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Christina Marie Mitcheltree

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## Exploring Design Thinking as an approach to worldview inconsistencies and innovation speed

Doctoral thesis

NTNU
Norwegian University of Science and Technology
Thesis for the Degree of Philosophiae Doctor
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Department of Mechanical and Industrial Engineering

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*I dedicate this thesis to my father*
*(Roy Lee Mitcheltree, 1961-2019)*
*who has given me the strength, inspiration and motivation to finish this thesis.*
*I love and miss you every day dad.*

*"The limits of my language means the limits of my world."*
**- Ludwig Wittgenstein (1921)**

**Abstract**

Innovation is one of the foremost generators of value for organizations. Yet, keeping up with rapid technological changes and market demands requires new ways of thinking about innovation, within and between organizations.
In this innovation context, innovation speed is viewed as an innovation capability to enhance performance. However, enhancing innovation speed, co-operation, and performance between actors requires an understanding of how actors view the innovation systems of which they are part. As actors naturally resist change, they may respond in different ways to innovation implementation and co-operation, based on having different preconditions and worldviews. For this reason, having different worldviews, and being unmindful of others´ preconditions and needs, may threaten actors´ existing beliefs, providing various barriers to the pace of innovation. This is seen as detrimental to the organizational (human-centered) innovation system.

Worldviews in this case involves how actors experience and make sense of the innovation systems of which they are part. This is related to the way actors create meaning from words, language (e.g. their own world understanding) and identity, which has significant value for how they respond to change and innovation. System structure is in this way perceived to impact worldviews by the way actors belong to language. As previous literature on innovation speed has emphasized economic or management factors, the social aspect and mechanisms driving commitment and willingness to cooperate is under-represented in innovation speed studies. For this reason, the thesis takes an interdisciplinary approach seeking to enhance our understanding of innovation speed, by drawing on the human centered concepts of System Thinking (soft systems), Worldviews and Design Thinking, emphasizing organizational actors' perspectives and experiences.

The worldview concept is investigated in relation to innovation speed from two case studies (innovation projects), presenting a *worldview process*, and contributes with four distinct elements perceived as significant for how actors create meaning and take action in innovation projects: *trust, a sense of urgency, defensive routines*, and *complacency*. Furthermore, to enhance clarity, future visions and understanding of asymmetrical worldviews for innovation speed, the concept of Design Thinking is examined as a human centered and visual approach for communication, awareness, and trust among actors. Accordingly, the study answers the following research questions:

- *In what way do system perspectives (worldviews) impact innovation speed?*

- *How is system structure (organizational vs. interorganizational project cooperation) significant for worldviews?*

- *What is the role of Design Thinking for worldviews and innovation speed?*

By facilitating knowledge of the complexities of organizational and interorganizational innovation situations, the thesis presents a contextual understanding of actors' worldviews and suggests a framework for innovation speed. This is of significance to managers or those participating or seeking to arrange innovation projects.

Main contributions to the literature involve presenting the dimension of worldviews to the innovation speed literature, as well as providing a new understanding of worldviews. The findings demonstrate how organizations may efficiently incorporate actor perspectives for innovation speed success, through more transparent, inclusive, and understanding innovation environments.

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To all my family in Texas and California who have sent prayers, support, and love, I love and miss you all so much and hope to visit soon!
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Animals are truly a human's best friend.

I am now closing an educational, exciting, frustrating, lonely, enriching, and empowering chapter in my life, and opening a new exciting one as a post-doctoral researcher at NTNU, Department of Industrial Economics and Technology Management!

*Christina Marie Mitcheltree*
*Gjøvik, August 2021*

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# 1 Introduction

## 1.1 Innovation and innovation speed

Innovation encompass the "development, production, and market commercialization of an invention as well as product diffusion and adoption by customers" (Garcia and Calantone, 2002). As such, it involves the development and adoption of something new in relation to products, services, management, or processes to acquire competitive advantages (Thornhill, 2006). In this way, an innovation process covers the *invention* (idea emergence), *development* (idea elaboration), and *implementation* (the widespread acceptance of the innovation) of new ideas (Garud et al., 2013). Accordingly, innovation is understood as a knowledge-driven result facilitated by organizations´ strategic choices (Cassiman and Veugelersrs, 2006), behavior characteristics (Liao et al., 2008), as well as technology implementation (Vaccaro et al., 2010; Wang et al., 2021).

There are three main forms of innovation (OECD, 1992; the Australian Bureau of Statistics, 1998; Hine and Ryan, 1999):

- *Product*, major (radical) or smaller (incremental).
- *Process*, referring to both technological and non-technological innovations. Technological innovations involve new products and processes as well as significant technological changes of these. An innovation is thus *implemented* if it has been introduced on the market (product innovation) or used within a production process (process innovation).
- *Non-technological innovation* is the changes that arise within organizations that do not directly relate to products/services and production methods (e.g. organizational innovation). However, non-technological innovations are related to managerial practices/processes.

Increasing technological advancements and competition have made innovation and change inevitable for organizations to meet their customers' needs. However, enhancing innovation performance (Wang and Wang, 2012) facilitates pressure for *speed* with regards to managerial decision making (Lynn et al., 2000; Kessler and Bierly, 2002), organizational innovation adoption (García-Zamora et al., 2013) and for actors ability to co-operate.

Innovation speed is a *characteristic* of innovation and part of the innovation literature (Markman et al., 2005). It is defined as "the ability to move fast from one idea to an actual product" (Kessler and Bierly, 2002) and the time used between initial product development and commercialization (Kessler and Chakrabarti, 1996). As such, it is related to the rate of innovation activities (Yao et al., 2019), and is

significant for organizations capability to innovate, providing "the most value for the lowest cost in the least amount of time" (Stalk and Hout, 1990). As innovation is often associated with rapid depreciation (Markman et al., 2005) and maximizing profits (McEvily et al., 2004), innovation speed is intrinsically related to time. Thereupon, time is a scarce resource that should be accelerated for innovation success (Markman et al., 2005). For this reason, innovation speed is viewed as a socially complex organizational capability (Kessler and Chakrabarti, 1996; Carbonell and Rodríguez Escudero, 2010), innovation performance indicator (Cheng et al., 2019), and a strategic dimension to acquire competitive advantages (Milan et al., 2020) of significance to organizational survival, renewal and success (Kessler, 2013).

However, a fast paced innovation strategy is most successful in predictable settings (Kessler and Bierly, 2002). Internal and external conditions may thus influence organizational processes and performance (Rajapathirana and Hui, 2018) as well as the effectiveness of innovation speed (Cheng et al., 2019). In fact, the worst way of speeding up an organization is mentioned to be doing existing tasks faster, as workers will burn out (Chen et al., 2010).

Previous literature on innovation speed has focused on antecedents of speed and performance subject to rapid new product development (how to go faster) (Milan et al., 2020), economic, or management perspectives (Markman et al., 2005). From the economic perspective speed emphasize innovation patterns, diffusion, and spillover among industries, sectors, and nations (Dosi, 1988). From this view, speed relates to the rate of innovation diffusion (Rogers, 1983). Innovation diffusion is stated as the process by which an innovation is communicated across various channels over time between members of a social system (Rogers, 1983). Hence, it is a type of communication consisting of sharing information of a new idea. Participants thus move towards or away from each other depending on the meaning they have of certain events (Rogers, 1983).

