance and specificity. Novelty is the degree to which an idea is both original and modifies a paradigm. Workability refers to the ease with which the idea can be
implemented and whether or not it violates any known constraints. The relevance of an idea is measured against whether or not it will be effective in solving the actual problem. Finally, Specificity is about how well the idea is described in terms of detail and clarity. In more contemporary research, Kudrowitz and Wallace (2013) argue that Novelty, Usefulness and Product-worthiness are adequate criteria to use when assessing ideas during FEI (partly based on Dean et al., 2006 findings). Magnusson (2009) advocates the use of a similar set of criteria, i.e. Originality, User value and Producibility. Here, Originality relates to the innovative dimension, i.e. the idea’s uniqueness (similar to novelty), User value is used as a lens for capturing the user’s perspective on whether or not the proposed idea will create any value for its users, and Producibility is the producer’s perspective regarding the level of ease with which the idea can be produced.

Frederiksen and Knudsen (2017) argue that a multi-dimensional assessment approach that includes the three criteria of Novelty, Usefulness and Market potential should be used when screening ideas during the FEI stages. The three criteria are derived from literature where the first two are linked to literature regarding creativity while the third is based on the innovation literature. Novelty is described as an idea’s ability to stand out in the marketplace, while usefulness focuses on the appropriateness or value of an idea from a user perspective. The third criterion, market potential, is a pure business perspective and relates to the potential value the commercialized idea would bring to the company. However, Frederiksen and Knudsen (2017) make it clear that the market potential criterion, which can be translated into a financial criterion, should be used with caution, and that ideas should at least be translated into more robust concepts before this criterion is used. Furthermore, the ideas used in the study were not raw ones; instead, they were already-developed concepts (which thus facilitate the use of more market-related or financial criteria). In addition, Frederiksen and Knudsen (2017) also stress that assessors should be as objective as possible in order not to dismiss ideas simply because they subjectively perceive them to be bad. The use of a criterion approach could thus be useful when wanting to increase the objectiveness of idea assessment.

Challenges of criteria assessment

Even though several studies have identified different criteria used during FEI idea screening, there is no defined set of criteria that decision-makers should use. Thus, exactly which criteria should be used is still unclear (Magnusson et al., 2014). One reason for this could be linked to the fact that there is a lack of studies investigating the FEI idea screening processes in practice. The studies mentioned above identify the different criteria using either literature reviews, qualitative interviews (in which the participants are asked to recall which criteria they use), or using survey data. However, there are problems with each of these. Firstly, no literature review has led us closer to a define set of criteria that could be applied to rational idea assessment. Secondly, it can be difficult for a decision-maker to recall his or her cognitive processes in retrospect (Nisbett and Wilson, 1977). Thus, qualitative interviews based on retrospective data can lead researcher to
make false assumptions regarding what criteria have been used, or which were considered important). Finally, survey studies in which participants select which criteria they use from a predefined list does not necessarily reflect the criteria that the decision-makers actually use in practice (see e.g. Carbonell-Foulquie et al., 2004). And in those survey studies in which participants fill in which criteria they use in retrospect, the participants might have difficulties recalling what criteria were used during the decision-making situation (see e.g. Hart et al., 2003), similar to the qualitative interview already mentioned. Hence, approaches based on retrospective data can be said to be made ex-situ (Edvardsson et al., 2012), i.e. the identified criteria might not necessarily be the ones used during an actual decision-making situation by decision-makers.

Another challenge when using criteria concerns how to aggregate the different assessments; i.e. how to weight the various criteria (Magnusson et al., 2016, Soukhoroukova et al., 2012). This challenge is argued to be crucial since a change in weights can alter the final selection of ideas for further development. Calantone et al. (1999) address the issue of criteria weighting by suggesting that the Analytical Hierarchy Processes (AHP) could be used when screening ideas. In the AHPs, the decision-maker is asked, prior to actually rating the criteria used, to identify which criteria to use and also to specify how important these are. However, exactly how decision-makers subjectively add weights to a certain criterion is unknown. Another alternative, proposed by Magnusson (2009) and Magnusson et al. (2016), concerns using an index to weight the different criteria depending on the type of innovation being sought (i.e. radical or incremental). However, just like the question of which criteria to apply, the question of how to weight the criteria lacks a definite answer. Based on the above review, it is clear that being rational is not always easy, especially if decisions are made when there is a lack of complete information (Kim and Wilemon, 2002, Montoya-Weiss and O’Driscoll, 2000, Rochford, 1991). As a result, interest in using intuitive assessments as an alternative decision-making approach has been growing in recent years (Burke and Miller, 1999, Dane and Pratt, 2007, Eling et al., 2014, Khatri and Ng, 2000)

**Intuitive decision-making**

Intuition consists of an information-processing system that differs from rational and analytical thinking (Dane and Pratt, 2007). Intuitive decisions are made within the unconscious System-1 described in the dual-process theory. Thoughts occurring in System-1 are automatic (Schneider and Shiffrin, 1977), rapid (Evans, 2008) and associative (Sloman, 1996), meaning that decisions are not based on rules, in contrast to the use of criteria. Thus, a decision based on unconscious thought occurring in System-1 is often referred to as the making of an intuitive or holistic decision (Akinci and Sadler-Smith, 2012, Hammond, 2000, Hogarth, 2001, Sadler-Smith and Sparrow, 2008). Intuition should not be confused with either insight or instinct (Dane and Pratt, 2009, Hogarth, 2001). Instinct is, for instance, described as an automatic biological response (e.g. shutting one’s eyes
when they are exposed to bright light), whereas insight, or the sudden ‘eureka moment’ is compared to intuition, described as a slower process. Insight, from gaining a sudden insight into something, is based on analytical (rational) processes that precede the sudden moment of insight (Hogarth, 2001).

**Evolution of intuition research**
Chester Barnard is often seen as a pioneering practitioner when it comes to intuitive decision-making. Barnard, who worked at American Telegraph and Telephone (AT&T), discussed intuition and analysed when and by whom it would be relevant to utilize as early on as the 1930s (Akinci and Sadler-Smith, 2012). Barnard argued that decision-making occurs using either "logical" or "non-logical" reasoning, thus resembling the subsequently-introduced dual-process theory. Herbert Simon, who came from academia, later developed Barnard's thoughts on intuitive decision-making in a business organizational context. Simon introduced the concept of “Bounded rationality” (Simon, 1997a), which states that the rationality of individuals is limited to the information at hand, the available time, and the cognitive limitations of the human mind. Thus, when a decision-maker, for example, screens ideas and faces a complex and limited-duration situation, as described by Montoya-Weiss and O'Driscoll (2000) and Hodgkinson et al. (2009), then he or she will probably try to simplify his/her decision-making. In doing so, the decision-maker thus exploits his/her prior experience of similar situations. This act is to be viewed as intuition, i.e. the ability to recognize patterns, something which helps to simplify the available information, according to Simon (1992). Pattern recognition later became a cornerstone of the theory of Naturalistic Decision Making (NDM), introduced by Klein, 2008. However, it must also be said that there is an ongoing debate about what level of trust can be ascribed intuitive decision-making (Kahneman and Klein, 2009). Kahneman and Tversky (1982) have, for example, introduced the term Heuristic and Bias (HB), on which basis they argue that intuitive thoughts can be biased, thus leading to bad decisions. On the other hand, Klein (2008) sees intuitive decision-making as a powerful way of quickly reaching adequate decisions.

**Definition of intuition**
In an extensive review of intuition and its role in managerial decision-making, Dane and Pratt (2007) identified 17 definitions of intuition within the fields of psychology, philosophy, and management. A previous synthesis of the concept can be described as the making of quick, unconscious decisions with limited information and limited reflection. Miller and Ireland (2005) have argued – based on the works of Simon (1987), Mintzberg (1994), and Crossan et al. (1999), – that intuition can be conceptualized as either a holistic hunch or automated expertise. Decisions made using a holistic hunch involve a subconscious synthesis of information drawn from diverse experiences, while automated expertise corresponds to the recognition of familiar situations. The use of past experience of different situations follows the belief that intuition is based on knowledge that has evolved over time via the experience gained by the decision-maker (see e.g.
Hogarth, 2001, Salas et al., 2010). In a similar vein, Sadler-Smith and Shefy (2004) considered intuition to be either expertise or feeling, where intuition as expertise is linked to thoughts of automated expertise while intuition as a feeling is in line with intuition as a holistic hunch. Pretz et al. (2014) argue that intuition should be seen as either holistic, inferential or affective. Holistic intuition is referred to the integration of diverse sources of information in a Gestalt-like, non-analytic manner, whereas inferential intuition is based on previously analytical processes that have become automatic. Finally, affective intuition are based on feelings (Pretz et al., 2014). However, in the comprehensive review of the field by Akinci and Sadler-Smith (2012), these scholars argue that Dane & Pratt’s (2007) definition of intuition as “affectively charged judgments that arise through rapid, non-conscious and holistic associations” (p. 40) has achieved an almost consensual status.

Prerequisites of the intuitive approach
Despite the fact that the use of intuition carries risks regarding biases, it is still argued to be a useful decision-making approach under certain conditions (Kahneman and Klein, 2009). Ambady and Rosenthal (1992) argue, for instance, that intuitive judgment is remarkably accurate. Furthermore, Salas et al. (2010) as well as Sadler-Smith and Shefy (2004) consider intuition to be an effective and efficient decision-making approach when used by experts. Experts, according to Shanteau (1992), are those who “… are operationally defined as those who have been recognized within their profession as having the necessary skills and abilities to perform at the highest level” (p. 255). Thus, in practice, an expert could be seen as a person mandated with making decisions regarding FEI idea selection. However, an expert’s ability to make intuitive decisions depends on his or her prior knowledge, acquired over time from a certain domain or context (Sadler-Smith and Shefy, 2004). This line of argumentation is also pursued by Kahneman and Klein (2009) who, despite their disagreement about which level of trust the intuitive decision should be given, agree that “an intuitive judgment requires an assessment of the predictability of the environment in which the judgment is made and of the individual’s opportunity to learn the regularities of that environment” (p. 515).

Furthermore, in a study of business professionals in the US, Burke and Miller (1999) found that a common theme among the participants was their intuitive skills having been obtained from past experience, training, or education, thus, further strengthening the link between prior experience and the use of intuition in a specific context. On this matter, Isenberg (1984) argues that “the higher you go in a company the more important it is that you combine intuition and rationality” (p. 81). Hence, when facing complex decision-making situations, the use of intuition becomes more important as one advances through the organizational hierarchy (Hodgkinson et al., 2009). However, it is important to note that subjective experience is not a reliable indicator of an intuitively-based decision since subjective thought can be biased (Kahneman and Klein, 2009).
**Connecting the intuitive and rational approaches**

Even though rational and intuitive decision-making can be portrayed as opposites, these two approaches should be seen as complementary (Fredrickson, 1985, Sadler-Smith and Shefy, 2004, Sadler-Smith and Sparrow, 2008, Salas et al., 2010). This thought goes hand-in-hand with Epstein’s (1994) Cognitive-Experiential Self-Theory or CEST. Similarly to dual-processes, theorist advocates of CEST also acknowledge the use of two different modes of information processing, a rational and an experiential mode (Epstein, 2013). The difference between CEST and dual-process theory does not lie in the basic construct of these two modes, since they both share the view of a dual process system, or modes in which conscious or unconscious thoughts occur. Instead, CEST highlights the interactivity between the two systems noticeably more than does the dual processes theory (Epstein, 2003). In several experiments, researchers from the CEST community have shown that people making decisions often involve both System-1 and System-2 (Pacini and Epstein, 1999). An example of how the rational system can affect an intuitive thought is hindering the latter from doing something very stupid (e.g. shouting at your co-workers or boss just because you do not agree on a certain topic). However, there could also be an interaction in the opposite way, e.g. when a decision-maker’s rational thought is flawed by unconscious thoughts occurring under System-1 (Epstein, 2003). A decision-maker could, for instance, be convinced that he/she has made a rational decision; however, in reality, the outcome of the decision may have been coloured by unconscious thoughts. The latter example is discussed within the heuristic and bias community.

The term Heuristic and Bias (HB) was introduced in the 1970s by Daniel Kahneman and Amos Tversky (Kahneman and Tversky, 1973, Tversky and Kahneman, 1974). The HB theory is portrayed as an experience-based technique that enables individuals to use rule-of-thumb inferences to speed up the process of finding solutions that are good enough. Tversky and Kahneman (1974) argue that individuals “...rely on a limited number of heuristic principles which reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations” (p. 1124). An example of a heuristic is when you are at sea and you see birds flying. Based on this, it could be rational to think that you are near land. However, this is not necessarily true. In fact, possibly false assumptions are often neglected, since we often evade questioning the heuristic at hand. Thus, our rational System-2 can be biased by unconscious thoughts occurring under System-1 without us being aware of it.

Even though knowledge of when a rational decision may be biased by unconscious thoughts is far from definitive, several decision-making researchers are in agreement that a combination of intuitive and rational approaches could be useful (Dane and Pratt, 2009, Eling et al., 2015, Sadler-Smith and Shefy, 2004). However, the way in which to combine the two approaches is still a topic of discussion. Shapiro and Spence (1997) suggest that the intuitive approach should be used prior to the rational approach, while Agor (1986) advocates the opposite.
In a recent experiment, Eling et al. (2015) found that it is beneficial to initially apply an intuitive approach, followed by a rational approach, in order to yield the highest decision-making quality. In addition, the setup of having an intuitive decision-making process prior to a rational one has also been found to lead to shorter lead-times (i.e. increased processing speed) (Eling et al., 2015). The interaction between the rational and intuitive decision-making processes discussed above is also in line with the thoughts of Dean et al. (2006). Dean et al. (2006) stress that a decision-maker’s intuitive rating of ideas (i.e. the combined assessment and evaluation of an idea) may either consciously or unconsciously include multiple constructs. They argue that a decision-maker may include additional criteria, for example novelty or workability, in their evaluations. Thus, an assessor’s intuitive assessment could be explained by the use of different criteria.

Inclusion of additional assessors
Regardless of the discussions regarding the use of rational or intuitive decision-making, the issue of having large numbers of ideas to screen is still one of the greatest challenges facing firms that collect ideas using an OI approach. The basic problem associated with having many ideas to screen is that the workload of the decision-makers can become overwhelming, leading to both a potential reduction in pace during the screening process and increased difficulties identifying good ideas (Di Gangi et al., 2010, Pisano and Verganti, 2008, Soukhoroukova et al., 2012). As stated in the introductory chapter, there is a risk of the decision-making committee becoming a bottleneck that can delay the FEI phase. A prolonged FEI phase can obviously delay later stages of the innovation process and, in a highly competitive marketplace, this could lead to missed marketing opportunities, e.g. being first to market (Magnusson et al., 2014). Furthermore, the decision-makers’ time should be used with caution (Montoya-Weiss and O’Driscoll, 2000). It would thus be preferable for decision-makers to have a reduced set of ideas to screen, so that they can instead focus more on the actual development of the best ideas (Koen, 2005, Montoya-Weiss and O’Driscoll, 2000, Reid and de Brentani, 2004). However, exactly how a best practice regarding a reduction of the number of ideas should look is under debate.