The management perspective has investigated innovation patterns within organizational processes and structures with regards to competitive behaviors (Eisenhardt, 1989; Kessler and Chakrabarti, 1996). However, there exist underspecified elements differentiating fast from slow innovation processes (e.g., organizational, and environmental factors) (Kessler and Chakrabarti, 1996). Accordingly, there has not been sufficiently emphasis on the factors and *underlying mechanisms* within the innovation process that enable fast development (Chen et al., 2010), speed (Kessler and Bierly, 2002; Milan et al., 2020), innovation adoption (Damanpour and Schneider, 2006) or organizational partnerships (Roos et al., 1997; Wang et al., 2021).

## 1.2 The human aspect of innovation speed

Of importance to innovation speed, is the fact that innovation performance gains are often hindered by user's unwillingness to *accept* and use the innovation (Talukder, 2014). Innovation adoption in this way encompasses innovation acceptance as a precondition for innovation use (adoption) (Talukder, 2014).

Innovation acceptance is important to enhance productivity and efficiency as well as realization of new products and systems (Talukder, 2014). From an organizational perspective, employee acceptance is essential for organizations´ performance, ability to take on new opportunities and surviving in challenging situations (Ober, 2020). However, as only a small portion of new products and services are successful, gaining a complete understanding of the underlying mechanisms for innovation acceptance is needed (Frambach et al., 1998; Bhattacherjee and Sanford, 2006).

From an innovation collaboration perspective, meeting needs, generating better profitability and efficiency require involvement on behalf of all members of a changing environment (Rajapathirana and Hui, 2018). However, individuals naturally resist change (Lynn and Seth, 2008). At the same time, actors need to consider their own logic and context, which may slow down innovation collaboration (Godin and Vinck, 2017).

Information rich environments may also reduce actors' ability to assign meaning and make sense of information (Carbonell and Rodríguez Escudero, 2010). This may facilitate functional diversity and difficulties with interaction on behalf of organizations which can reduce cohesiveness and enhance work related stress within a group (Robert, 2001). This is understood to reduce innovation progress.

As most literature on innovation speed has focused on how to go faster (e.g., economic, performance and time measures), little emphasis has been taken on understanding the organizational and thus human mechanisms of significance to innovation speed. For this reason, the thesis emphasizes the *characteristic* of innovation, *innovation speed* within the context of two innovation projects subject to product and non-technological innovation. As such, the thesis follows a management perspective (Markman et al., 2005) to acquire a new understanding of speed.

In this sense, I present two different case studies. One is on behalf of an innovation implementation project in a Norwegian hospital laboratory (multi-location) context, emphasizing innovation acceptance among laboratory employees. The other case is a material (aluminum) substitution project subject to an energy transmission tower among industrial (interorganizational) actors. As actors in this case operate from the basis of the organizational community (Lave and Wenger, 1991) of which they are part, becoming aware of how communities may frame identity and meaning creation is important. In this sense, both cases are written from an understanding subject to

the Norwegian Work Life Model. Essential for this model are trust, co-operation, participation and co-determination in the workplace (Strand, Strand et al., 2013). Hence, the model facilitates a context which enables trust and human approaches to innovation (motivation and commitment factors).

In contrast to an economic understanding of the term speed, speed within the thesis represent *progress*, emphasizing a human-centered dimension of speed impacting collaborating actors´ positive/negative response, commitment, and drive. The thesis thus seeks to explore the complexities of innovation speed. Innovation is as such understood to relate to the specific case project context.
For example, the hospital case involved an ongoing innovation implementation project where the hospital division management had implemented new laboratory equipment at different hospital locations. The new laboratory equipment may in this situation be viewed as a non-technological organizational innovation as it was new to the organization. This meant that the laboratory employees needed to learn how to use the machines, which also involved a change from old to new routines. For this reason, innovation speed is viewed in the light of the hospital employees experience with the introduction and thus implementation of the new equipment, involving their relationship with the hospital division management. As the project goal was successful implementation of the laboratory equipment, the thesis seeks to explore innovation speed in relation to human centered mechanisms of importance to innovation acceptance of the new equipment. In this situation, innovation speed is understood to be dependent on the human mechanisms that may facilitate innovation acceptance. Hence, the thesis contributes to the innovation speed literature by emphasizing organizational and human mechanisms seen as important for the process of moving towards innovation acceptance. Acceptance is as such described to involve a positive response (involving trust and a true sense of urgency) towards management as well as the innovation implementation of significance for organizational performance. As this case was ongoing, acceptance is viewed as a precondition for equipment adoption.

The energy transmission tower case consisted of a finished research project subject to product innovation involving the development of a new energy transmission tower. Like the hospital case, the project involved relationships with other actors. However, as this was a finished project, innovation speed is explored in relation to the effectiveness of project cooperation and thus understanding various actor specific mechanisms of importance to finishing the project (contributing to either standstill or innovation progress). Hence, innovation speed has been studied in relation to actors' experience with the project. In this way, the contribution relates to important organizational preconditions and actor specific mechanisms found to impact the development and thus realization of such innovations.

For this reason, the thesis aims to *understand the complexities in terms of enhancing innovation speed* by exploring the perceptions of organizational actors as to how they experience and make sense of the organizational and interorganizational systems of which they are part. This is based on how actors create meaning, which I argue has significant value for how they respond to change and innovation. Accordingly, the thesis is subject to the theoretical paradigm of *soft systems* (Checkland, 1981; Checkland, 2000; Checkland and Poulter, 2010) and soft systems thinking (Checkland, 1978; Checkland, 1981) with an emphasis on interpreting human systems. More specifically, the thesis seeks to understand how the complexities of our social world may be understood from the perspective (e.g. beliefs, desires and intentions) of different organizational actors´ "Weltanschauung" (worldviews) (Churchman, 1968; Checkland, 2000).

Studies that mention worldviews subject innovation speed relates the concept to organizational communication and cooperation with regards to belief, perception, or ways of thinking (Scozzi et al., 2005; Davenport, T. H., et al. 2006; Taura and Watkins, 2014; Huff, 2016; Euchner, J., 2017). However, these studies do not describe the concept of worldviews, nor do they explain what it means for innovation speed. Thereby, the thesis aims to take a system view in terms of understanding the meaning of actors´ worldviews for innovation speed.

### *1.2.1 Meaning creation and worldviews in innovation projects*

The worldview concept is part of the Soft Systems Methodology (SSM); a framework made to facilitate an approach to organizational process modelling through a 20-year action research program (Reynolds and Holwell, 2010). As such, SSM is a system approach addressing human issues of complex real-world problems. It was created in response to the hard system approach that emphasized system engineering and more systematic ways to solve machine related problems (Md Saad, N. H., et al., 2013). However, the hard system approach left out organizational and human aspects (Md Saad, N. H., et al., 2013). In this way, SSM is applicable to management as it uses system thinking to identify and evaluate different solutions to a problem, emphasizing human perception, learning and reflection (Novani and Mayangsari, 2017). SSM thus involves understanding the bigger (problem) picture (one worldview of a problem) and reaching an agreed solution to meet needs (Novani and Mayangsari, 2017). Hence, SSM involves making sense of what is practiced through interaction (Checkland and Scholes, 2000; Novani and Mayangsari, 2017).