In addition, the increased difficulties of identifying good ideas can be linked to the uncertainty experienced by decision-makers (Hammedi et al., 2013). Both in terms of being additionally pressed for time (i.e. to reach a decision despite having an increased number of new ideas to screen), and also in terms of the risk of making Type I or II errors (i.e. selecting bad ideas as well as rejecting good ones). From a practical point of view, a simple solution to this challenge would be to increase the number of assessors taking part in the screening process, given that the firm’s decision-making committee is kept fairly constant. This approach could thus be used to decrease the numbers of ideas decision-makers should focus on when making their final selections of ideas. However, it is not easy to predict whether or not the inclusion of additional assessors would increase or decrease the level of uncertainty experienced by the decision-makers during the
screening process. An increased level of uncertainty could, for instance, arise if the additional assessors identify certain ideas as good which differ from those of the decision-makers responsible for the final selection of ideas. On the other hand, if the invited assessors identified certain ideas as good that were similar to those of the decision-makers, then the latter group’s uncertainty would probably decrease. However, exactly which individuals have sufficient knowledge (i.e. use and technology knowledge) to allow them to participate in the FEI idea screening has not been fully investigated as yet. Two groups that are frequently highlighted as key resources in assisting with idea screening during FEI are users (external resource) and employees (internal resource). In the following sections, the literature on the involvement of these two groups during FEI idea screening is presented.

Users screening ideas
One proposed solution for managing the bottleneck encountered when the number of ideas is high and the number of decision-makers low is to involve users in assisting decision-makers during the screening of ideas (Toubia and Florès, 2007, Magnusson et al., 2016). In the thesis, the term user represents the intended end-user of, for example, a service or product innovation. Thus, users are seen as being external end-users of the intended innovation being offered by a firm. The reason for not using the term customer is that a paying customer may not necessarily be the intended user for innovations developed in the future. In the literature, the involvement of users is highlighted as a great source of knowledge to be utilized during the innovation process (Mahr et al., 2014, Magnusson, 2009, Prahalad and Ramaswamy, 2004). Furthermore, Fuchs and Schreier (2011) have shown that empowering users to participate in the screening of new ideas also improves the firm’s image of as user-oriented (Fuchs and Schreier use the term customer-oriented), thus strengthening the firm’s competitive advantage in this regard. Traditionally, user involvement has often focused on participation during the idea generation and final testing phases of the innovation process (Magnusson et al., 2003). However, in the service innovation literature, it is argued that users should be involved throughout the entire innovation process (Alam and Perry, 2002), and that this is key to innovation success (Alam, 2006). With the use of online IT-based platforms, the possibility of involving users in, for example, the screening of ideas, has increased (Sawhney et al., 2005). As it becomes easier to engage users in the innovation process, the cost of involving them has decreased (Piller and Walcher, 2006). Hence, interest in actively involving users in crowdvoting activities is growing (Blohm et al., 2011). The concept of crowdvoting is similar to the concept of “wisdom of crowd”, which argues that the independent judgement of a crowd is similar (and in some cases even better) than decisions made by a few decision-making experts (Surowiecki, 2005). However, a user could be expected to think a bit differently to an internal decision-maker, as discussed below.

Decision-makers are likely to make more sophisticated idea selections than users (Toubia and Florès, 2007). This is because decision-makers are assumed to have the relevant use and technology knowledge for assessing both the problem and
solution parts of an idea. Thus, decision-makers can take both parts into account in greater depth than would a user, who might not have the same level of supply-side knowledge. However, idea selection conducted by decision-makers may not, in terms of user needs, be better than idea selection conducted by users (Toubia and Florès, 2007). Thus, it can be argued that users would be able to identify ideas that could have an increased chance of being accepted in the marketplace, based on user needs. In a field experiment, it was found that decision-makers appear to be more sensitive to "solution information", which is linked to the solution part of an idea and the technology knowledge held by the decision-maker, while users, on the other hand, were more sensitive to "need information", which corresponds to the problem description and use knowledge (Toubia and Florès, 2007). However, the outcome of user involvement during FEI idea screening is not fully covered in the literature (Magnusson et al., 2016). A user could, for instance, be portrayed as a lead-user, i.e. as having both the use and technology knowledge needed to produce a solution that answers the stated need (Lüthje et al., 2005). But he/she could also be described as skilled or naïve, depending on his/her level of technology or supply-side knowledge (Magnusson et al., 2016). In addition, it is also argued that users might not be able to assess more complex ideas, and that they should instead be involved when the task is as simple as choosing a possible end design for, for example, a new product (Pisano and Verganti, 2008).

There is a lack of systematic studies comparing users' assessments of ideas with the firm's own decision-makers (Magnusson et al., 2016, Riedl et al., 2010). Studies involving users generally compare the users' and the decision-makers' idea selection by using different screening methods. Users are often instructed to use intuition-based approaches such as Idea markets or Prediction markets, while the decision-makers make their decisions based on rational criteria assessments (Blohm et al., 2011). In an Idea market, for example, users trade ideas as stocks, and the price of each respective stock reflects the idea's popularity among the users (a prediction market works in a similar way). The use of differing methods of assessing ideas between users and decision-makers makes comparisons between these groups difficult. The only true comparative outcome from these kinds of studies is the actual identification of which ideas are perceived to be good or bad between the two groups. However, even though similarities between the identification of top-rated ideas are used as an argument for the inclusion of users in idea screening, this does not reveal if or why similarities (or dissimilarities) exist in terms of idea ratings. Thus, more detailed comparisons are needed, for example how different criteria are weighted in connection with which role an assessor has, as a user, employee, or decision-maker. Having this type of data would make it possible to give better recommendations to practitioners regarding how to organize a screening activity that involves additional assessors. However, involving users in screening ideas during the FEI phases is not as easy as it is sometimes portrayed by its advocates, negative aspects do exist (Gassmann et al., 2010).
Challenging aspects of user involvement

According to Ozer (2009) as well as Pitta and Fowler (2005), it would be optimum to identify and incorporate lead-users into FEI idea screening. A lead-user is a person whose currently strong needs will become common in the marketplace in the future, and someone who is also able transform his or her needs into working solutions, e.g. a new product (von Hippel, 1986). Thus, a lead-user has both use and technology knowledge, which is important when screening ideas. However, identifying lead-users is both difficult and costly (Lilien et al., 2002). Thus, even though lead-users would definitely be of interest to involve when screening new ideas, the difficulties and costs associated with identifying them could arguably reduce the benefits compared to involving "regular" users. The question is, in other words, whether or not it would be beneficial to involve users who do not (at least in theory) have the same level of technology knowledge as lead-users when screening ideas during FEI.

Involving users in FEI idea screening can lead to challenging aspects that should be addressed before users are involved. For instance, a firm must confidentially manage aspects such as difficult issues regarding intellectual property rights and ownership of ideas (Alam, 2006, Alexy et al., 2009). Disclosing internal information and processes to external parties (such as users) could lead to information ending up in the wrong hands. It would be naïve to assume that users would always have the firm’s best interest at heart (Bonabeau, 2009). Participating users could, for instance, take ideas that they think are good and have them developed elsewhere if in disagreement with, for instance, the firm in terms of price estimations for the finally-developed innovation.

Another aspect of concern, and one also connected with the above discussion, is the risk of users becoming frustrated over the outcome of a screening. According to (Di Gangi and Wasko, 2009), user frustration can occur when ideas selected by a firm do not correspond with the ideas selected by the user. With the introduction of social media, users’ frustrations could easily and quickly lead to negative publicity which can be both difficult and costly to manage. A third challenging example regarding user involvement is getting the internal organization’s approval (i.e. acceptance) to open up the processes to the users. Piller and Walcher (2006) argue that internal acceptance of opening up processes to customers is a key success factor that must be in place before customers get involved. However, since innovation processes are traditionally portrayed as internal, or closed to outsiders (Chesbrough, 2003), employees might be reluctant to involve external parties (e.g. users) since this could interfere with their working routines, thus they might resist change (Gilbert, 2005). A common term relating to the latter is the "not-invented-here syndrome" (Katz and Allen, 1982), which, despite frequently being used to describe how ideas from external sources are rejected by internal employees, can also be used to describe an unwillingness to include knowledge from external sources (Antons and Piller, 2015), which could be the case when users are involved in FEI idea screening. Challenges like the ones mentioned above can thus make firms hesitant to involve users in screening
ideas. One alternative to involving users could thus be exploiting the knowledge held by other employees who are already affiliated to the firm. Hence, in the coming sections, the focus will be on involving employees in idea screening during the FEI phase.

**Employees as an alternative to users**

Employees should be seen as an unused asset in the screening of ideas (Feldmann et al., 2013). At larger firms, there are obviously many different types of employees, in terms of positions and duties, who could potentially be asked to screen ideas. In this thesis, two types of employees are in focus, R&D employees and Frontline employees (FLEs). Alam (2006) as well as Feldmann and Kohler (2015) identify the FLE as an important employee to involve during the early innovation phases. They argue that FLEs have the ability to transfer the external view from the customer and to incorporate it into idea screening. Karlsson and Skålén (2015) argue that FLE involvement during all stages of the innovation process increases the likelihood of an innovation being successful in the marketplace. It is also argued that the early innovation phases (which include FEI idea screening) would benefit from having the increased involvement of the departments which, on a regular basis, interact with the customers (Ernst et al., 2010). Hence, FLEs are seen as having relevant use knowledge regarding customers’ wants and needs, based on their frequent interactions with them (de Jong and Vermeulen, 2003, Sundbo, 2008). They are also portrayed as having an understanding of the technology knowledge aspects of an idea on the basis of their duties, even though knowledge held by the FLEs is often neglected by, or even unknown to, middle and top management (Engen and Magnusson, 2015). R&D employees are, similarly to the FEI group, also assumed to have relevant use and technology knowledge. It can be expected that the R&D employees, through their accountability regarding the development of new products/services (Koen, 2005), have sufficient use and technology knowledge to take part in FEI idea screening.

However, empirical studies of the involvement of employees in screening ideas is not sufficient to base general recommendations upon. In studies that discuss the involvement of employees in screening ideas, no paper has been found, for example which compares the assessment of ideas on a departmental level with decision makers’ assessments. Thus, exactly which types of employees (in terms of positions and duties) have participated in the studies has not been fully clarified. Instead, employees are often described on a more generic level when involved in idea screening activities. One example of an interesting study discussing employee involvement in idea screening is the one by Onarheim and Christensen (2012). They found a connection between how a group of executives and a group of employees assessed ideas. Based on a field experiment, in which employees assessed ideas simply by giving them a yes or no recommendation, it was found that experienced employees, compared to less-experienced ones, rated ideas similarly to experts. In a similar vein Lauto et al. (2013) also argue that
there is a link between the outcomes of decision makers and employees in terms of their seniority and job position.

Studies of employee involvement in idea screening typically apply various methods on the basis of a market mechanism perspective (Kamp and Koen, 2009), methods thus similar to the ones for involving users described previously. Examples of the methods used include; Idea markets (Lauto et al., 2013, Soukhoreukova et al., 2012), Information Markets (LaComb et al., 2007) and Serious Games and Crowdfunding (Feldmann and Kohler, 2015). The underlying market mechanism in these methods is the same as the one described for user involvement above. One interesting result from the studies of employee involvement is that they argue that employees pick out the same top ideas as the decision-makers responsible for screening (once again, similar to studies that involve users). Thus, the argument that employees should be incorporated into idea screening seems legitimate. However, more detailed aspects, such as the aforementioned aspect of the aggregation and weighting of different criteria, are not revealed in the literature.

Hence, although contributing valuable knowledge of the potential usefulness of distributing idea screening internally, it is difficult to generalize about the findings from the studies mentioned. An initial reason for this is that the studies obviously use different assessment approaches when comparing employees with their respective reference groups. A common theme here is that the reference group (i.e. decision-makers) in the studies mentioned makes its decisions based on a rational decision-making approach. The employees, on the other hand, often use a holistic intuitive approach. Secondly, none of the studies mentioned discuss the employees in more detail. Thus, knowledge of whether or not different groups of employees make similar or different idea selections, compared with the decision-makers responsible for screening, is limited. This consequently leads to discussion of who to involve from the internal organization. In a practical situation, the question of whether or not it will be possible to involve anybody in the organization to screen ideas is intriguing. Should only, for example, more experienced employees be asked to participate?

**Research questions**

From the above research presentation, regarding rational and intuitive decision-making, as well as the involvement of non-decision-makers in screening ideas, several questions can be raised. However, based on the findings in the appended papers, three general research question will be addressed in this thesis. From the rational decision-making approach, the use of criteria is of interest. Are, for instance, the criteria identified in previous research the same as the criteria that decision-makers actually use when screening ideas in practice? Or, are some additional criteria, unknown to the research community, being used by decision-makers? Based on the methods that the previous literature built on, it is thus relevant to study the decision-making process in practice in order to fully reveal
exactly what decision-makers base their screening decisions on. An initial research question is thus formulated as follows:

**RQ1:** What criteria do decision-makers take into account when intuitively (holistically) screening ideas during the FEI phase?

Following the first research question is the subsequent difficulty of weighting the different criteria assessments towards each other (e.g. when applying a Linear model approach to make a final idea selection). This matter becomes even more interesting when discussing the involvement of non-decision-makers in the form of either users or employees. From the literature it is clear that both users and employees should be considered as a useful knowledge source to utilize. But does for example the weighting of different criteria differ between different types of assessors? The second research question is thus formulated as follows:

**RQ2:** Does the weighting of criteria differ between decision-makers and non-decision-makers, and if so how?

The two first research questions above thus correspond to the rational decision making approach. However, the increased attention given to intuitive decision making is highly interesting in regards of idea screening. Especially when a firm facing large amounts of new ideas to screen. Yet knowledge is scant when it comes to discuss difference and or similarities from using the two decision approaches, both in terms of the outcome and also by whom is involved in the screening process (decision maker vs non-decision-maker). Hence, the third research question is two folded where the first part focus on the differences between the two decision making approaches (rational or intuitive) and the latter focus on whether or not decision-makers and non-decision-makers assess ideas differently in regards of the two decision making approaches. The third research question is formulated as follows:

**RQ3:** How is idea screening affected on the basis of which decision-making approach is applied (rational or intuitive) and on the basis of who conducts it (decision-maker or non-decision-maker)?