Thereupon, the thesis is inspired by the essence of SSM in relation to worldviews. However, I build on the concept of worldviews by acquiring an understanding of various mechanisms and preconditions that may constitute worldviews on behalf of different actors with regards to the different case situations. As such, I explore the worldview concepts´ applicability to innovation speed. Accordingly, I argue that different worldviews may threaten actors´ existing beliefs, providing barriers to

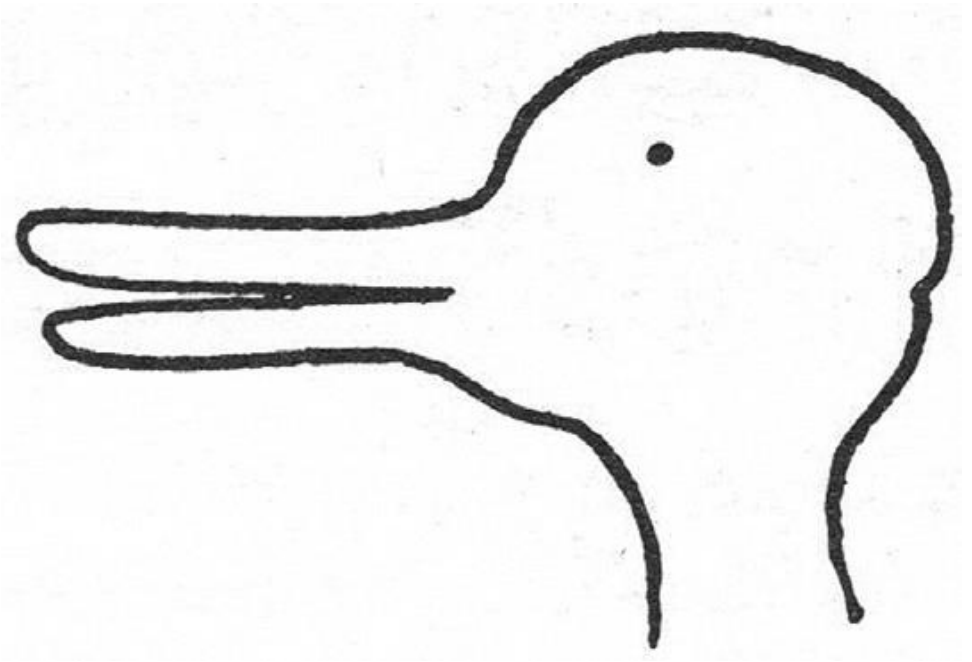
innovation co-operation and speed. The first research question "*in what way do system perspectives (worldviews) impact innovation speed?"* thus seeks to understand how actors think and act (human mechanisms) with regards to a specific innovation setting as well as the implication for innovation speed.

SSM is argued to be part of the interpretive sociological paradigm (Burrell and Morgan, 1985) which is regulative. Hence, it involves an implicit rather than explicit emphasis on regulation as it studies individuals subjectively. As such it is about the content of experience, or as Merleau-Ponty and Husserl describe it: "a kind of meaning" (signification) or "sense" (sens), not semantic content, but rather the intuitive coherence things have for us when we find them and cope with them in our practical circumstances" (Maurice, 2013). In this way, worldviews involve our perceptual sense "Wahrnehmungssinn" as to how things make sense to us perceptually (or not) from the content of sensory experience (assumptions, anticipations, memories, and associations) (Maurice, 2013). *Sensemaking* (Weick, 1995) and the *meaning of language* (Wittgenstein, 1953) are as such included as relevant concepts subject to soft systems and worldviews, due to their emphasis on how humans make sense of the organizational systems they are part. For this reason, the thesis is inspired by the Austrian philosopher Ludwig Wittgenstein's later period of thoughts (Wittgenstein, 1953).

### *1.2.2 Wittgenstein and the Duck-Rabbit*

From Wittgenstein's (1953) view, sense is about "belonging to language" where structure or systems depends on the nature of meaning; what speaking is, and what it is to express or mean something. Language and thought are thus equal in the way of portraying reality, there is thus an identity of form between language and reality (Wittgenstein, 1953; Rhees, 1959). Consequently, all propositions needs to have a common intelligibility or commensurability by being propositions or having sense to portray how worlds have meaning (Wittgenstein, 1953; Rhees, 1959). Wittgenstein emphasized the meaning of words in practice, through various language games (Wittgenstein, 1953). This is about the way we use language and speaking as a part of an activity, a form of life, which provides meaning to language. Hence, words provide meaning "only to the extent that they are embedded in actions or situations" (Göranzon and Florin, 1992).

This thinking differed from Wittgenstein's (1921) earlier views, where the logical structure of language facilitated the limits of meaning: "The world is *my* world: this manifest in the fact that the limits of language (of that language alone I understand) mean the limits of *my* world" (Wittgenstein, 1921). Hence, everything beyond a proposition or fact (that cannot be said) can only be shown. Unless you are contributing to explicit knowledge, you are asked to "remain silent" (Wittgenstein, 1921).



*Duck-Rabbit (Ludwig Wittgenstein, Philosophical Investigations 1953).*

You probably remember seeing the picture above or a similar picture as a child. In one moment, you see a rabbit, and in the next moment you see a duck. However, it is impossible to see the two simultaneously. The Duck-Rabbit picture was made famous by Wittgenstein. It represents the philosophers´ later work in Philosophical Investigations (1953), in relation to aspect perception and "seeing as" - how different individuals perceive and understand words and objects. However, to see whether there is a duck or a rabbit, one must be *familiar* and *recognize* the two *aspects* of the Duck-Rabbit. In this way, we may *switch* between perceptions depending on our understanding and the role (e.g. sense) a certain artefact has in our lives ("being aware of a resemblance between what is seen and something else") (Schroeder, 2010). For this reason, what we know, as well as the experiences we have, impact the way we perceive, recognize, and respond (attitude) to the world. Hence, the Duck-Rabbit portray how language may have different meanings in use.

The Duck-Rabbit picture is used as an analogy throughout this thesis, to portray the duality present between actors in the context of project cooperation. As having separate understandings of worldviews may provide limits to knowledge and the understanding of others, I seek to understand this duality in innovation projects. Hence, language is in this thesis subject to organizational actors' worldviews, and described as something implicit between actors, involving identity and meaning.

Language as such, provides the starting point as to which organizational actors´ make sense of the world around them. This inconsistency is understood to hinder innovation speed.
In this regard, visual tools may facilitate various ways of complex thinking, facilitating different layers of meaning (Suwa et al., 2001). Visual communication may in this way provide a common language across disciplines (Vervoort, Hoogstra et al., 2014) providing a "medium for cultural evolution" (Miller, 2013).

### 1.3 Enhancing understanding from visualizing language

A *Rich picture diagram* is a powerful sensemaking tool to deal with problematical situations in SSM (Walker, Steinfort et al., 2014). This is because it acquires an overview of a problem situation as a snapshot, capturing the main structures, parts, views as well as current and potential issues (Checkland, 2000; Checkland and Poulter, 2010). As it is performed from drawing or using mapping tools, it aims to facilitate sensemaking, reflection and new insights from connecting the visual to own experiences and perspectives (Conte and Davidson, 2020). Rich pictures are thus a way to exchange ideas and understanding between individuals (Checkland, 2000).
From his retrospective journey, Checkland (2000) addressed SSMs holistic consistency with other Design Science Research (DSR) approaches. One of these being Design Thinking (DT) (Sharma, Zhang et al., 2019). The concept of DT is chosen in this case, as it is understood to involve the use of relational propositions (representations) which trigger understanding and thinking. DT may in this way create an environment for interfirm language games by triggering emotion, helping actors become aware, and understand phenomenon's differently (making language more explicit). Innovation speed in this way, derives from the enhanced ability to understand and see things in different ways, and from others´ perspective. Accordingly, I argue that Design Thinking may be an approach that facilitates communication and meaning creation from visually and practically sharing and pre-experiencing propositions. Design Thinking is thus chosen as an important factor for understanding worldviews.
With this intention, the main theoretical contribution of the thesis is subject to introducing a collection of human-centered concepts representing important ingredients (a worldview process) (figure 2) not previously explored in relation to innovation speed. The worldview process components are explained in the next section.

### 1.4 The worldview process explained

*Worldviews* (Churchman, 1968; Checkland, 2000) within the worldview process (figure 2) represent the human factors (actors experiences, perceptions, needs and intensions) of importance to innovation speed and involves how actors create

meaning of the innovation systems they are part. Worldviews as such represent the human complexity of importance to innovation speed.

Organizational communities (CoP) are stated to frame identity and meaning creation through interaction and learning (Lave and Wenger, 1991). Hence, it enhanced my curiosity in relation to understanding the meaning of organizational identity for innovation speed. As such, I wanted to explore how shared meaning and engagement (Wenger, 1998) are created among actors. *Language* within the worldview process therefore represents actor's different (implicit) world understanding based on their specific (community) identity. Actors may thus perceive an innovation situation differently based on the meaning and significance (e.g., coherence) (Maurice, 2013) it has. Hence, the reason for including the thoughts of Wittgenstein (1953) has been to demonstrate the nature of meaning for system understanding and how actors´ implicit understanding derives from the meaning (involving identity) individuals place in language. The thesis is thus inspired by Wittgenstein (1953) thoughts with regards to the Duck-Rabbit. Consequently, the Duck-Rabbit picture provides a visual representation within the thesis of how actors understanding may vary depending on what is familiar to them. As such, I argue that Wittgenstein's (1953) thoughts in relation to language (belonging to language) are relevant for innovation speed cases today, as actors make sense, communicate and act from what they know and understand. The purpose of including Wittgenstein in the thesis has thus been to enrich the understanding one has and convey the message of the thesis in a simple way.

Equally important, the thesis emphasize system thinking (Richmond, 1994) which is stated as a language and way of thinking (Senge, 1994; Senge, 2008) to understand interrelationships and system behavior. Language is in this way viewed as an essential variable for meaning creation between parts (e.g., actors) of a system. Thereupon, the way actors belong to language is seen as an important factor within the worldview process for innovation speed.

For that reason, *being unmindful* or unaware represent information and understanding that is not present between actors, hindering the ability to see things in other ways or from others´ perspective (barrier for innovation speed).

As belonging to language was stated to involve sense and meaning, *sensemaking* has been chosen as a variable within the worldview process as it stresses actors´ search for meaning to deal with uncertainty (Helms-Mills, 2003). Sensemaking is thus seen as a catalyst or decision point for innovation speed within the thesis as it involves the translation of events into understandable situations using language to facilitate action (Weick, Sutcliffe et al., 2005). Sensemaking as such, may facilitate collective belief structures (Deazin, Glynn et al., 1999) of importance to actor collaboration (impacting positive or negative response). In this regard, *emotion* is stated as a powerful trigger for learning (Checkland and Poulter, 2010) and behavior (Donald 1969; Kotter, 2008). Emotion is therefore included as a variable that influence how

sense is made as well as how language is understood (precondition for sensemaking).

In this way, the worldview process presents a *soft system* which in this thesis represents the two innovation projects (case) contexts in terms of the human aspect of the innovation system as to how the actors perceive and make sense of the projects they were involved in (told experiences). In the process of exploring the concept of soft systems and worldviews, the SSM framework was mentioned to be a powerful sensemaking tool as it emphasizes organizational actors' worldviews by studying individuals´ subjectively (implicit understanding) through rich pictures of a problem situation (Walker, Steinfort et al., 2014). SSM stresses finding compromises between individuals in relation to decision making in a system (Checkland, 1981). For this reason, the thesis is inspired by the *essence* of SSM, namely understanding worldviews, as well as using creative visualization methods that facilitate thinking and taking purposeful action (Checkland and Poulter, 2010). SSM was therefore chosen as relevant for the thesis´ aim of enhancing innovation speed.

Moreover, in addition to communities being meaningful to frame identity and meaning creation (Lave and Wenger, 1991), and as worldviews involves our perceptual sense from sensory experiences (Maurice, 2013), *sensory experience* is chosen as a variable within the worldview process. Sensory experience thus describes the preconditions and organizational characteristics believed to influence the way actors make sense of the innovation systems they are part. In the light of this, as the thesis´ cases consisted of two different innovation settings (organizational vs. interorganizational project cooperation), system structures have been included as a relevant dimension in the study to understand its impact on how actors create meaning. Hence, the second research question "*how is system structure (organizational vs. interorganizational project cooperation) significant for worldviews?"* aim to explore context/case specific differences of importance for meaning creation.

Finally, the question "w*hat is the role of Design Thinking for worldviews and innovation speed?* builds on the two first research questions. Here, the concept of Design Thinking is explored as a collaborative and human-centered approach to innovation speed in the thesis, emphasizing visualization.
Design Thinking is described as a methodology, a mindset, and collection of tools to facilitate product or service innovation (Liedtka, 2014; Tschimmel, 2012; Carlgren, 2016; Brown, 2008; Meinel et al., 2011). Problem forming, solving and design is thus part of its methodology (Meinel et al., 2011). As there are different Design Thinking models, the most common one is that of the Hasso-Plattner-Institute of Design at Stanford involving the following stages/modes: (re) Defining the problem (Emphasize), Needfinding and benchmarking (Define), Brainstorm (Ideate) or