The three different research questions thus correspond to the three different research areas discussed above.
3. Empirical context and methods

In this chapter, the research methods and the quality of the research are discussed. Since the thesis starts out from practical problems related to idea screening in the FEI phase and the empirical data is based on field research, the research is problem-driven and thus referred to as applied research (Edmondson and McManus, 2007). Applied research refers to studies that seek to solve practical problems (Bickman and Rog, 2009). To answer the research questions and fulfil the overall purpose of the thesis both qualitative and quantitative methods have been used. The first research question is addressed using a qualitative approach, while the second and third research questions are studied using a quantitative approach. Detailed descriptions of the practical setup are given in each of the appended papers. The empirical data is based on three different studies, using either a qualitative or quantitative approach, or a combination of them, depending on which of the research questions are addressed (see figure 2 below for a visualisation).

To answer the first research question which can be described as exploratory, an inductive qualitative approach was applied, using the talk-aloud method (Fonteyn et al., 1993), to Papers I and III. To answer the second and third research questions, which explores whether or not differences exist among the different groups of people (e.g. decision-makers and users), when screening ideas, a quantitative experimental research approach was used. However, the field research setting did not allow the random division of the participants into groups, which is essential for an experimental research design (Bryman and Bell, 2011). The absence of a random group assignment consequently calls for the use of a quasi-experimental design (Mertens, 2014, Shadish et al., 2002). In the appended papers, all the participants’ group affiliations (e.g. decision-maker and non-decision-maker) were based on the affiliations that the participants had already in day-to-day life or work. Thus, individuals who, for example, had been tasked with participating in idea screening activities at the respective firms were grouped and labelled as decision-makers. In relation to the quantitative approach applied to questions two and three, Paper II is based on deductive hypotheses testing. Papers I, IV and V on the other hand had an inductive focus, implying an iterative process, moving between data and theory (Bryman and Bell, 2011), since the existing literature regarding to each papers aim did not permit the use of a deductive approach (due to a lack of extensive theoretical foundations). Even though the non-random group assignment of the participants during a quasi-experiment cast a shadow over a study’s internal validity (i.e. the extent to which a causal conclusion based on a study is warranted), the results are still frequently compelling since they regularly take place in a natural field setting (Mark and Reichardt, 2009). Thus, the ecological validity (i.e. whether or not social scientific findings are applicable to peoples everyday natural social setting) is often portrayed as being high (Bryman and Bell, 2011).
Connections between the studies, papers and research questions

As visualised in Figure 2, the data from the first study, which Papers I and II are based on, corresponds to research questions one, two and three. Hence, both a qualitative and quantitative approach was applied. Paper III is based on data from the second study and addresses research question one (thus a qualitative approach was used) Finally, Papers IV and V are based on data from the third study and correspond to research questions two and three. Thus, the final study is based on the quantitative approach.

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<th>Research projects</th>
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<td>Study two</td>
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The above figure also shows that a total of 192 ideas and 127 participants were involved in the three different studies. In the coming section focus is on the empirical context of the different studies before the methods used to gather data are discussed.

Overall research context

Three global Swedish firms; Telia (telecom provider), Ericsson (telecom equipment manufacturer) and Volvo (commercial vehicle manufacturer), all agreed to participate in the studies that this thesis is based on. All of the studied firms had been applying, prior to the research conducted, an open innovation perspective to idea generation, i.e. involving individuals other than just members of the R&D department in the generating of new ideas (Chesbrough, 2003). Hence, they had all experienced the challenges of having to screen large numbers of new ideas collected within a short timeframe. The goal of the first project was to achieve a better understanding of idea screening based on holistic (intuitive) assessment, in relation to specific criteria (i.e. rational decision-making). In study
one Telia provided access to study how their decision-making experts screened ideas. The second study were conducted both at Ericsson and at Volvo (at Volvo the project was carried out at their R&D unit, known as Volvo Technology or V-Tech). The objective of the second study was to investigate more deeply which criteria decision-makers utilize when screening ideas, in order to justify the findings made in the Telia study. Finally, the third study was about exploring the involvement of non-decision-making employees during the screening process at Volvo.

The first study was funded by grants from the Swedish Governmental Agency for Innovation Systems (VINNOVA). Studies two and three were part of the research profile called Service Innovation for Sustainable Business (SISB). The SISB profile was funded via the Swedish Knowledge Foundation (KK-Stiftelsen); prior to becoming a PhD student in mid-2011, I was part of the team in charge of the application processes, together with (Prof.) Bo Edvardsson and (Prof.) Lars Witell.

**Study one**

The Telia study was initiated at the beginning of 2010 (at the time when I was still a project assistant). Through Telia, (Prof.) Peter Magnusson, (Assoc. Prof.) Erik Wästlund and I gained access to ideas collected via Telia’s online web forum called Innovation World. Innovation World was launched during 2008 and the idea behind it was to create an environment (or venue) in which small and medium sized firms (working with mobile phone services) were offered opportunities to create and develop new ideas jointly with potential end-users. The only guidance the idea creators were given was that the ideas should be part of the context of mobile telephony. In early 2010, all the 155 ideas published on the Innovation World web forum (between 2008 and 2009) were extracted and given to us. In Papers I and II, we used a sub sample of 83 ideas, instead of the 155 ideas originally extracted from Innovation World. This reduction in the number of ideas was based on the initial idea of studying and understanding the background to the created ideas. Thus, we asked all the idea creators for the backstories behind their ideas; from this, we obtained the stories for 83 of the 155 ideas, which we asked the decision-makers from Telia to screen.

To easily involve the participants in assessing the ideas, we developed (with help of an external IT consultant) an online platform aimed at simplifying the assessments. This platform made it possible for an invited assessor to remotely assess all the ideas using an individual ID and password. The idea assessment platform was designed so that the first time an assessor logged in, he or she would have to complete a background survey (i.e. questions about age, gender, education and usage of mobile phone apps). As a feature of the platform, we also gave all the assessors the ability to pause their assessments and continue assessing the ideas on a subsequent occasion, as long as the tasks were completed within a predetermined timeframe. In Paper I, the ideas were assessed by a group of decision-makers from Telia, while in Paper II, they were also assessed by two
groups of users (technically-skilled and technically-naive users). In addition to the purely numerical assessments generated by the participants, one of the decision-makers from Telia was also invited to conduct the intuitive assessment in-situ at Karlstad University. The verbal data generated during this session constitutes the qualitative study in Paper I.

The Telia study was initiated and governed by Peter Magnusson, who was also responsible for liaising with the participating decision-makers at Telia. However, I contributed in several other areas. First, the task of compiling and transferring all the ideas from Innovation World into a template that was later used in our own IT-based assessment platform was my responsibility, as well as coordinating and recruiting participants (users) that are part of Paper II. In addition, I was also in charge of all administrative responsibilities regarding our own developed assessment platform. This included the task of testing the platform and fixing layout issues (i.e. the included HTML and PHP coding). Later, I was also responsible for transferring and compiling all the data from the online assessment platform to SPSS for statistical analysis. In sum, I took part in and was responsible for several of the tasks in the project.

**Study two**

The second study was conducted to further investigate the findings from the qualitative study presented in Paper I and based on the SIBS profile, the focus was on service-related ideas. Prior to initiating data collection (leading to the creation of Paper III), I spent almost two months (between September 2011 and June 2012) at Ericsson's and Volvo's headquarters in order to learn more about their respective ways of working with idea creation and idea screening during the FEI phase. At Ericsson, I studied their idea management system, called IdeaBoxes. The creation of IdeaBoxes during 2008 was part of a strategic effort by the firm to gather, evaluate, develop and implement the ideas generated both by employees (internally) and by external stakeholders (e.g. customers, partners etc.). In essence, IdeaBoxes is a web-based platform whose users can follow and submit ideas, as well as search for and find others possibly sharing the same interests.

Since the IdeaBoxes system contained more than 50,000 ideas at the time, and its research profile was oriented towards service innovation, the focus was on ideas collected by the business unit responsible for global services, called BUGS. I examined and extracted all the 507 ideas submitted to 20 different IdeaBoxes within BUGS. Selection of the different IdeaBoxes was carried out by Manfred Dasselaar (who at the time was a member of the Ericsson Global Service Research team). All the collected ideas were initially categorised firstly, on the basis of whether the idea had an internal (firm) or external (customer) focus and secondly on the basis of all the ideas being labelled as having either a service or a product orientation using a scale of one to six. An idea marked as lying between one and three on the scale was product-oriented. Ideas rated between four and six were consequently labelled service-oriented. This categorisation was
subjectively carried out by Manfred and me, with the one to six scale being used to force all the ideas too fall within one of the two categories. The result showed that almost 70% of the ideas had a product focus. The tendency towards a preponderance of product-related ideas is in line with Ericsson’s heritage as a goods-producing firm. This is even though services account for over 67% of the firm’s overall revenues in 2016 (Telefonaktiebolaget LM Ericsson, 2016), and the fact that the ideas were collected within BUGS, which is the firm’s services-oriented business unit. From the initial sample of 507 ideas, 50 service-oriented ideas (from the 151 service-oriented ideas) were randomly selected to be part of the verbal idea screening assessments. The ideas were randomly selected by having Excel produce 50 randomized numbers between 1 and 151. The choice to include 50 ideas was because all the booked sessions with decision-makers at Ericsson were scheduled to last one hour each. Moreover, since we were interested in their intuitive decision-making process, we did not want the participants to have time to engage in analytical reasoning. Before the talk-aloud sessions began at Ericsson, the final idea sample was reduced to 46 since four of the ideas were written in a way that made them impossible to interpret (due to poor English written by non-English speakers). The elimination of these four ideas was done in collaboration with Manfred Dasselaar from Ericsson two weeks before the first talk-aloud session took place.

At the time, Volvo had no formal idea management system comparable to Ericsson’s IdeaBoxes. Instead, I examined the roughly 1,000 ideas collected from three different Innovation Jams held between 2009 and 2011. The idea behind an innovation jam stems from IBM; it can simply be described as an online forum where employees from the various business units of a firm come together to share and discuss new ideas (Bjelland and Wood, 2008, Ringo, 2007). The first two innovation jams at Volvo had been open to the whole Volvo Group (at the time consisting of almost 100,000 employees). The third jam was only open to employees working at the research and technology unit, called V-Tech. All three jams included different themes such as (uptime, fuel economy, emerging markets, IT, future transport solutions and improved business). However, no instructions were made to force the idea creators to focus their ideas towards either products or services. Hence, both types of ideas were generated in the different jams. After analysing all the ideas using the same approach as at Ericsson (but this time without help from a firm official), the results were similar to those at Ericsson, i.e. the majority of all the ideas (73%) were marked as relating to product development. From those ideas that were marked as being service oriented a sample of 35 ideas was randomly selected to be part of the study at Volvo (using the same randomization technique as described in the Ericsson case). The reason why the sample contained fewer ideas than Ericsson was that the ideas from Volvo were collected after I had already conducted the first talk-aloud study at Ericsson. One key observation from Ericsson was that the time needed to go through all the ideas took longer than expected. Hence, since the time restrictions concerning Volvo were tougher (compared to Ericsson), a smaller sample of ideas was used. In the study, the final sample of ideas was reduced to 32 after 3
were labelled as incomprehensible by two members of the service research unit (who were not taking part in the talk-aloud sessions) due to the English being poor. In Paper III, the findings from the Talk-aloud studies at Ericsson and Volvo are presented.

The initial contacts and discussions regarding the intention of the Talk-aloud study were managed by Peter Magnusson and Lars Witell. However, as soon as we received approval to initiate the study, I took on the role of project leader. Hence, I acted as the point of contact for both firms. This meant that I was also responsible for all the administrative tasks and data collection, as described in the Telia study above. Thus, in comparison with the first project, my responsibilities grew in the second study.

Study three
The third study was aimed to explore the involvement of non-decision-makers during FEI idea screening. During the time I spent at Volvo headquarters, before and during the Talk-aloud study, I had numerous informal discussions with individuals from the service development team at V-Tech. A reoccurring topic for discussion was how to handle the vast amounts of new ideas being submitted during the innovation jams. When mentioning the possibilities of getting users to participate in the screening processes (based on the findings from the Telia study, see Paper II), discussions turned to the problems experienced when actively trying to involve users or partners in the development of new innovations. The problems mentioned were discussed mainly from a firm-internal perspective, relating to the issue of the control and ownership of the ideas. This was despite the fact that the involvement of users is often highlighted as a success factor during innovation work (see e.g. Alam, 2006). One possible solution to the practical challenges of involving external users or customer, jointly discussed with Volvo, was to investigate the outcome of involving additional internal employees. Hence, the final study was built around this matter.

In Paper IV, assessments made by non-decision-making employees from the R&D department were compared to those made by the firm’s decision-makers. The goal was to investigate whether or not the responsibility for decision-making and (firm-specific) experience affect idea assessment. Paper V investigates whether or not frontline employees screen ideas differently to R&D employees. This is in order to generate appropriate recommendations regarding whether or not frontline employees could be incorporated into the screening process. The ideas used during the two experiments emanated from an internal Volvo Truck jam which specifically requested service-related ideas. The jam was open to the R&D department at Volvo Trucks and a total of 86 ideas were generated. Similar to the previous studies, I made an initial analysis of the orientation of the ideas as product or service oriented (using the same technique as described above). In total, 70 of the 86 ideas were marked service-oriented (81%). From the "service oriented idea sample", a total of 31 ideas were extracted using the Excel technique described previously. In addition, I also invited four of my colleagues at the
research department (Bo Edvardsson, Lars Witell, Peter Magnusson and Martin Löfgren) to check my initial classification of ideas. Their analysis showed that all 31 ideas were, in fact, service-related. When conducting the two experiments presented in Papers IV and V, a reduced set of ideas had to be used since strict time limitations were imposed by Volvo when a larger group of participants were involved, compared to study two (especially when involving FLE). Thus, the 31 ideas was randomly divided into two parts, i.e. the 21 ideas used in Paper IV and the 10 ideas used in Paper V. This third and final study was both initiated and managed by me with the support of Peter Magnusson and Lars Witell. Thus, I was responsible for the whole project, from beginning to end.

Data collecting methods
The coming sections introduce the qualitative Talk-aloud method corresponding to the case study design used in Papers I and III, followed by a description of the experiments performed during Papers I, II, IV and V.

The aim of the Talk-aloud method is not judging the outcomes of a participant's cognitive process, but exploring the decision-making process itself (Ericsson and Simon, 1993). As discussed in the theory chapter, previous research into which criteria decision-makers utilize when screening ideas is mostly based on retrospective data collection methods, meaning that the decision-makers studied try to recall which criteria they have been using when screening ideas. However, individuals who are asked, for example, to verbalize their cognitive processes which lead to a decision, in retrospect, can be biased (Nisbett and Wilson, 1977), thus leading a researcher towards incorrect assumptions. However, the use of verbal data (i.e. Talk-aloud) is still seen as reliable. According to Ericsson and Simon (1980), the negative attitude to the use of Talk-aloud data can be traced to the type of verbal data being analysed. Hence, Ericsson and Simon (1980) make a distinction between concurrent and retrospective verbal data. Information that is verbalized, for example during an actual idea screening activity, is labelled concurrent data, while information provided by participants who are asked to recall and verbalize their cognitive processes from situations that have occurred in the past is labelled retrospective data. It has been shown that the concurrent Talk-aloud method outperforms the retrospective method by providing clearer descriptions of the decision-making steps between the "stimulus introduction" (in this case the introduction of the ideas) and the final decision being made (Kuusela and Pallah, 2000).

All the verbal idea screening sessions during the Telia Study (Paper I) and the Talk-aloud study (Paper III) followed the recommendations given by Fonteyn et al. (1993) and Ericsson and Simon (1993). Thus, each participant was instructed to think aloud during the whole session and, if he/she was quiet for more than a few seconds, then he/she would be reminded to "keep thinking aloud". Additionally, all the ideas were presented in a randomised order to the individual assessors. The reason for presented the ideas in this randomized order was to manage the "order-effect bias" that can occur (Perreault, 1975). For example, if
an assessor is getting tired of a task, he or she can potentially start making bad assessments (e.g. simply by not doing his/her best). By randomizing the order in which the ideas are shown to the assessors, this effect is obviated. Furthermore, all the sessions were held individually with each participant, and tape-recorded for later analysis.

During the Talk-aloud session presented in Paper I, Peter Magnusson, Erik Wästlund and I jointly listened and took notes. During the Talk-aloud sessions presented in Paper III, Manfred Dasselaar and I participated in all the eight sessions held at Ericsson (with Peter Magnusson taking part in four of these), while at Volvo, I ran all the sessions alone. All the sessions at Volvo took place in Lyon (France), hence the reason for my conducting them alone. In all the Think-aloud sessions held at Telia (Paper I) and Volvo (Paper III), our own IT platform was used to display the ideas. However, at Ericsson (part of Paper III), the ideas were presented on paper. The reason for this was time constraints on my part; I did not have enough time to correctly setup the IT platform when we were given the opportunity to conduct the experiment at Ericsson. However, they were shown in the same format as on the IT platform (and in randomized order for each participant). The collected data was analysed using Thematic Analysis (Boyatzis, 1998), following the recommendations of Braun and Clarke (2006). Since similar patterns were found in the data in both samples in study two, the different setups do not seem to have affected the participants’ assessments. For more detailed descriptions of the practical setup and the analysis of the Talk-aloud sessions, see Papers I and III.

The experiments conducted in Papers I, II, IV and V strongly resemble each other and the same idea-randomization procedure was used during the experiments, as mentioned in the Talk-aloud section above. In Paper I, all the participants were asked to individually assess the ideas, using our online IT platform, by initially making an intuitive assessment. This was followed by a second assessment using three established criteria, i.e. Originality, User Value and Producibility (Magnusson, 2009). The setup of having the participants depart from an intuitive decision-making approach before conducting a rational assessment is in line with Shapiro and Spence (1997) and (Eling et al., 2015) arguments as regards applying the intuitive approach in advance of the rational approach to increase the decision quality.

In Paper II, a similar setup was used; however, this only included the rational criteria assessment (due to the aim of the paper). Paper II used the same three criteria as Paper I. For the experiments in Papers IV and V, a similar setup to Paper I was used. Thus, all the participants made an intuitive assessment of the ideas, followed by a rational criteria assessment. However, three differences exist in the setup of the experiments conducted during Papers IV and V, compared to Paper I. Firstly, we used a commercial IT platform instead of our own self-built platform. The reason for this was minimizing the administrative efforts needed to get everything up and running. The setup of the commercial platform was,
however, similar to our own platform. Secondly, all the participants assessed the ideas using both an intuitive and a rational decision-making approach during the same session (due to time constraints at the case firm). In Paper I, the different assessment approaches were made two weeks apart so that the assessments would not affect each other. However, since the analysis made in Papers IV and V shows a similar pattern to Paper I, the differences in the setup do not seem to have affected the outcome. Finally, into Papers IV and V, two additional criteria were incorporated (Strategic-fit and Profitability), based on the findings from the two qualitative studies conducted during Papers I and III. The data collected from the experiment was later analysed using the SPSS and SmartPLS software. For more detailed descriptions of the experiments, see Papers I, II, IV and V. In Table 2 below, the research designs used in the appended papers is summarized.

<table>
<thead>
<tr>
<th>Paper</th>
<th>Research approach</th>
<th>Empirical base</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Qualitative and Quantitative</td>
<td>83 ideas, 4 decision-makers (Telia)</td>
</tr>
<tr>
<td>II</td>
<td>Quantitative</td>
<td>83 ideas, 4 decision-makers and 30 users (Telia).</td>
</tr>
<tr>
<td>III</td>
<td>Qualitative</td>
<td>78 ideas, 16 decision-makers (Ericsson and Volvo)</td>
</tr>
<tr>
<td>IV</td>
<td>Quantitative</td>
<td>21 ideas, 17 decision-makers and 22 non-decision makers (Volvo).</td>
</tr>
<tr>
<td>V</td>
<td>Quantitative</td>
<td>10, ideas 38 R&amp;D- and 38 frontline employees (Volvo).</td>
</tr>
</tbody>
</table>

Table 2 Research approaches and methods used in the appended papers.

Table 2 shows the empirical base of each paper; in the next section, some clarifications are made regarding the recruitment of those participating in the appended papers.

**Empirical sample**

In **Paper I**, our initial contacts with the supervisor of the Innovation World platform made it possible to invite three decision-makers (in addition to the supervisor). The four participants from Telia actually made up the entire staff, employed to evaluate incoming ideas from the Innovation World web portal. In **Paper II**, we also involved two groups of users to compare their idea assessments against the initial four decision-makers from Telia. The first group, labelled technically-naïve users, consisted of students voluntarily recruited from an undergraduate course in marketing at Karlstad University. From this group, seven (of the 23 students in total who expressed an interest) participated in a pre-study during which we let them read and discuss our instructions regarding how to conduct the study. We followed Bryman and Bell (2011) recommendations to ensure that the instructions were perceived and interpreted by the participants in the intended way. The pre-study was organized as a focus group, once again following the recommendations given by Bryman and Bell (2011) in respect of setup and implementation. Based on the inputs from the pre-study, some clarifications were made regarding the instructions given to the participants in the ensuing online experiment. The improved instructions were later used during both the Talk-aloud study and the third Employee Involvement study. After excluding the students who did not assess all 83 of the ideas, the technically-naïve group consisted of eleven people.
A second group of users, labelled technically-skilled users, were also invited to assess the 83 ideas. The technically-skilled users were recruited during early 2010 via the Swedish online forum Swedroid (swedroid.se). The Swedroid forum mainly discusses the Android mobile phone operating system, and related topics, e.g. app development. This website started up during the second quarter of 2009, at roughly the same as the first Android-based phones were being launched on the Swedish market. Today (mid-2017), the forum has over fifty-five thousand members and over a hundred thousand visits a week. Even though the forum can today be described as a community consisting of members with various levels of technical knowledge, its members back in 2010 can be portrayed as early adopters. These early adopters, or pioneering users of the Android system, are portrayed in Paper II as people having a high level of interest in new technologies, and hence having great technical knowledge (controlled for in the initial background survey). In April 2010, I approached the administrators of the Swedroid forum asking them whether or not it would be possible to invite the members to sign up to the study. They were in favour of the idea and created a post containing a list where visitors to the site could enter their names. Since we were not sure about the general level of interest in participating, we stated that each participant completing the task of assessing all 83 ideas would be rewarded with 200 SEK. Just 20 minutes after the post had been published, over 60 forum members had entered their names, forcing us to take down the application form since our budget was limited to 20 participants in total. However, some Swedroid members, making contact via email and asking to participate voluntarily without the cash reward, were also included in the study. In the end, after removing those who had not completed the assessment of all 83 ideas, the technically-skilled group consisted of 19 participants.

In Paper III, a total of 16 decision-making experts from Volvo and Ericsson (eight from each firm) took part in the empirical study. As regards Ericsson, the data was collected at the firm’s headquarters in Stockholm during the autumn of 2012. All the participants at Ericsson were recruited internally with help of Manfred Dasselaar, and were all part of an idea-screening team that came together every other week to screen new ideas collected via the eight IdeaBoxes they were responsible for. All the participants at Volvo were members of an R&D team in Lyon (France) that was mainly responsible for the screening and implementing of service ideas in France. I came into contact with the French R&D group via Jonas Thorngren (Global Innovation Manager at V-Tech), with the data being collected in Lyon during the spring of 2013.

Between late 2014 and mid-2015, I collected the data for Paper IV at Volvo. With help of Daniel Zackrisson (Technology Area Director - Soft Products), I was able to invite 102 of V-Tech’s approximately (at the time) 500 employees to participate in the study. The invited group thus consisted of almost 20% of V-Tech’s workforce. From the initial sample of 102 invited participants, 39 finalized the task of screening 21 ideas. The participants from V-Tech were divided into two groups based on their role during the screening of the ideas (i.e. whether
they were decision-makers or non-decision-makers), and also based on their experience. A threshold of 10 years of experience working at the Volvo Group (corresponding to the ability to make intuitive decisions) was applied on the basis of the argument that true expertise evolves over a timespan of, ideally, ten years at Ericsson (2006). The setup of the idea-screening task was similar to the one used in Paper I.

In the final paper, Paper V, 77 individuals from V-Tech and the Nordic Sales and Support Group at Volvo Trucks participated, assessing 10 ideas. All the participants from Paper IV were invited once again; from the initial 39 participants, 38 finalized the screening of the 10 ideas. In addition, 55 individuals who were part of the Sales and Support organization for the Nordic market were invited into the study via an internal email. Erik Allenström (a service design specialist at V-Tech) assisted in the recruitment. After excluding those who had not finalized their assessments, 38 individuals were participating from the Sales and Support Group.

Quality of the research
As with all studies, the quality of this thesis can be discussed. In the following section, the main shortcomings, as I see them, will be discussed, emphasizing the reliability and validity of this thesis. Reliability, which is closely related to replicability, is linked to the question of whether or not the results of a study are repeatable (Payne and Payne, 2004), i.e. whether or not similar results would be obtained if the methods used in this thesis were to be replicated by other researchers. The question of reliability, which often relates to the use of quantitative methods, corresponds to the dependability of qualitative studies, i.e. whether or not findings are likely to apply at other times (Bryman and Bell, 2011).

Another term used when judging research quality is validity. This refers to whether or not the method used actually measures what it is intended to do (Payne and Payne, 2004). Validity is often seen as one of the most important criteria when evaluating research (Bryman and Bell, 2011). Even though validity can be presented and discussed in several ways, most questions relating to it can be grouped under the subterms Internal or External validity (Payne and Payne, 2004). Internal validity is, for example, about the extent to which a performed experiment successfully eliminates confounding variables within itself. Thus, does a causal relationship between two variables "hold water". External validity, on the other hand, deals with the issue of whether or not the results can be generalized beyond the specific research context. A third subterm here is Ecological validity, which is used to judge whether or not the research findings are applicable to people’s natural settings, or everyday life (Bryman and Bell, 2011). A study’s validity is thus connected to both reliability and replicability.

From both a qualitative and quantitative perspective, I argue that the conducted experiments and the Talk-aloud sessions are described in such a way that it would be possible for other researchers to replicate them. However, since the data from both the quantitative and qualitative studies presented in this thesis has been
collected in a field research setting, it is slightly more challenging to assess the reliability. For example, the non-randomization of the participants, in addition to the specific firm context, makes it difficult to perform a perfect replication of the quantitative experiments, also applicable to the qualitative Talk-aloud sessions. Nevertheless, since the findings from the studies do show similar patterns, even though they were performed at different firms and in different industries, I argue that the research lives up to the expected standards of reliability.

The discussion regarding the validity of this thesis is divided on the basis of the Talk-aloud and experiment methods used. In respect of the qualitative Talk-aloud studies presented in Papers I and III, one issue of concern is what level of legitimacy can be attributed to the results. The answer to this is twofold; all the findings are based on results from three different firms acting within different industries. Thus, even though it is argued that making generalizable conclusions from a single study (Paper I) is not adequate, the follow-up study (in Paper III) strengthens the generalizability of the findings. Additionally, the Talk-aloud method used in the qualitative studies is considered to be appropriate when seeking to understand the cognitive decision-making process (and from it identifying the underlying criteria used by decision-makers). On the basis of the argument that concurrent Talk-aloud techniques give the researcher good insight into the cognitive processes (Kuusela and Pallab, 2000), I argue that the qualitative findings have a high level of validity. But, claiming that the results from the Talk-aloud studies would be representative of other firms, regardless of their industry affiliation, is neither scientific nor appropriate. However, for firms operating in a similar context to the three case firms, the results are interesting.

When discussing the validity of the quantitative experiments presented in Papers I, II, IV and V, there are at least two questions that should be illuminated. The first (1) question is whether or not the method actually captures intuitively-based decisions. The second (2) question is whether or not the type of idea (i.e. product or service) has an impact on the actual assessment. Regarding the first question, it is challenging to truly say whether or not a specific decision is in fact based on intuition. As pointed out in the previous chapter intuition can be divided into sub-categorises; holistic, inferential or affective (see page 18). In the different studies the participants were instructed to make holistic assessments. The reason for this was that we did not have the ability to measure either the duration of the participant’s decision-making process or their physical status.

Firstly, the lack of timestamps (measuring the time needed for the assessors to finalize their decisions after having read the idea descriptions) makes it impossible to say whether or not the participant’s decision-making processes were quick or slow i.e. relating to inferential intuition. This is because it was technically impossible to divide and measure with certainty the time it took for the participants to initially read the idea before engaging in the actual decision-making process. However, even though intuitive decisions are said to be faster than rational decision-making, no research has been found which explicitly
argues that an intuitive decision takes a specific amount of time to complete. Thus, using timestamps would not say whether or not decisions should be marked as intuitive or rational; timestamps would merely give an indication of how long the assessments took, which would be interesting, but would not bring us closer to knowing whether or not the decisions were, in fact, based on inferential intuition. One alternative could have been to use a student sample in order to better check the time the assessments took (i.e. tuning the method to make it more closely resemble a lab experiment). However, in that case, the results would not perfectly target the practical issues taking place in a natural setting.

Secondly, regarding the participant's physical status, the experiments conducted did not permit any additional data gathering in this regard. Even though it must be said that the connection between somatic markers e.g. palm sweat is interesting (see e.g. Damasio, 1996). Thus any physical reaction which could be linked to e.g. an affective intuitive decision-making situation, was impossible to control for. However, this is not part of the traditional business administration field that I come from (this is more about clinical neuropsychology). Thus, not having access to equipment to measure somatic markings makes it impossible to say whether or not any of the participants made affective intuitive decisions. However, during each experiment, we instructed the participants make holistic assessment and not to engage in analytical reasoning. Furthermore, the data showed similar patterns between the participants, and holistic (intuitive) decision making has been portrayed as commonly used when screening ideas (Hart et al., 2003), it can be expected that the participants were able to make holistic intuitive decisions (Magnusson et al., 2014). Finally, the fact that the assessments were made individually also minimizes the risk of groupthink (Janis, 1972). Thus, the individual ratings should reflect the true opinions of each participant.