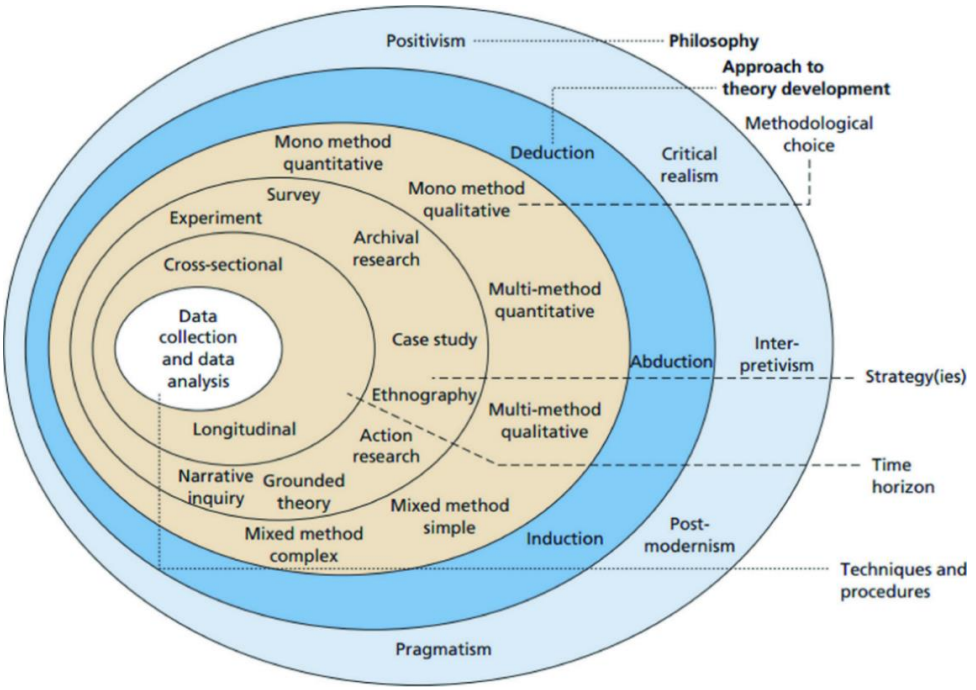
Bodystorm (e.g., physically experiencing a situation that facilitate empathy and new ideas), Prototype (Build) and Test (Learn) (Meinel et al., 2011; Weinreich, 2011). As such, it is a social and creative way to innovation capability as it involves using various tools to enhance understanding of others.
The last research question has therefore been directed at understanding whether Design Thinking as a mindset or method may be useful to enhance the understanding that seems to be lacking within the innovation speed literature; an awareness and understanding of organizational and human mechanisms that awaken emotions (positive response), facilitate cooperation and commitment. As Design Thinking has mainly been used for problem framing and idea generation in the early phases of product or service innovation (article 1, table 4), the thesis aims to challenge Design Thinking's usage for other areas of innovation, *beyond the known emphasis on initial product/service idea and concept generation phase (invention).* For the purpose of the thesis, this relates to the thesis´ case contexts and involves how Design Thinking may provide awareness and clarity of organizational and human mechanisms of significance for innovation acceptance (innovation implementation) and realization (innovation product cooperation). *Design Thinking* is as such a variable within the worldview process to address the complexity of innovation speed as it emphasizes enhanced dialogue, awareness, understanding, empathy, and positive emotions (e.g. trust) among actors. *Design Thinking* is therefore chosen as a collaborative approach for actors to enhance implicit understanding of other actors´ worldviews by its ability to visualize language.
An elaborated version of the modes within the Design Thinking model of Hasso-Plattner-Institute of Design is described in section 3.4.

The thesis contribution is discussed from the context of the two cases (article 2 and 3, table 4), considering Design Thinking (article 1, table 4) as an approach for clarity, future visions and to enhance understanding of asymmetrical worldviews for innovation speed.
The thesis starts by describing the choices of methodology and philosophy (section 2). Section 3 presents the theoretical framework involving the background for the development of the research questions. Section 4 presents my main arguments based on three articles (table 4) in a combined result and discussion section, suggest theoretical and practical contributions, and proposes limitations and directions for further research. Section 5 lays forward the conclusion. Finally, section 6 shows three independent articles.

## 2 Methodology

Following the research onion by Saunders, Lewis et al. (2019) (figure 1), this section summarizes, elaborates, and clarifies the thesis articles´ content beyond what is stated in the individual articles (section 6). As such, it presents a discussion addressing *the validity and reliability of methods* and *results, ethical challenges in research methodology* and *research role.* In this regard, the thesis´ *interpretive framework* and *philosophical assumptions* are presented, first to explain and justify the methodological choices, research strategy, data collection procedures and analysis techniques chosen for the articles. An overview of the thesis´ research dimensions subject to the research onion, is shown in table 2.

*Figure 1. The research onion (Saunders, Lewis et al., 2019)*




### 2.1 Interpretive framework

*«Our own beliefs and assumptions about what is important affect the decisions we make throughout our lives. Some of our decisions and the research we undertake to inform them can prove life-changing, not only for ourselves, but also for the wider society in which we live" (Saunders, Lewis et al., 2019)*

Philosophy in research is about abstract ideas and beliefs that guide our research and framework chosen (Creswell, 2013). Moreover, they shape the way we understand

research questions, methods and how findings are interpreted (Saunders, Lewis et al., 2019). This involves personal history, views of the self and others, and ethical and political issues.

There are four major philosophies researchers use in conducting research: positivism, critical realism, interpretivism, and pragmatism (Creswell, 2009; Creswell, 2013). This study is positioned within the philosophy of *interpretivism*. However, a brief explanation will be done of all the mentioned ways of viewing reality (Saunders, Lewis et al., 2019):

- *Positivism* implies what is "posited" or "given". Positivists perceive social entities as real, like physical objects. As such they emphasize stringent scientific empiricist methods that facilitate "pure data and facts uninfluenced by human interpretation or bias" (Saunders, Lewis et al., 2019). This involves highly structured methodologies (facilitate replication), measurable/quantifiable data, causal relationships, and generalizations. However, there are many varieties of positivism, whereas some seeking to quantify qualitative data (Crotty, 1998).
- *Critical realism* emphasizes the explanation of experiences/what is seen e.g. social structures underlying reality which frame what is observed. As such, critical realists perceive reality as something external, not precisely attainable from their observation/knowledge of it. Hence, it involves using various methods, sensory data of observations, and reasoning to address a situation (search for the bigger picture). Moreover, in-depth historical analysis (over time) are performed to change organizational structures (Reed, 2005).
- *Pragmatism* implies that concepts are significant only where they support action (Kelemen and Rumens, 2008). Hence, research is conducted with different research strategies with a goal of improving practice from various practical solutions. Pragmatists thinks that there are many ways/methods to interpret the world. As such, there is no one way to portray reality.

*Interpretivism* (also referred as social constructivism) focuses on humans as different from physical objects, as they develop meanings (Creswell, 2013; Saunders, Lewis et al., 2019). As such, interpretivists investigate these meanings (from interaction) to understand the complexities of e.g. organizational realities. It derives from strands such as hermeneutics and phenomenology (Crotty, 1998). Understanding according to hermeneutics is that there is more to understanding than sense (e.g. intuition in interpretation and hidden meaning) (Catherine, Ann et al., 2018). Hermeneutics thus involves interpretation and the philosophy of understanding (Palmer, 1969). This involves emphasis on human cultural artifacts (e.g. images, symbols, stories, texts), lived experiences and others´ and own interpretations. In this regard, my research is

inspired by hermeneutical phenomenology, which is a type of phenomenology where research is focused at interpreting the "texts" of life (hermeneutical) and lived experiences (phenomenology) (Van Manen, 1990) of organizational actors.
The idea and thus symbol for Hermeneutics is a circle, and focuses on understanding as something we understand through linking it with something we already know (e.g. by comparison or contrast) (Catherine, Ann et al., 2018). Hence, from perceptual or cognitive experience, we already have pre-conceptions (fore-having) of things which are impacted by fore-sight and fore-conception (Heidegger, 1962). As such, hermeneutics philosophy of understanding involves categorizing things into boxes that make sense.
For the purpose of this study, understanding has been made by linking information of what is known (situation) within the cases, with participants told experiences. The purpose of the study has thus been to create in-depth understanding and interpretation of actors' realities (involving language) and contexts from the actors´ standpoint. These are intentions familiar to that of the interpretivist researcher (Saunders, Lewis et al., 2019).
Subject to the philosophical framework are the philosophical assumptions. The assumptions will be explained in relation to the thesis in the next section.

### 2.2 Philosophical assumptions

This thesis is a qualitative case study. For the purpose of qualitative studies there are four guiding philosophical assumptions (Creswell, 2013):

- Ontology (the nature of reality)
- Epistemology (what counts as knowledge and how knowledge claims are justified)
- Axiology (the role of values in research)
- Methodology (the process of research)

Philosophical assumptions are rooted in our practices and community (Creswell, 2013). As some assumptions may be learnt from several disciplines, others are more narrow focused following certain research components. In this way, as assumptions may change, and multiple philosophical assumptions may be used, a study can be evaluated in different ways (Huff, 2009).

To be able to distinguish the philosophical assumptions, *objectivism* and *subjectivism* are relevant factors, as they provide an awareness of ways researchers view social realities (Creswell, 2013).
In contrast to *objectivism* which assumes social reality as external to us (often emphasizing realism), this thesis emphasize *subjectivism* as it incorporates assumptions of social reality coming from perceptions and actions of social actors

(individuals) (Saunders, Lewis et al., 2019). Additionally, it involves *conventionalism* as it emphasizes structures of social phenomena deriving from individuals (involving the researcher) through conceptual categories, language, perceptions and actions (Saunders, Lewis et al., 2019). Hence, reality is experienced differently (multiple realities as opposed to one reality) (Burrell and Morgan, 1985). However, as the thesis stresses reaching a kind of compromise between actors through Design Thinking, *social constructionism* (Saunders, Lewis et al., 2019) has been relevant, as the thesis seeks to understand how actors can structure their reality through social interaction (share realities and meaning). Consequently, understanding how actors may construct their reality intersubjectively from Design Thinking.
The thesis thus presents a critical perspective on organizations seeking to enhance the status quo from a subjectivist lens (instability, language and meaning in organizational realities) (Burrell and Morgan, 1985; Kelemen and Rumens, 2008).

To understand the thesis´ philosophical assumptions and thus type of research study, research questions and methods, I will firstly explain the background for the thinking involved that guided the research choices made.
My research community (Department of Mechanical and Industrial Engineering), and PhD project is connected to NTNU Aluminum Product Innovation Center (NAPIC) and the project "V-ALU-E" (Value Driven Aluminum Product Development). As NAPIC has a vision to become a world leader in research driven aluminum product innovation, the aim of VALUE is to increase competitiveness of the Norwegian-based aluminum industry. To face this challenge, collaborative strategies, and capabilities on various levels, including project teams, between project teams within an organization, and across companies within cluster/industry, are the most important enablers for innovating aluminum-based products. As such, the aim of VALUE is to generate new knowledge on inter-intra collaboration, co-development, learning capabilities and strategies within the context of value-driven innovation of aluminum products. The starting point for initiating this project was a need for new knowledge on how to perform systematic product (or process) innovation, as well as the need for improved efficiency in collaborative innovation efforts.

From this view, the decision for my PhD was to explore collaboration methods (modes) applicable to aluminum product innovation projects to impact the speed of innovation. The concept of innovation speed was chosen, based on known challenges in the Norwegian aluminum industry with regards to time spent for innovation realization in innovation projects. To enhance innovation efficiency, speed has involved looking at various collaboration conditions in which the innovation progress may be enhanced. Hence, various collaboration modes may enable, or

hinder action taken within a project depending on context. The initial aim of my PhD project and the one that framed the aim in the first article, was therefore to understand how collaboration modes impact the speed of innovation. Design Thinking was chosen in this regard as it is known as a methodology, a mindset and a collection of tools to achieve product or service innovation (Liedtka, 2014; Tschimmel, 2012; Carlgren, 2016; Brown, 2008; Plattner Meinel et al., 2011). The goal for the first article was thus to see whether DT was useful as a valid tool to address innovation speed for planned processes in later innovation phases. As such article 1 was a conceptual paper.
Next, I will present the thesis´ philosophical assumptions, consistent with the views of Creswell (2013).

### *2.2.1 Ontology (what is the nature of reality?)*

Ontology is the nature of reality involving its characteristics. In this way, this thesis has sought to gain understanding of collaboration modes´ role for innovation speed. Building on the results from the first article as well as the aim of the VALUE project, there was a need to understand DTs role for innovation speed subject to organizations and actors´ experiences. However, to understand how DT may be used in this context (for comparison), an empirical understanding of various barriers and enablers to innovation speed was essential. As the innovation speed literature seemed to lack emphasis on organizational and environmental factors (e.g. human and social factors), I wanted to understand the complexities of enhancing innovation speed by exploring the perception of organizational actors. This is the reason for the choice of the soft systems paradigm, involving sensemaking and worldviews. Consistent with the Norwegian Work Life Model and collaborative modes emphasizing commitment, is trust. As such, trust and a true sense of urgency were, in addition to DT, chosen as variants of collaborative modes to impact innovation speed. These themes and the themes found as barriers to innovation speed (defensive routines and complacency) thus served as theoretical concepts for the following two articles.

### *2.2.2 Epistemological assumption (what counts as knowledge?)*

Getting close to the participant is important for the epistemological assumption. Gaining subjective evidence of individual actors' experiences has therefore been important. As such, I was introduced to two projects (cases) on behalf of my research community perceived as relevant to my research. The first one, the energy transmission tower project, was directly related to industrial actors within aluminum product innovation and the aluminum industry. Whereas the hospital project involved laboratory employees and innovation implementation of new instruments (involving aluminum). However, as the main aspect was an understanding of actors for innovation progress and speed, the hospital case served valuable input for

comparison seen as beneficial for our understanding of human innovation systems. To minimize the "objective separateness" (Guba and Lincoln, 1989; Creswell, 2013) and get as close as I could towards the actors, in- depth interviews (involving quotes) were chosen on behalf of both cases. Moreover, I underwent a 3-month PhD placement at the hospital, in which I gave an account on behalf of the hospital and my own research, of employees' experiences with the ongoing innovation implementation.
Further explanation of ontological and epistemological assumptions for the creation of knowledge is described in the methodology section 2.2.4.