The answer to the second question, whether or not the types of ideas (i.e. product- or service-oriented) have an effect on the assessments is also difficult to answer. This is because both the numbers of ideas in the Telia study (which was the only study containing both product and service ideas) and the numbers of participants were too small to make any significant estimations as regards whether or not the type of idea affects screening. As regards both the qualitative and quantitative studies, quality issues exist. However, in terms of ecological validity, i.e. whether or not the findings are applicable to people's daily lives (Bryman and Bell, 2011), I would claim that the validity is quite high. However, one must bear in mind that the findings presented in this thesis are based on just three firms; thus, arguing that the results would be representative of other firms regardless of their industry affiliation is, once again, neither scientific nor appropriate.

**Reflections on the research process**

From my parents, I have learnt that it always pays to be honest. Therefore, I can honestly say that my understanding of the term methodology has grown
considerably during the finalization of this thesis. Thus, when reading about the perfect linear research process portrayed in most method books, I feel that my processes are a bit more chaotic, involving both qualitative and quantitative methods (often making me question why I am writing a thesis, due to the feeling of hopelessness arising from not understanding what it is I do).

When I now reflect on what I have been doing over the last couple of years, it becomes clear to me that I have trouble classifying what type of researcher I am, in terms of my ontological and epistemological standpoint. Ontology, for instance is according to Bryman and Bell (2011) about how one see the world. However, I find it difficult to give an direct answer to this. Should I, for example, consider social entities as objective entities (i.e. objectivism), or should I see them as social constructs (constructionism). Epistemology, on the other hand, refers to the question of how we get to know things, how we know whether things are true or false, and what steps we need to take to gain knowledge of the world (Bryman and Bell, 2011). From an ontological perspective, I find it difficult to say whether or not the activities I have studied (i.e. idea screening) should be regarded as observable behaviour, taking place in observable and material circumstances, thus labelling myself an "objectivist researcher", or if I should instead see the world more from a constructivist point of view, thus seeing the phenomenon of idea screening as something that is socially constructed and in a constant state of revision.

Since I have used both qualitative and quantitative methods to collect data, I have also taken the trouble to position myself on the epistemological "positivism - interpretivism spectrum". Thus, whether or not I should favour the idea that knowledge is gained through observable and measurable facts, using quantitative methods (positivism), or if I should see knowledge as a social construct that comes from using more qualitative based methods (interpretivism). However, I am not sure that it would be wise for me to paint myself into a corner, by stating that I am "this exact type of researcher". If I did so, I think I would tie myself down, making it difficult to conduct research on topics that I might find interesting in the future. Instead, I think it is a good thing for a researcher to have knowledge of both qualitative and quantitative methods, and to be open to challenging his/her own view of the world. Thus, I think it is important to be open-minded and to listen to others’ perspectives. Questioning what other researchers have done should not, in my view, be judged solely on the basis of the perspective they are starting out from, rather on how well they have been able to be transparent in showing how they have conducted their research. Based on this, it is up to the reader to say whether or not he/she thinks that the research is interesting and valid.

My belief in having an understanding of both qualitative and quantitative methods, and being transparent as regards how these are used is inspired by my work at the Service Research Center, which I am affiliated to. The research center is a multidisciplinary research centre focusing on service research; the researchers
working here have different backgrounds in terms of their field of expertise (i.e. business administration, engineering, psychology, computer science, sociology, sociology of religion, and working life science). Hence, many of my colleagues have different fields of expertise in terms of qualitative and quantitative methods. Fitting in, and having a chance to follow the often lively debates among my colleagues, has made it necessary for me to understand at least the very basics of the various qualitative and quantitative strategies (and their matching methods).

In my own research, it has thus become natural to use both qualitative and quantitative methods when studying the phenomenon of screening ideas during the FEI phase. Even though it has been argued that having one’s ontological and epistemological perspective in place right from the start makes the research process more straightforward (Bryman and Bell, 2011), I still think that it is good to test, as a researcher, the different methods and to thus dare to challenge one’s beliefs and perceptions along the way, and to thus see the studied phenomena from different perspectives (even though this almost certainly requires more time).

During my time as a PhD student at the Service Research Center, I have had the fortune to use both qualitative and quantitative methods, and I have also realized the importance of being transparent. To me, this is what a doctoral education is all about, i.e. testing and realizing that you can see a phenomenon from different perspectives. In the future, I want to continue being curious, using the methods that are the most suitable at the time, even though this might force me to learn and understand a new qualitative or quantitative method, which once again might make me feel hopelessly ignorant (before I do understand what it is that I do).
4. Summary of the appended papers

In this chapter, the five appended papers are briefly summarized. As shown in Figure 2, Papers I and II are based on the Telia study. Paper I corresponds to the first and second research questions in the thesis while Paper II is linked to the third research question. Paper III, which is based on the Think-aloud study, addresses research question one. Papers IV and V are based on data from the Employee Involvement study, and correspond to research questions two and three.

**Paper I - Exploring holistic and intuitive idea screening in the light of formal criteria**

With the aim of achieving a better understanding of idea selection, based on intuition in relation to formal specific criteria, four decision-makers independently have evaluated a set of 83 ideas (as part of the Telia study). Built on a quasi-experimental approach, the decision-makers initially rated each idea on the basis of their intuition (using both a radical and an incremental scenario), while not using any predefined criteria. After the intuitive assessments, the same decision-makers independently rated the same ideas again (two weeks later), but this time using three established and specific criteria (Originality, User Value, and Producibility). In conjunction with the first intuitive assessment approach, one of the decision-makers did the assessments while thinking out loud (the qualitative think-aloud method), in order to further understand and reveal the factors influencing the intuitive decision-making process.

A regression analysis showed that the three criteria explained about 50 percent of the intuitive assessments. The paper thus contributes to the literature by establishing a statistical relationship between assessment based on intuition and assessment based on formal specific criteria. The regression analysis also revealed the decision-makers’ weighting of the three criteria used, showing that user-value is seen as the most important criterion. The qualitative think-aloud study also identified two additional candidate criteria that could provide a further explanation of a holistic intuitive assessment (Strategy-fit and Profitability), as well as acknowledge five affectors (trend, simplicity, legitimacy, cluster, and existence) that could provide further explanation of intuitive assessment.

**My contributions to Paper I**

The paper is co-authored by (Prof.) Peter Magnusson and (Assoc. Prof.) Erik Wästlund. My main contribution was the review and writing the intuition part of the theory chapter, as well as parts of the introduction. Erik was responsible for the statistical analyses and Peter and I contributed equally to the qualitative analysis. Peter was in charge of the overall writing process.

**Paper II - Exploring users’ appropriateness as a proxy for experts when screening new product/service ideas**

As part of the Telia study, the aim of Paper II was to investigate the appropriateness of having users act as a proxy for professional decision-makers
when screening ideas during the FEI phase (using a criteria decision-making approach). In other words, are users’ rational assessments conformant with professional decision-makers’ assessments, and are they reliable as a proxy for decision-makers during idea screening? The assessments of ideas done by two user groups (Technically-Skilled Users and Technically-Naïve Users) were compared with those done by a group of professional decision-makers at Telia. The idea sample consisted of 83 ideas, which were assessed using three established criteria (Originality, User Value, and Producibility).

The results showed no conformance between Technically-Naïve users and decision-makers when comparing the absolute scores given to the ideas. When comparing the Technically-Skilled users and the decision-makers, the former group gave, on average, a significantly higher absolute score to all ideas (but not as high as the Naïve user group), except when assessing ideas in terms of their producibility, where the score was identical. However, when comparing the groups’ ranking of ideas, both user groups were conformant with the decision-making professionals, meaning that the groups identified the same top ideas. The results indicate that companies can employ users when screening ideas during the FEI phase, as a means of reducing the initial number of ideas the professional decision-makers should focus on.

My contributions to Paper II
Co-authored by (Prof.) Peter Magnusson and (Assoc. Prof.) Erik Wästlund. I took part in and contributed to all stages of the writing and analysis. However, Erik had the main responsibility for the statistical analysis, whereas Peter was in charge of the overall writing process.

Paper III - Improving criteria-based idea screening by emulating experts’ holistic decisions
Departing from the findings made in the qualitative part of Paper I, the Talk-aloud study (project two) resulted in the making of Paper III. The objective of Paper III was to improve knowledge of rational criteria assessments made during the FEI idea screening process by developing a better understanding of what criteria to use and understanding how individual decision-makers assess ideas in practice. The results presented in the paper are based on a Talk-aloud study that includes sixteen decision-makers working at Volvo and Ericsson, who holistically screened new ideas collected from the respective firm’s idea management system (see the project description of the Talk-aloud study in the method chapter for more information about idea collection).

The participating decision-makers’ (Talk-aloud) assessments of the ideas, using a holistic intuitive decision-making approach, revealed that decision-makers mainly use five underlying criteria when intuitively screening ideas (Originality, User Value, Producibility, Strategic fit and Profitability). Furthermore, the results also showed that decision-makers often create mini-scenarios to put the ideas into context and help them form a basis for their own criteria assessments. In
addition, four different types of judges were also identified, who could affect idea selection. The four different metaphorical types of judges affected how the idea assessments were done; these four types are labelled Generalist, Creator, Rationalist, and Dispatcher.

The Generalist is a person who can see the idea in a wider perspective and fairly easily establish whether or not it matches the business scope of the company. A Creator is an individual who develops, improves and connects different ideas with each other while assessing them. The Rationalist often demands more information in order to evaluate the idea. Lastly, the Dispatcher is someone who only focuses on ideas within his or her area of expertise; thus, he or she does not focus additionally on other ideas. The Dispatcher wants to dispatch ideas that are not within his or her area of expertise to those who have the relevant knowledge to make a proper assessment. The findings in Paper III contribute to the discussion about which criteria to apply when making a rational criteria assessment, in addition to showing that individual decision-makers affect how ideas are assessed.

My contributions to Paper III
The paper was co-authored by (Prof.) Peter Magnusson, however, I was in charge of the whole writing process (including the analysis). Peter was active in the creation of the abstract (based on my initial draft) used during the conference submission process. He then assumed the role of coach and guided me through the writing process for the actual paper.

Paper IV - Exploring the effects of experience and responsibilities on idea screening
The fourth paper investigates how experience and responsibility (i.e. having a decision-making mandate for acting as a formal decision-maker) at Volvo Trucks affects how new ideas are assessed. The focus on exploring the involvement of (non-decision-making) employees during the FEI idea screening process emanates from the practical challenges associated with involving external parties (e.g. customers) in a response to control- and ownership-related issues. In the paper, 39 participants assessed 21 service-oriented ideas using both a rational and an intuitive decision-making approach. The participants represent the firm’s decision-making committee, as well as employees working in R&D (i.e. quasi-experimental design).

The statistical analysis showed that no significant differences exist regarding how the assessors rated the ideas in relation to their experience. In fact, the only significant differences demonstrated between the two groups concerned how they assessed the ideas’ originality. The group of non-decision-makers (not having any responsibility for decision outcomes) was shown to be more optimistic (i.e. giving higher absolute scores to ideas) when assessing the ideas’ originality. No significant differences were shown when comparing the groups’ intuitive assessments. The findings thus suggest that a firm can involve non-decision-making R&D employees in helping to reduce the workload of the decision-making individuals responsible for FEI idea screening activities.
My contributions to Paper IV
I wrote the whole paper myself.

Paper V - Frontline employees screening ideas
The goal of Paper V was to explore whether or not it is possible to make initial screening more efficient by distributing idea screening tasks among employees at the organization, focusing on frontline employees (FLE) at the firm, in order to manage the huge inflow of ideas. It thus investigates whether or not FLEs screen ideas in the same way as employees at the R&D department, since the latter department is often seen as responsible for the initial screening of new incoming ideas. A quasi-experimental approach is used to compare the rational and intuitive assessment of 10 ideas between the groups. In total, 77 participants from the Volvo Truck organization took part in the study.

The empirical data showed that FLE and R&D employees identify the same top ideas, but also that their ratings significantly differ in terms of absolute scores. When comparing the absolute score, it is evident that the FLE group, on average, is more optimistic about new ideas than the R&D group, regardless of which decision-making approach is applied. In addition, a PLS-SEM analysis also showed that both groups tend to focus on the use perspective when screening ideas using an intuitive decision-making approach.

My contributions to Paper V
The fifth paper is co-authored by (Prof.) Peter Magnusson and (Assoc. Prof.) Lars E. Olsson. I was in charge of the whole writing process and thus wrote the initial draft on my own. Lars’ contribution was the PLS-SEM analysis and the corresponding discussion sections. In addition, both Lars and Peter made constructive comments on my writing.
5. Empirical findings and main conclusions

In this chapter, the findings made in the appended papers are linked to the thesis research questions. The chapter is divided into four parts that correspond to the three research questions introduced in the second chapter, as well as a final concluding part.

Criteria used during FEI idea screening

The first research question explored in the thesis was formulated as follows: What criteria do decision-makers take into account when intuitively (holistically) screening ideas during the FEI phase?

The Talk-aloud studies reported on in Papers I and III reveal the predominant use of five specific criteria when ideas are screened by decision-makers; Originality, User-value, Producibility, Strategic-fit and Profitability. Although the identified criteria are not new in relation to the criteria previously noted in the literature, the findings do add to the debate about which criteria should be recommended, and may even be seen as a standard to apply when screening ideas during the FEI phase. Screening ideas in terms of their originality, user-value and the ease with which they are developed and produced (i.e. producibility), is rather elementary and frequently mentioned in the literature (see, for example, Balachandra and Friar, 1997, Dean et al., 2006, Kudrowitz and Wallace, 2013, Magnusson, 2009). However, the participating decision-makers’ inclusion of Strategic-fit and Profitability is interesting since the value of including them early on during the innovation process has been debated in the literature. For instance, an idea that does not match the business scope of the firm (strategic-fit), and/or is not seen as being able to generate financial value (profitability), is difficult to manage. Of course, if ideas are desirable regardless of whether or not they can produce a revenue stream (e.g. ideas which, for instance, improve the brand), then the importance of profitability will naturally be minimized. However, if this is the case, the firm will most likely have defined what it wants before screening commences.

If Strategic-fit is used as a rational criterion, then ideas that could potentially pave the way for new markets runs the risk of being overlooked. Thus, a firm that employs a blue ocean strategy needs to be cautious when making a rational criteria decision involving Strategic-fit, so that it does not mistakenly reject ideas outside of its business scope, which could lead to the creation of new markets. A blue ocean strategy is about finding uncontested market spaces (blue oceans), instead of develop innovations to compete on existing markets, called red oceans, where the vicious level of competition turns the ocean red with blood (Kim and Mauborgne, 2004). On the other hand, if only ideas that are outside of the firm’s core strategy are promoted, then all the ideas that could be used to improve the current market position risk being rejected. Thus, strategic-fit can be seen as a double-edged sword and should be used with caution, and also in line with the type of idea desired. In a more radical view, the use of a strategic perspective during screening could potentially be skipped, if the challenges (i.e.
the descriptions of the ideas being sought by the firm) were to be better elaborated and communicated to the idea generators. From a creativity perspective, it is argued that having a well-elaborated problem description actually improves the ability of the participants to generate new ideas that have both greater quality and are more original than ideas generated for an ill-defined problem (Mumford et al., 1994). Thus, giving clear boundaries as regards which ideas are desirable could potentially prime the generation of ideas so that these fit within the current strategy, or with regard to which specific area is of interest. However, priming idea generation by introducing boundaries should be done with caution, and especially if being based on cost-saving incentives (Olsson et al., 2017). Furthermore, arguing that, for example, only internal employees should be asked to generate ideas, in order to improve the alignment of the generated ideas with the strategy of the firm (based on their knowledge of it) should not be seen as a final solution. Research has shown that the inclusion of outside stakeholders (e.g. users) leads to the creation of more original ideas (Kristensson et al., 2002), and that expertise in the field can create mental boundaries, making it difficult for stakeholders to see matters in a broader perspective (Dane, 2010, Ward, 2004, Simon, 1997b). Thus, it would be wise to think about the types of ideas that are desirable before starting to screen ideas in terms of their strategic-fit. If the types of ideas being desired are unknown, there will be a risk of the assessment of an idea’s strategic fit acting as a decisive criterion in a disadvantageous way.

The use of profitability as an assessment criterion is also interesting. In the literature, no clear guidelines exist when it comes to the use of market and financial aspects during the FEI phase. On the one hand, criteria relating to market and financial aspects, e.g. profitability, are argued to be commonly used when screening ideas (Balachandra and Friar, 1997, Ronkainen, 1985). However, making financial and or market claims about ideas this early on during the innovation process is, on the other hand, said to be difficult (Lynn et al., 1996, O’Connor, 1998). Moreover, it is argued that this is something that should be emphasized when the initial idea has been transformed into a more robust concept (Boeddrich, 2004, Frederiksen and Knudsen, 2017). Just as with strategic-fit, profitability can thus be portrayed as a double-edged sword which, on the one hand, promotes ideas that have been elaborated enough for their financial and/or market value to be assessed and evaluated. Alternatively, ideas that have not been elaborated enough to be assessed with regard to their profitability can be directly rejected. Hence, as stated above, it seems important to think about how the criteria can affect the outcome of a screening process before commencing screening. This is particularly important if a linear decision-making model is applied, whereby the final outcome is based on the relative importance (i.e. weight) of the different criteria used (Baker and Albaum, 1986).

When summarizing the findings from the Talk-aloud studies, it is clear that generating a concrete list of criteria to use during a rational idea screening activity is difficult. As previously mentioned, specific criteria should be chosen in respect of the given context (Balachandra and Friar, 1997, Hart, 1993, Hart et al., 2003).
Thus, it is important to think about what is desired before rushing into idea screening without a compass or a map, just as in the initial quote from Alice Adventures in Wonderland.

Worth mentioning, even though it is outside the scope of the first research question, is that many of the participating decision-makers frequently created mini-scenarios in order to put the idea into context (see Paper III). Also, their willingness to do this seems to depend on personal traits, i.e. either being open-minded regarding new ideas (and trying to develop original ideas) or being more conservative (unwilling to develop original ideas themselves). Also worth noting is the finding that different factors or "affectors" can affect the assessment of ideas (see Paper I). For example, factors such as trends, simplicity, and legitimacy were all identified as influencing assessments in relation to the five criteria, by either amplifying or de-amplifying the assessments. To conclude, five criteria (Originality, User-value, Producibility, Strategic-fit and Profitability) dominate the holistic assessments made by decision-makers from three firms, acting in different industries; thus, these five could be used as a starting point or guideline for helping non-decision-makers to form rational assessments of new ideas.

**Weighting criteria**

The second research question explored in the thesis is formulated as follows: *Does the weighting of criteria differ between decision-makers and non-decision-makers, and if so how?*

In Papers I and V, a statistical relationship between the participants’ holistic (intuitive) assessments and their rational criteria assessments is established. Based on regression analysis, the weighting of different criteria is shown. When closely inspecting the findings, it is evident that all groups put the greatest weighting on the User-value criteria (in terms of beta value). The beta values, presented in Papers I and V, give an indication of how important the different criteria are to the respective groups of judges when making holistic assessments. In Paper I, which is based on two different holistic criteria (promoting radical and incremental ideas), the User-value was given a beta value almost twice as big as the second criterion (Producibility). Similar patterns were also shown for the radical assessment scenario. The findings in Paper V also show a similar pattern for both for R&D and Frontline employees. Thus, User-value was rated almost twice as high (in terms of beta value) compared to the next following criterion. The great emphasis on ideas’ User-values is interesting since it can be linked to the individual assessor’s use-knowledge. Thus, it could to some extent be argued that having good use-knowledge, or the ability to understand users and customers, is more important than anything else during FEI idea screening. However, focusing too much on User-value could lead to tricky situations. For example, if a new and potentially disruptive idea is presented, it could, at first glance, be difficult to fully understand its greatness in terms of its User-value. Hence, since User-value seems to play an important role, it can also be argued that it would be recommendable to instruct the idea generators to start out from
this perspective from the very beginning. However, the solution given in the idea description (that is initially screened), should not be seen as the final version, since it will likely be transformed during the development process (Gottfridsson and Stålhammar, 2014).

Furthermore, and even though the experiment conducted in the two papers mentioned differs in terms of the criteria applied (i.e. Originality, User-value and Producbility are used in Paper I, while Paper V additionally also includes Strategic-fit and Profitability), the findings are interesting to compare. The findings in Paper I revealed that the participating decision-makers’ holistic (intuitive) thinking could be explained, to approximately 50 percent, by Originality, User Value, and Producbility. In Paper V, which compares R&D employees’ idea assessments against those of frontline employees, the results showed that the latter group’s variations from their holistic assessments could be explained to almost 80 percent on the basis of the five criteria. The R&D group, who share stronger ties with the decision-makers in Paper I, in terms of duties, showed a 41.7 percent explanation rate, more in line, consequently, with the decision-makers in Paper I. One reason for this could be groups interpreting ideas differently on the basis of their use and technical knowledge; however, it could also be the case that their experience of idea screening affects the outcome.

The decision-makers and the R&D employees probably have greater experience of working with ideas and idea development, thus making them aware of additional aspects that can affect their decision-making processes when compared with frontline employees. However, based on the finding that User-value is the most emphasised criterion, the frontline employee group’s extensive use knowledge, from working closely with customers, would most certainly make them interesting to incorporate into FEI idea screening.

However, when incorporating frontline employees, the findings in Paper V also indicate that their high explanation rate (80 percent) as regards their holistic (intuitive) assessments is mainly based (i.e. shows a significant effect) on three criteria; Originality, User-value, Strategic-fit. Thus, frontline employees’ holistic assessments are mainly based on whether or not they see the idea as new (original) or as generating value for the users (use-value), and whether or not it is in line with the current business scope (strategic-fit). User-value explained almost 43 percent of the variation in the holistic (intuitive) assessments of the frontline employees, while Strategic-fit and Originality explain 23 and 10 percent respectively. Hence, frontline employees do not seem to see ideas with the same "wide" perspective as decision-makers and R&D employees do (since the variation in latter groups holistic screening showed a lower explanation rate). This finding is interesting since it challenges somewhat the notion that the expertise and vast experience of decision-makers would limit their abilities to see matters in a broader perspective (Dane, 2010, Ward, 2004, Simon, 1977b). On the other hand, it could be the case that increased experience and expertise affect their abilities to generate novel solutions to certain problems. Yet, when given the task of judging a potential solution (i.e. an idea) to a given problem, a person’s
experience and expertise could make him/her better equipped to make fair (objective) judgments. In sum, before initiating screening, it seems wise to once again discuss and decide the type of idea desired. If, for instance, it is important to judge an idea’s producibility (when, for example, ideas that are easy to quickly develop and implement are desired), then frontline employees will not be of much help during the screening process. Thus, this raises the question of who should be given the task of screening ideas on the basis of the type of idea being screened, and also on the basis of which criteria. Frontline employees should not, for instance, based on the presented findings, be given the task of judging an idea’s profitability or producibility.

Regardless of which decision model is applied when screening ideas, i.e. Conjunctive, Disjunctive, Lexicographic or Linear (see page 14), the importance of criteria weighting cannot be ignored. Even if the Linear model alone explicitly aggregates the total score (e.g. by multiplying the score from each criterion against the respective weights, the different criteria are assigned), the three other models also, indirectly, weight the criteria. If the Conjunctive model is applied, then ideas have to reach a specific minimum threshold value in order for each criterion used to pass. In the Disjunctive model, an idea must reach a certain threshold score in order for specific criteria to be accepted, while the Lexicographic model ranks ideas based on the applied criterion’s importance. Hence, the applied threshold value, or ranking, of the criteria will reflect how important individual criteria are portrayed (corresponding to the weighting of the criteria). Thus, it is important to decide what weights should be given to the applied criteria. Advocates of the Analytical Hierarchy Process (AHP) argue that these weights (or the importance of a criterion) should be set before the actual assessment and evaluation of ideas starts (Calantone et al., 1999, Saaty, 2008). Yet, weighting criteria is challenging (Magnusson et al., 2014, Soukhoroukova et al., 2012), and previous research argues that weightings should be based on the type of innovation a firm is aiming at, i.e. radical or incremental innovations (Magnusson, 2009). However, Magnusson (2009) bases his indexes upon reasoning, hence studies are lacking which explicitly explore how decision-makers actually weight the criteria when making holistic intuitive decisions, besides the studies reported on in Papers I and V. Hence, more research is required in order to give more thorough recommendations regarding how idea screening can be divided among individuals on the basis of their knowledge.

**Different decision-making approaches and assessors**

The final research question in this thesis was formulated as follows: *How is idea screening affected on the basis of which decision-making approach is applied (rational or intuitive) and on the basis of who conducts it (decision-maker or non-decision-maker)?*

In Paper II, the result of the experiment shows that assessors with more technical knowledge were also more hesitant about, on average, giving ideas a higher absolute score compared with assessors with less technical knowledge. Thus, the decision-makers from Telia (with great technical knowledge) give ideas (on
average) a lower score than the two user groups, regardless of which decision-making approach was used. Similar results were also shown when comparing the two user groups, where the technically-skilled user group, on average, gave ideas a lower score than the technically-naïve user group. In Paper IV, the comparison between decision-makers and non-decision-makers (working in the same R&D environment) did not show the same differences between the groups (in terms of the absolute scores given to ideas) as in Paper II. In fact, the groups only showed a significant difference when screening ideas for their Originality, where the latter group, on average, awarded significantly higher absolute scores. In Paper V, however, a similar pattern to Paper II was found. Assessors working in an R&D context (implying that they have great technical knowledge), who had less customer interaction than the frontline employee group, gave ideas lower scores, on average, than the latter group. Hence, frequent customer interaction among frontline employees could be a factor influencing them to take a more user-oriented perspective and thus to be more positively-inclined towards new ideas (similar to the users in Paper II).

The positive attitude among the frontline assessors in Paper V might also be explained by their potential lack of previous experience of working with innovation projects, thus unfamiliar with which internal issues and challenges can arise when developing the initial idea into a finalized innovation. Also, users and frontline employees might not have seen ideas like these before, thus generating a greater wow factor. Hence, their positive, or optimistic, views can be linked to their assumedly lower levels of technology-knowledge than the decision-makers or non-decision-makers working in R&D. However, focusing more on technology (i.e. taking a supplier/firm perspective) could, on the other hand, lead to missed opportunities. For example, ideas might be rejected if they do not match the contextual experience of the assessors working in R&D. Thus, having a one-sided perspective could make it difficult for firms to change their attitudes towards ideas outside of their current business scope.

The findings in the different papers thus resemble each other, i.e. an assessor’s focus in terms of use and technology knowledge seems to affect screening. Yet, concluding that decision-makers rate ideas completely differently from other assessors, e.g. users or frontline employees, is not the whole truth. Findings in Papers II and V showed, interestingly, that the different assessor groups seem to be able to identify which ideas are perceived to be the top ones when making an intuitive (holistic) assessment. Paper II showed, for example, that the two user groups were able to identify the same top-ranking ideas as the decision-makers. In other words, although the absolute ratings were different between, for example, decision-makers and users, the relative ranking of the ideas could still be used to sort out the relatively best ones from a given number of ideas. These results are similar to those shown in Paper V, where the frontline employees and the R&D group identified the same top ideas. When further comparing the rational criteria assessments made in Paper V, the results also showed that, for
Originality, User-value and Strategic-fit, the selection of top ideas was similar between the R&D group and the frontline employee group.

Based on intuition research, the conforming result, in terms of the relative ranking of ideas, is interesting. Even though the results of the assessments are not directly comparable in terms of absolute score, the relative ranking of the holistic assessment of ideas could lead to an interesting discussion about the use of intuition. In both Papers II and V, the assessors were able to holistically identify the top ideas in terms of how good these were. However, traditionally, it is argued that intuitive decisions should only be trusted when made by individuals with a high level of expertise and experience within the specific context an idea concerns, for example. However, it has been shown that even moderate levels of expertise (i.e. the ability to understand the idea’s context) increase the ability to make a correct intuitive decision (Dane et al., 2012). Since the majority of the ideas used in the studies which this thesis is based on are service-oriented, it is likely that non-decision-makers, in the form of users and frontline employees, might have an easier task of using their intuition correctly compared to if the ideas had focused on specific product aspects. Hence, if a firm encounters a situation where it has large numbers of, for example, service ideas to screen, then additional non-decision-makers might be able to help if the relative (intuitive) ranking is used, or if the threshold values are different depending on which group makes a rational assessment. In essence, the findings show that, if the assessment of ideas is compared on the basis of the absolute score given to ideas, then differences will exist on the basis of who makes the assessments, and this will be regardless of which decision-making approach is applied. However, since the top ideas are identified (based on their relative ranking) regardless of who does the assessments, it can be questioned whether or not it actually matters who is doing the first screening.