### *2.2.3 Axiological assumption (what is the role of value?)*

The value-laden nature of research involves how researchers "position themselves" in a study (e.g. values, ethics, and biases) (Dellinger, 2005). As values guide action, it is important to reflect on these as they may influence topics chosen and how the research is conducted (Heron, 1996; Creswell, 2013). As interpretivism is viewed as subjectivist, researchers often take an empathetic stance. Hence, the researchers own beliefs and values may impact the research process. For this purpose, it has been essential to understand actors' worldviews from their point of view. However, throughout the study, there has been a genuine and underlying interest in enhancing the work environment and interaction for actors in an innovation speed setting. This involves work related issues such as fairness among actors, work satisfaction, work-life balance, and wellbeing, which are perceived as significant elements for actors´ motivation and commitment. These are also values consistent with the Norwegian Work Life model, and may have had an impact on the choices made with regard to theoretical themes in the study and choice of methods (actor perspective).

### *2.2.4 Methodology*

To understand the complexity (context) of actors´ system perspectives and worldviews as a source to innovation speed, this thesis has followed a qualitative approach involving literature reviews, two single instrumental case studies (Yin, 2009) and semi-structured interviews. Qualitative or experimental methods (e.g. semi-structured interviews, focus groups, or ethnographic approaches) facilitate elaboration and more detailed accounts of e.g. relationship experiences (Ozawa and Sripad, 2013). Hence, the thesis involves facilitating an interpretivist understanding and thus meaning of actors' contextual experiences (Glaser and Strauss, 1968; Ponelis, 2015). As such, the findings in this study may make way for larger, more generalized quantitative investigations.

Explorative and interpretive case studies emphasize *number of cases, data collection techniques, unit of analysis, role of prior theory and analysis methods* (Eisenhardt, 1989; Ponelis, 2015). Article 2 and 3 followed this framework. The procedures to

answer the research questions is framed by the aim of exploring and understanding actors' perspectives and needs (contextual understanding). As such a combination of an inductive (theory emerging from the data) and deductive (test data against previous theory) approach (Strauss and Corbin, 1990; Thomas, 2006) was used. Moreover, the study has been cross-sectional, capturing and analyzing data at a specific point in time.

For the purpose of article 1, which was a literature review and thus a conceptual paper, Cooper (1986) research stages in conducting a literature review was chosen. This framework consisted of *problem formulation, data collection, data evaluation, analysis* and *interpretation*, and *public presentation*. Moreover, in choosing the most relevant (e.g. validity) articles, the article followed Wallace and Wray's (2011) framework for critical synopses and analyses of multiple literature texts, creating a comparative critical review from completed analyses. As these elements have been mentioned in their respective articles (section 6), I will present the *validity and reliability of methods and results, ethical challenges in research methodology*, and *research role* on behalf of the articles in the following sections.

Furthermore, the thesis takes an *interdisciplinary* approach to be able to go beyond the scope of innovation speed (as a single discipline). A discipline is described as "thought domains – quasi-stable, partially integrated, semi-autonomous intellectual conveniences – consisting of problems, theories, and methods of investigation" (Aram, 2004). Hence, they are continually evolving, internally fragmented and specialized. Thus, it is difficult to clearly define the boundary of each discipline (Aram, 2004; Chettiparamb, 2007). In this way, disciplines are argued to be socially rigidified forms of what were once interdisciplines or worldviews (Fuller and Collier, 2004). Interdisciplines as such facilitate a comprehensive understanding of the world, not simply a "regionalized ontology" (Frodeman and Mitcham, 2007).

Interdisciplinarity research cut across disciplinary boundaries, facilitating "increasing levels of interaction among disciplines" (OECD, 1998). The reason for conducting interdisciplinary research is argued to be the trend towards a higher specialization within science and a need to connect knowledge from various areas to address certain scientific challenges (Morillo et al., 2003). As it is associated with innovation, creativity and progress, many intellectual "breakthroughs" have been the result of such studies (Morillo et al., 2003). In effect, interdisciplinary research is a way to capture and understand the inherent complexity of nature and society (Anon, 2005).
However, as disciplines seek narrowness of depth, specialization and detail, interdisciplinary efforts are often described as shallow (Frodeman and Mitcham, 2007). On the contrary, as disciplines do not to offer the width of contextualization,

there is no epistemological justification as to why we should choose a vertical as opposed to a horizontal dimension of knowledge. Recognizing limits in relation to the amount of information needed to solve a problem is thus a challenge within interdisciplinary research (Frodeman and Mitcham, 2007).
The question of knowledge for most of the twentieth century is argued to be framed by disciplinarity (Klein, 2000). In effect, this century has involved shifting the metaphors of knowledge from "the static logic of a foundation and a structure to the dynamic properties of a network, a web, a system, and a field." (Klein, 2000). Hence, interdisciplinary knowledge enhances connections among disciplines, reveal gaps and facilitate new focus areas for knowledge. As such, it is a process for achieving an integrative synthesis that starts with a question or issue (Klein, 1990; Klein, 2000).

As the thesis aims to enhance awareness and understanding of organizational and human centered mechanisms´ importance for speed and progress, the interdisciplinary approach has been useful to explore and answer the research questions as they are not confined to the single discipline of innovation speed. As such, the main theoretical disciplines have been subject to System Thinking (Soft Systems), Worldviews, Sensemaking and Design Thinking to advance fundamental understanding of innovation speed. From an epistemological perspective, I use "bridge building" (building a bridge between theories) and "restructuring" (Klein, 1996) to challenge and expose inadequacies of knowledge within the innovation speed literature to address new ways of thinking of and understanding speed. An epistemological bridging of disciplines is based on system theory as it involves finding similarities within theoretical constructions of different disciplines, adding insight to a discipline (Checkland 1981). As such, finding and identifying similarities and abstracting the theoretical *essence* from the disciplinary theories, which can have relevance across a broader range of disciplines.

Challenges of interdisciplinary research may involve disciplinary issues as well as systemic concerns (Chettiparamb, 2007). For example, there exist an "interaction zone" or "loosely structured pidgin zone" between disciplines (Klein, 1996). According to linguistics, a pidgin zone is a form of interim communication "based on partial agreement on the meaning of shared terms" (Klein 1996; Chettiparamb, 2007). In one way, this may create subcultures or alter the native language of a group, facilitating new identities, and new ways of knowing (defining truth) (Klein, 1996). However, this thesis is subject to creating conceptual links using a perspective in one discipline (in this case, System Thinking, Soft Systems, Worldviews, Sensemaking and Design Thinking) to modify a perspective in another discipline (innovation speed) (Karlqvist, 1999; Klein, 2000). Hence, challenges have been related to unifying knowledge (Karlquist, 1999) and develop the innovation speed theory in

relation to bridging the variables between the disciplines (finding factors that could be related across the disciplines and identifying a framework around which to build the research). This has been with regards to interpreting the innovation speed concept, and manifesting the variables and mechanisms within the other disciplines that trigger response, commitment and drive to the same structure (e.g. understanding of innovation speed) that is believed to impact speed (e.g. progress) within the innovation speed literature. Bridging the different disciplines has thus been built on a combination of my own understanding of speed from the innovation speed literature, based on the human component that was found to be missing from this discipline, as well as the organizational and human mechanisms found in the data analysis (cases) and chosen concepts. The speed factor has thus been interpreted considering the different case project contexts and goals (innovation acceptance and realization). Hence, the aim has been to understand how human and organizational mechanisms may be a source to e.g. commitment and understanding, which I argue is of importance for whether and how actors respond to innovation (e.g. take action).