**Summary of findings and contributions**

As stated in the introduction, the aim of the thesis is to contribute towards better understanding the use of rational and holistic intuitive decision-making approaches when screening ideas during the front-end innovation phase, and to explore the involvement of non-decision-makers in the screening process; some of the results shown above replicate previous findings, while others provide new insights into the idea-screening procedure. The findings corresponding to this thesis’ three research questions can quickly be summarized as follows: Firstly, ideas assessed using an intuitive (holistic) approach are predominantly based on the use of five underlying criteria: i.e. Originality, User-value, Producibility, Strategic-fit and Profitability. Secondly, among these criteria, User-value has been shown to be emphasized (i.e. weighted) as the most important criterion. Finally, the empirical data shows that having a more technical (or supply-oriented) perspective, when screening ideas, makes assessors more pessimistic in their assessments (i.e. that, on average, they give ideas lower absolute scores). This could, depending on the applied decision-making model, lead to a harsher rejection of ideas than when a more user-focused perspective is taken. However, even though the criteria assessments cannot be
directly comparable in terms of absolute scores, the relative ranking (based on holistic assessment) of ideas indicates that the top ideas are identified regardless of who makes the assessments. The latter is highly interesting since it was found that non-experts were able to identify the same top ideas as the decision-makers, thus questioning intuition as something that could and should be used by highly-experienced experts (Hayashi, 2001, Kahneman and Klein, 2009).

The findings above provide the research community with several interesting contributions. In relation to the first research question, an initial contribution is the demystification of the concept of intuition, in the context of screening product or service ideas. In Papers I and III, a concurrent Talk-aloud data collection method was used, which diverges from traditional retrospective methods such as surveys and interviews, often used when studying idea screening (see, for example, Carbonell-Foulquie et al., 2004, Hart et al., 2003). Based on the Think-aloud sessions, it was found that decision-makers’ holistic decisions were predominantly based on five criteria; Originality, User-value, Producibility, Strategic-fit and Profitability. These five criteria explained between 50 and 80 percent of the variations of the holistic assessments made by non-decision-makers. Hence, this shows that a holistic assessment might not always be intuitive but still includes some sort of underlying reasoning processes. The finding thus adds to the debate about the connection between intuitive and rational decision-making (see e.g. Fredrickson, 1985, Sadler-Smith and Shefy, 2004, Sadler-Smith and Sparrow, 2008, Salas et al., 2010). However, further studies of the application of intuitive decision-making are needed, especially since it was also shown that the holistic assessments made by decision-makers and non-decision-makers were similar in terms of the relative ranking of the top ideas.

Furthermore, the finding that many decision-makers involve financial and market aspects (i.e. profitability) when holistically screening ideas is also interesting. In the innovation literature that focuses on rational criteria assessments, several authors argue that there are difficulties associated with the screening of ideas using financially- and market-related criteria too early on in the process (Cooper, 2014, Lynn et al., 1996, O’Connor, 1998). Despite this, decision-makers from the three firms that this thesis is based on involve these aspects during screening. This could potentially lead decision-makers into taking a short-term perspective when holistically screening ideas, i.e. focusing on ideas that could have a positive impact on the next set of final accounts. Hence, a radical idea that might require great investment in terms of financing and time might be rejected too early if it does not include enough information to assess its potential profitability. The findings thus support the thoughts of (Cooper, 2014) as regards using more flexible decision-making criteria, i.e. not making a final decision when not enough information is at hand at the time of the decision. However, more research is required before solid recommendations can be made regarding how, for example, profitability criteria should be used when screening ideas during the FEI phase.

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In relation to the second research question, regarding the weighting of different criteria, the current literature is scant (Magnusson et al., 2016, Soukhoroukova et al., 2012). The results of the appended papers add to the discussion about criteria weighting by establishing a statistical relationship between holistic (intuitive) assessments and rational criteria assessments. Thus, when screening ideas, assessors highlight user-value as the most important criterion. This finding is interesting from an idea-generation perspective since it emphasises the importance of idea creators focusing on what user-value their ideas can bring (Dean et al., 2006). Another interesting finding that relates to criteria weighting is that some non-decision-makers (i.e. frontline employees) only focused (significantly) on three of the five criteria when screening ideas; i.e. user-value, strategic-fit and originality. Thus, depending who makes the assessment, it is advisable to use different criteria; for instance, strategic-fit is impossible for users, for example, to evaluate because of their unawareness of internal company strategy (Magnusson et al., 2016).

The main contribution made in relation to the third research question was the finding that an assessor’s orientation towards a technical or user perspective affects his/her assessments. Thus, if a rational criteria decision approach is applied, then different groups would most certainly reach different conclusions (i.e. in terms of absolute scores), on the basis of whichever orientation they based their decisions on. This finding is highly interesting since no research has been found that compares different assessor groups who assess ideas using the same method (see appended Paper IV). Previous research often applies different assessment methods to different groups (e.g. decision-making experts make rational criteria assessments while non-decision-makers use holistic methods). In addition, when focusing on the relative holistic rankings of ideas, the results show that companies can employ non-decision-makers (e.g. users and employees) to select the best ideas for further elaboration (Magnusson et al., 2016, Toubia and Florès, 2007). The findings of the thesis thus contribute knowledge which argues that users can be used as proxies for in-house decision-makers. Furthermore, the results presented here also contribute to the open and user innovation literature, which has traditionally discussed users as a source of new ideas, by showing that both users and non-decision-making employees are also able to contribute to the assessment of ideas. Hence, a firm that has been flooded with new ideas could, by involving users and non-decision-making employees, significantly reduce the amount of ideas that the in-house decision-makers will ultimately have to focus on.
6. Discussion

In this final discussion chapter, the reported findings are categorized into three themes relating to idea screening; the How, the What, and the Who. Initially, the "How theme" links to how ideas can be screened based on a rational or intuitive (holistic) decision-making approach. The focus of the "What theme" is on the practical setup, based on the decision-making approach chosen. Finally, the "Who theme" addresses the issue of who should take part in screening. In the final part of the chapter, some managerial implications and conclusions are discussed, as well as areas for future research.

How to decide what decision-making approach to apply

The main task when screening ideas is to minimize the risk of making type I or type II errors (see page 4). However, making an initial selection of which ideas to accept for further development or reject is challenging (Barczak et al., 2009). Furthermore, the pressure on decision-makers to promptly screen ideas also increases if the concept of open innovation is applied, since the number of ideas can increase tremendously, compared to when just a group of, for example, R&D employees generates ideas on their own (Chesbrough, 2006). Thus, the problem is not getting new ideas per se, it is how to screen them effectively and efficiently. When screening ideas, two essential decision-making approaches can be used, i.e. the rational or the intuitive (Evans, 2003). The main difference between the approaches is the time it takes to reach a decision. Intuitive decisions are generated effortlessly and quickly, while rational decisions take time and effort to complete (Akinci and Sadler-Smith, 2012). Due to facing complex situations, e.g. when screening ideas in a rapidly-changing environment, interest in using an intuitive decision-making approach has increased (Hodgkinson et al., 2009, Pétervári et al., 2016, Salas et al., 2010). However, it is not possible to argue solely that intuition would, in fact, be preferable when screening ideas under these conditions. There are more factors for managers to take into consideration before applying an intuitive decision-making approach.

Risk of a one-way perspective

As stated in the introduction, a decision-making committee, or review board, often consists of either executives, senior management, or experts. However, even though a high level of knowledge may lead to an improved understanding of the idea, as perceived by the idea assessor (Gregan-Paxton and Roedder John, 1997), it is suggested at the same time that greater expertise may reduce people’s ability to challenge their existing understandings when facing novel situations (Dane, 2010, Ward, 2004). From an organizational sensemaking perspective, it is argued that individuals who think differently are often in the bottom half of the organizational hierarchy (Weick, 1995), while those at the top seldom have any interest in changing their way of working, especially if this were to jeopardise their current positions (Weick, 1995). For example, if decision-makers in top positions base their intuitive decisions on what they have experienced in the past, this could prevent them from look at new ideas objectively. One reason for this
could be that decision-making experts acting at the top of the organizational hierarchy might be unable to see outside of their own areas of expertise, thus experiencing difficulties coping with changes in their industry environment (Almendoz and Tilesik, 2016). Instead, they will likely favour ideas that align with their personal interests, i.e. ideas that strengthen their own positions (Loch, 2017). From a psychology perspective, intuitive system 1, which is also labelled the evolutionary system (Evans, 2008), can explain how individual self-preservation can affect a decision.

Since intuitive system 1 was developed prior to the logically-driven system 2, it has formed the basis of our survival (Evans, 2008). Thus, an idea that potentially threatens a decision-maker’s existence at, for example, an organization would most probably be rejected, regardless of whether or not it would improve the organization as a whole. The latter argument is similar to the finding that people in general tend to be more sensitive to losses than to gains (Tversky and Kahneman, 1992). This line of reasoning could act in an explanatory way as regards why, for example, Xerox was unable to realize the potential of what its R&D department jointly developed in the late 1970s (i.e. the mouse-driven graphical interface). Instead of Xerox seeing the potential, it was outsiders like Steve Jobs who were able to see the potential of these ideas and concepts, helping him to build the Apple Corporation. There are several other examples of firms and industries which either had or are having difficulties seeing the potential threats or benefits of competing products and/or services. Recent examples include how the taxi trade has tried to cope with Uber’s success and how Airbnb competes with traditional hotels. In the case of Uber, several countries have implemented new laws hindering Uber’s business model. Hence, instead of seeing the possibilities, many choose to see the risk of change.

Limiting oneself to only one perspective can, in my view, lead to misinterpretations, which is why I think it is important for firms to include other parties when, for example, screening ideas. As I see it, many firms embrace open innovation as a tool for increasing their ability to generate new ideas. However, following that, it seems like many firms close themselves off in order to retain control of their ideas. The risk of this is that it undermines the opportunities that open innovation can potentially bring (i.e. new perspectives). The difficulty of seeing the potential of ideas outside one’s area of expertise is referred to as cognitive entrenchment (Dane, 2010), and this can be linked to the concept of bounded rationality (Simon, 1991), also resembling the not-invented-here syndrome (Katz and Allen, 1982). Thus, if a person seen as a true expert in his/her field, then he/she might not see everything happening around him/her clearly (Ward, 2004). Hence, individuals make their decisions based on what they know at the point of making these decisions, which inevitably affects these decisions.

If the same "old" decision-makers were to go through all the new ideas, then they would risk using their "old" perspectives when assessing new ideas, thus manly
promoting those in line with their expertise and experience. Hence, if a firm wants to take full advantage of the open innovation concept, I think it will need to be open all the way through the innovation process, and not just at the very beginning when ideas are being generated or at the very end when customers and potential users can provide feedback on what has been developed. However, being open minded is difficult; some might say it is naive since other stakeholders might not share a firm’s visions. However, I believe that, based on the findings presented in the appended papers, non-decision-makers can contribute positively to idea screening, especially if a firm found itself in a situation of being flooded with new ideas.

What to include when screening ideas
Based on whichever decision-making approach is used, the idea screening setup will differ. If an intuitive holistic approach is used, then the screening process will be rather straightforward. The ideas will simply be assessed against one holistic criterion; e.g. how good the idea is perceived to be by the assessors. If a rational decision-making approach is used, then the assessors will obviously assess ideas using different criteria. In the literature, there is also an ongoing debate about which decision-making approach should be used, depending on what type of idea is being assessed, i.e. radical or incremental (see e.g. Eling et al., 2016).

Traditionally, it has been argued that incremental ideas should be developed using formal structures by means of, for example, using stage-gate processes and rational decision-making, while radical ideas should be treated with a higher degree of flexibility (Cooper, 1993, Leifer, 2000). However, contemporary research argues in favour of the benefits of also applying a formal development process (including rational decision-making) when developing radical ideas (Eling et al., 2016, Holahan et al., 2014). However, even though a rational decision-making approach is argued to be beneficial, regardless of the type of idea in question, I would argue, based on what I have learnt during my studies, that decision-making approaches should be chosen not only on the basis of the type of idea in question, but also on the basis of who is a member of the screening team. For instance, since an intuitive (holistic) approach should be based on whether or not the assessors understand the idea, in relation to their experience and expertise, it would probably be easier to make intuitive assessments if the idea is incremental compared to a radical one since it can be expected that the participating assessors have an easier task of recalling relevant knowledge of something that already exists and that they are familiar with. However, since an intuitive (holistic) decision can be biased and misleading, if the conditions for making such an intuitive decision (i.e. extensive experience and expertise in the specific idea context) are not met by the assessor in question (Kahneman and Klein, 2009, Kahneman, 2011), the intuitive (holistic) decision-making approach should be used with caution. In the following paragraphs, I focus on the differences in screening setup in relation to the type of idea in question before
turning my attention to who should be involved as an assessor, and how this can affect the choice of decision-making approach.

**Flexibility is important**

If a rational decision-making approach is used, then it will be important for the criteria to match whatever is desired, and for them not to be too rigid either, since this would risk ideas being rejected too harshly (Cooper, 2009). According to (Cooper, 2009, Cooper, 2014), an idea should not be rejected immediately if it lacks information corresponding to a certain criterion; instead, it could be given a tentative ‘go decision’ and be evaluated at the next stage of the innovation process. If, however, the information needed is still lacking at this point, the idea could then be rejected; this way of working is referred to as using fuzzy gates (Cooper, 1994). Hence, the relevant criteria should be chosen with regard to the given context, and also on the basis of where in the innovation process these are to be applied (Balachandra and Friar, 1997, Hart, 1993, Hart et al., 2003). Thus, it is important to be flexible when applying the relevant criteria, and to not casually apply the same criteria during every screening session since each session should differ depending on the idea desired by the firm.

Thus, depending on the type of idea being screened, different criteria should be emphasised. For example, an incremental idea, which improves an already-existing solution (product or service), or process, should primarily be assessed, in my view, on the basis of whether or not it improves the current user-value, and whether or not it is easy to implement (i.e. its producibility). Its originality or strategic-fit should not, on the other hand, have the same importance since the idea addresses and improves an already-existing solution or process. However, profitability is more interesting to measure since it answers, for example, the question of whether or not any financial benefit will result from developing and implementing the idea. However, making claims about an idea’s profitability requires a sufficient amount of information about the idea to exist at the time of the assessment, as stated in the previous chapter.

Radical ideas, on the other hand, which might question current ways of working or introduce new business areas into the firm, should be more thoroughly assessed using a rational decision-making approach since this would hinder the biological interplay from intuitive system 1, and thus minimize the risk of the decision-maker being misled without being aware of it. Assessing a radical idea in terms of its originality and user-value is obvious (if it is not new or does not create any use value, it would not be interesting to start with). However, the weightings of the remaining three criteria should reflect what the firm wants as well as the time horizon during which it wants it. For instance, if an idea required vast amounts of development resources over a long period of time, then the producibility criterion should be emphasized. If the firm wants ideas that match its current scope of business, then strategic-fit will naturally be emphasized. However, if the firm, on the other hand, truly seeks new ideas that stand out, then the importance of strategic-fit should be downplayed. As with profitability,
this can, as stated in the previous chapter, be seen as a double-edged sword that should be used with caution since it is easy to reject ideas that are difficult to assess in terms of their market and financial aspects. Hence, it should be applied during later stages when the idea has been developed into a more robust concept. While the practical setups of the rational and intuitive decision-making approaches differ, it is important not only for the chosen approach to focus on the type of idea being screened but also for the decision about which approach to use to additionally be based on who is a member of the screening team. Summarizing the above, it is clear that what to include in screening will depend both on the type of decision-making approach applied and on the type of idea being subjected to screening.

**Who to involve in the idea screening**

As stated previously, prior research argues that the ability to make trustworthy intuitive decisions is based on who is making them (Kahneman and Klein, 2009). Hence, the choice of decision-making approach should seem to be based also on who is part of the screening process. Based on classic intuition research, an intuitive assumption here could be that, when involving others than the decision-makers, who are seen and defined as experts at a firm (Shanteau, 1992), screenings should not be based on an intuitive decision-making approach. However, the findings in the appended papers question this assumption. The reported findings indicate that decision-makers and non-decision-makers (e.g. users or frontline employees) rate ideas differently in terms of their absolute scores. However, when looking at their relative ratings of ideas, it shows that both users and frontline employees holistically identified the same top ideas as the decision-makers and the R&D employees (whereby the latter make similar decisions to the decision-makers). Thus, when involving non-decision-makers, these will likely be able to holistically (intuitively) identify the ideas that the decision-making experts find most interesting (i.e. the top ones). Thus, a non-decision-maker is as good at making holistic assessments as a decision-maker when comparing relative ratings.

To make it clear, I am not stating that intuition as a concept is not linked to expertise and previous experience. However, I do think that the term intuition is being described a bit too mythically, and as something that is only valid for a selected few individuals, who are envisioned and defined as experts. In an interesting study on this matter, Dane et al. (2012) showed that individuals who were not experts but who had moderate levels of knowledge of the idea’s context, were as good as the experts when making intuitive decisions. However, it is worth noting that, in the study mentioned, the context was either basketball (Experiment 1) or designer handbags (Experiment 2). The findings made by (Dane et al., 2012) could, however, be linked to the findings made in this thesis, i.e. that holistic intuitive decisions are mainly based on user-value. Hence, as long as the user-value of an idea is clear to a non-decision-maker (e.g. a user or frontline employee), and he/she understands the idea’s context, it is likely that he/she will reach similar conclusions to more experienced decision-makers.
An example here (even though it relates to idea creation) is the classical anecdotal Henry Ford quote (which have been questioned whether or not he actually have said it); "If I had asked people what they wanted, they would have said faster horses" (Vlaskovits, 2011). Based on the quote, it is easy to think that customers should be ignored when pursuing innovation, i.e. that they would not be able to express ideas in terms of new technology. Similar expressions have originated from former Apple CEO Steve Jobs. However, when looking more closely at the quote, it is clear that even though the customers in question were unable to think in terms of new technologies (i.e. the car), they were still able to state their need for faster transportation, which corresponds to the user-value criterion, thus linking with the emphasis on user-value when holistically screening ideas. If the user-value is clear, and the invited assessors have a basic understanding of the idea’s context, I think it would possible to involve them in screening, thus helping the decision-makers.

At the same time, it is important not to forget that the ideas which have been part of this thesis were partly based on mobile telephony (Papers I and II), and also service-oriented ideas intended for external users (Papers IV and V). The mobile telephony ideas were also created by potential users and thus all the ideas could be said to have a clear demand-side or use-knowledge focus. If the ideas had been more technically (or supply-side) oriented, the results would probably not have been the same. An idea which, for instance, concerns a new drug in a pharmaceuticals industry context will most likely be very difficult for a layman to assess, if he/ she does not have the relevant technological knowledge. This reasoning is in line with the argument that the average customer is unable to conceptualize ideas that are technically-based outside his or her experience (Knudsen, 2007). Such ideas obviously require more advanced technological knowledge.

**Understanding the idea is important**

Based on the findings made in Paper III, it is important that assessors understand the idea they are about to assess. If an assessor, for example, does not understand an idea, then there will be an obvious risk of the assessment potentially being biased and incorrect. In situations where decision-makers hold incomplete information, and still have to make a decision, some of the decision-makers in the reported Think-aloud studies (see Paper III) created mini-scenarios to increase their comprehension of an idea. On the one hand, this might be a good way of maintaining a rapid pace during screening, by not having to stop and wait for additional information from, for example, the idea creator. However, it can also cause challenging situations, e.g. when an assessor is unable (or unwilling) to create a mini-scenario. In the latter situation, intuitive (holistic) decisions might be more of a guess than a decision and based (at least) on some of the assessors' previous experience and expertise. If this were to be the case, then a rational decision-making approach using criteria would be preferable, otherwise there would be an obvious risk of type I and II errors being made. Thus, an intriguing thought here is: Does the assessor have the relevant use-knowledge to actually
assess whether or not a specific idea is of value to people outside his/her working context (since their interpretation of user-value is assumed to be based on his/her experience from e.g. their working context).

Of interest in this regard is the finding that an orientation towards either the use or the technology perspective affects the assessments, especially since this can be discussed in terms of demand- and supply-side knowledge, where demand-side knowledge corresponds to use-knowledge and supply-side knowledge to technology knowledge, also essential for recognizing the idea’s value during assessment (Ozer, 2009, Magnusson et al., 2016). Thus, if decision-makers take a more supply-side oriented perspective, they could risk neglecting ideas that are more user-focused, since they might find it difficult understand the benefits of the idea based on a user perspective. This could happen if the firm were to apply a Conjunctive, Disjunctive decision-making model whereby each idea has to pass a specific threshold regarding one or more criteria. For example, if a specific threshold is set to, for instance, the user-value criterion, and assessors focus more on the supply-side perspective, they will generate lower ratings compared to, for example, users. Hence, they might not reach the threshold and the idea could then automatically be rejected even though it might be a good one. Also relevant to the above is whether or not different types of ideas, in terms of product or service, affect how well, for example, non-decision-makers can understand them. Research into idea comprehension could generate suggestions regarding how ideas should be written in order to capture their use-value. Hence, before starting to screen ideas, three questions should be answered. Firstly, which types of ideas are desired. Secondly, which types of ideas will be subjected to screening (incremental or radical) and, finally, whether or not assessors understand the idea’s context. Not until the answer to these three questions is known should the choice of how to commence screening be made.

**Managerial implications**

For managers who are in control of the FEI idea-screening process, it is important to put time and effort into how screening should be started once the ideas have been collected. Based on the findings in the appended papers, initial screening should be seen in a new light. An initial step should be making sure that the ideas being subjected to screening are, in fact, ready or complete enough to be assessed. If an idea is incomprehensible to an assessor, it would not be wise to try to assess it regardless of the decision-making approach used. It could thus be argued that, before screening even starts, ideas that are not "complete enough" should undergo a refinement stage to improve and/or even reshape the original idea. However, this would increase the time needed during the FEI phase and thus calls for a more systematic way of categorizing ideas based on their readiness for critical assessment. This is, however, outside the scope of this thesis. If, on the other hand, ideas were to be screened immediately, the systems used should then include a function permitting assessors to develop the original idea. One way to do this could be to make it possible to include the mini-scenarios that some individuals create. Their scenarios could, for example, be formalized (e.g.
recorded or written down) so that other assessors could increase their comprehension of the idea in question. These mini-scenarios could also be used when further developing ideas into more robust concepts during later development stages. Besides the obvious importance of making sure that ideas are ready to be critically assessed, proper decision-making should also be based on the type of idea to be screened (incremental or radical), as well as on who will be taking part in screening (i.e. what knowledge they have).

Regarding who should be taking part in screening, I think it will be good if more people are involved since this would broaden the perspectives. As an analogy, the creation of a football team can be used. When forming a football team, it is necessary to find the right mixture of players since not everyone can be a goal scorer. You need a goalkeeper, as well as defenders, midfielders and attackers, and some of these will have different tasks in their respective positions (e.g. acting as the playmaker). The same thought is applicable when working with the FEI phase. Ideas that are generated might not be complete, i.e. they are unable to “score a goal” by themselves, they need the help of the team. Furthermore, it is not always the case that the idea’s originator is able to develop the idea by him-/herself into an assessable concept; he/she might need help from a creative midfielder. However, if the idea is assessed by a person with a negative attitude to new things (e.g. a brutal defender), the chances are that the idea will be rejected and the idea creator might not want to participate in future idea generation activities due to, for example, the lack of constructive feedback. During the Talk-aloud studies in Paper III, these challenges were noted. To clarify, it is important to have players (i.e. decision-makers) who are willing and who dare to question the need for new ideas since no firm has the resources to develop every single new idea into a finalized innovation. However, being too harsh during the first screening of an idea might also lead to missed opportunities. Thus, like a football coach or a manager of screening, it is important to set up the team in a way that maximizes the chances of scoring, in other words identifying ideas that have a substantial chance of becoming successfully-developed innovations (i.e. having the right person do the right thing at the right time).

When taking an even wider perspective on the FEI phase and screening, it would be recommendable for firms to become more precise about what it is they want. If knowing from the beginning which types of ideas are desired from the beginning, it would be easier to steer (prime) the idea generators towards a specific direction. This would likely increase the quality of the ideas (Ward 2004). However, contemporary research indicates that it is not preferable if it is based upon financial criteria, i.e. cost reductions when priming idea generators (Olsson et al., 2017). Thus, the difficulty of incorporating financial criteria into the screening process is similar to having it during the actual idea generation phase. Financial aspects are not unimportant and have a role to play; however, it might not be the best criterion to use during the initial FEI phase of the innovation process. Finally, it is important to note that an idea for an innovation might not turn out to be the same as the finalized innovation itself. Therefore, it is
important to think about what the idea is really all about before deciding its ultimate future (in terms of either being rejected or accepted for further development). Thus, the problem of obtaining vast numbers of new ideas might be due to a lack of thought about what is being sought in the first place. Research has shown that the quality of the ideas has a high impact on the success rate of the innovation process (Kornish and Ulrich, 2014). Thus, this thus substantiates why idea quality should be emphasized over the advancing of high numbers of generated ideas in the first place (Markham, 2013). Furthermore, having a well thought out strategy for what is desired when ideas are being generated will improve the chances of identifying good ones (Kock et al., 2015) Consequently, think before you decide.

**Future research**

As already mentioned in the previous chapter, there are several interesting areas that should be highlighted for future research efforts. Two areas I find particular interesting concern (1) the ideas and (2) the assessors taking part in screening. Regarding the ideas, additional research is needed to understand how different ideas are perceived and comprehended by assessors. Comprehension can be defined as a person’s capability of discerning appropriate meaning (Smith and Taffler, 1992). An assessor’s comprehension of an idea, in relation to his/her prior experience and expertise, should, in my view, be taken into account when choosing which decision-making approach to use. However, even if the meaning or benefits attached to an idea is believed to be clear, from the assessor’s point of view, it might still differ from the idea creator’s initial thoughts and intentions. From the empirical findings, the focus on user-value when making an intuitive holistic assessment stands out in this regard, especially since what is perceived to be valuable to a user might differ from assessor to assessor.

If an idea, for example, lacks adequate information at the time of screening, this will increase the difficulties of assessing it properly (Kornish and Ulrich, 2014). Thus, idea descriptions which are posted, for example, on an online and open innovation forum should (in a perfect world) carry enough information to make them understandable to the assessors screening them. Previous research argues in favour of the importance of an idea’s specificity and clarity, suggesting that a complete idea should include answers to the who, what, where, why and how questions, as well as clearly linking the problem and the solution description to each other (Dean et al., 2006). Hence, ideas that are not complete will force assessors to either request additional information or make assessments based on their presumptions, associations and interpretations of these ideas. The latter case may mislead both comprehension and subsequent assessment (Moreau et al., 2001). However, it might not always be possible to ask the idea creator for additional information about the idea description, for example if the idea creator is an outsider (e.g. a user) who is not easily accessible. Thus, assessors could be forced to make decisions based on the limited information they have. Hence, it would be interesting to investigate how the elaboration of idea descriptions would affect assessments. This could, for example, be done using an
experimental design whereby the same original idea is presented in two different ways (unelaborated vs elaborated). The results could, for instance, be used to instruct how ideas should be written in order to maximize the likelihood of them being interpreted in the way the idea creator intended them to be.

In addition to the ideas, the findings in Paper III, regarding how individual traits affect willingness to generate mini-scenarios, are also something that I would address in future research. Do, for instance, these individuals differ in their actual assessments? If they differ, should the screening team then be organized on the basis of how individual assessors can maximize their individual performance? Knowing more about how individual traits might affect how ideas are interpreted could enhance the way firms organize their FEI activities. For example, a firm that has identified individuals who are more creative could, for instance, involve these in the initial development of the raw ideas, as suggested by Stevens et al. (1999). Individuals who are more conservative might, on the other hand, be involved when the initial raw idea has matured (been developed) into a more robust concept.

**Final remarks**

This thesis has demystified the concept of intuition during the screening of product and service ideas. It has shown that decision-makers utilize five main underlying criteria when intuitively assessing ideas. Of these, the findings indicate that user-value is the most important one, or at least the single criterion that most assessors emphasize when making an intuitive decision. The findings presented in the thesis thus contribute towards increasing our understanding of the use of rational and holistic intuitive decision-making when screening ideas during the FEI phase, as well as questioning the traditional view of intuition, as a decision-making tool that is only reliable if applied by those with vast amounts of experience and expertise. The findings reported indicate that, for example, users with an understanding of the idea’s context are able to intuitively identify the ideas that decision-making experts identify as the top (best) ones. Hence, managers facing a situation of being flooded with new ideas can turn to non-experts for help.
References


DI GANGI, P. M., WASKO, M. & HOOKER, R. E. 2010. Getting customers’ ideas to work for you: Learning from Dell how to succeed with online user innovation communities. MIS Quarterly Executive, 9, 213-228.


FELDMANN, N., GIMPEL, H., KOHLER, M. & WEINHARDT, C. Using crowd funding for idea assessment inside organizations: Lessons learned from a market engineering perspective. In: AGARWAL, R., SELEN, W.,


MEEHL, P. E. 1954. Clinical versus statistical prediction: A theoretical analysis and a review of the evidence, Minneapolis, University of Minnesota Press.


First things first - think before you decide

This thesis explores and investigates two alternative decision-making approaches (the intuitive and the rational approaches) used when screening ideas during the initial part of the innovation process. In this thesis, the concept of intuition when screening product and service ideas is demystified. The empirical findings show that decision-makers utilize five main underlying criteria when making intuitive assessments of ideas. Of these, the findings indicate that user-value is the most important one, or at least the single criterion that most assessors emphasize when making an intuitive decision.

The findings presented in the thesis increase our understanding of the use of rational and holistic intuitive decision-making when screening ideas during the Front End Innovation phase, as well as questioning the traditional view of intuition, as a decision-making tool that is only reliable if applied by those with a vast amount of experience and expertise. The reported findings indicate that, for example, users with an understanding of the idea context are able to intuitively identify the ideas that decision-making experts identify as the top (best) ones. Hence, managers faced with a situation where they are being inundated with new ideas can turn to non-experts for help.