Other challenges have been related to finding compatible disciplines (Karlqvist, 1999). As there was a lack of emphasis on the human component within the innovation speed literature, it has been necessary to offer an in-depth interpretation of the chosen disciplines to be meaningful for innovation speed. In the light of this, as the concepts chosen within this thesis has contributed to various mechanisms and thus one way (the worldview process) of understanding innovation speed, the results are a function of what is noticed (e.g. from the literature and data analysis) and considered important (Klein, 2000) to answering the research questions. Hence, other challenges with interdisciplinarity research may relate to various ways of knowing and thus the researchers´ choice, understanding, interpretation and bridging of the various disciplines (Karlqvist 1999; Chettiparamb, 2007) (e.g. the value-laden nature of research) (Dellinger, 2005). Comparatively, challenges may relate to academic disciplines having and adhering to their own subtle traditions (Gardner et al., 2013) and finding common ground among disciplinary traditions (Brown et al., 2015; Pischke, E., et al. 2017). From a practical standpoint (e.g. research projects), differences between research paradigms may thus result in culture barriers and misunderstandings (Pischke, E., et al. 2017).

### *2.2.5 Validity and reliability of methods and the results*

Validation in qualitative research is viewed by the accuracy of results. Value thus involves time spent within a field, thick descriptions, and the closeness between researcher and participants (Creswell, 2013).

For the purpose of the constructivist research paradigm (viewed as related to the interpretivist understanding of reality), the following criteria are used for evaluating the research design/methods (Riege, 2003):

- *Credibility* is about trustworthiness and approving empirical results (e.g. from the interview participants or others) as we contain different realities that may be viewed in various ways. This includes thick descriptions (richness and meaningfulness), internal coherence of results and systematically related concepts.
- *Transferability* relates to generalization of results (finding different or similar phenomenon between participants/actors) and whether there exist sufficient thick descriptions that resonate with others. Moreover, it involves whether the results are connected to previous theories.
- *Dependability* (reliability) is about consistency in the process (techniques) of gathering data e.g. having clear research questions that are congruent with study design, and whether the research has been performed with care.
- *Conformability* is related to data interpretation, and whether the implications made are reasonable and reflect the findings in the empirical data.

Some of the techniques used for establishing validity and reliability that were used for the purpose of this thesis are shown in table 1 (Riege, 2003) and discussed further in the next section.

*Table 1. Techniques for establishing validity and reliability for the purpose of case studies (Riege, 2003)*

| | **Case study techniques** | **Qualitative techniques** |
|---|---|---|
| **Credibility** | Within-case analysis, then cross-case pattern matching<br>Explanation building<br>Assure that internal coherence of findings and concepts are systematically related | Researcher assumptions, worldview, theoretical orientation |
| **Transferability** | Define scope and boundaries of reasonable analytical generalization for the research<br>Compare evidence with extant literature | Predetermined questions<br>Thick description<br>Cross-case analysis<br>Specific procedures for coding and analysis |
| **Dependability (reliability)** | Give full accounts of theories and ideas<br>Record observations and actions as concrete as possible<br>Use case study protocol<br>Record data, mechanically develop case study database | Dependability audit (examine and document the process of inquiry) |

| | | |
|---|---|---|
| | Assure meaningful parallelism of findings across multiple data sources<br>Use peer review/examination | |
| **Confirmability** | Multiple sources of evidence<br>Establish chain of evidence | Confirmability audit (examine the data, findings, interpretations, and recommendations) |

The cases were explored in-depth to explain the complexity of project co-operation for innovation speed. As the cases had different contexts and theoretical concepts, they were explored in relation to relevant barriers and enablers for innovation speed. This made it possible to find patterns (systematically related concepts) within the cases that could be compared (similarities and differences). However, as inconsistencies of case results may provide deeper meanings to answering the research question (that may provide value for other actors), I acknowledge that different contexts and theoretical concepts, even though they were perceived as overlapping/similar, may impact the ability to transfer the findings.
Similarly, amount of cases chosen and participant boundary/scope may influence results and generalizability (Creswell, 2013). With regards to case complexity, time, and resources available for the PhD study, boundaries had to be set (number of actors/participants/methods). As actors were chosen based on their position in the projects (suggested by project managers and/or other participants), the case scope may impact the quality of the results. In this sense, as two cases made it possible to acquire in-depth understanding and cross-case analysis of the specific actors in relation to innovation speed, it makes it more difficult to generalize the results.

To improve accuracy with regards to the interaction and translation of experience on behalf of the participants (important for what results are communicated by the researcher), the actors had the possibility to view the interview transcriptions (sent by email). As such, participants had the opportunity to comment on what had been translated, as well as withdraw from the study (confirmability). Moreover, quotes were included in the discussion and provided a basis for transparency and explanation of results and implications made.
In the light of this, an important point that may impact the credibility of the results, is the researcher having to choose what to focus on and what to leave out to answer the research question. Moreover, "facts" are a construction of our own perception, and thus a consequence of facts available to us. Hence, methodological frameworks guiding research practice may only be explaining a "partial truth" (Seale, Gobo et al., 2004). As methods help produce realities, they are performative, re-crafting and creating new versions of the world. This means that realities may be made in different ways. Making something present with one method, thus means that other

things relating to the present are made absent, hidden, or uninteresting (Law, 2004). Additionally, the construction of reality is linked to meaning creation in making the unknown manageable (Chlopczyk and Erlach, 2019). Hence, within social sciences, methods used in analysis are by some stated as performative, and do not catch the mess in reality as some textures may be missed (sets limits to our understanding) (Law, 2004). Greater methodological variety is thus needed, as researchers are often told what to see and do in research. Consequently, we must include ways of knowing that allow the development of different (indefinite) realities (Law, 2004).
Considering this, I acknowledge that there could be other/more methods or sources (e.g. cross-checking information) that might enhance internal coherence and the quality of results from awareness of inconsistencies (e.g. triangulation) (Flick, 1998). However, NVivo and color coding was used for data analysis to provide rigor, structure and confidence in the analysis process and mechanisms developed. Moreover, a semi-structured interview guide makes it easier with regards to upholding transferability and dependability of results. This was also true in relation to findings being compared to previous theory.

Equally important, literature chosen may impact validity of problematic conceptualization, methods, and inferences from the studies (Cooper, 2010). As literature reviews were used within the articles, care has been taken in the review process with regards to what was perceived as valid and relevant of extant literature to the research goal (Messick, 1995; Dellinger, 2005). Then again, a neutral representation of a body of literature is challenging, due to the "value-laden nature" of social science research (Dellinger, 2005). As literature reviews are inherently interpretive and value driven (Cooper, 2010), I am aware that the reviews may vary between researchers, providing different ways of going about solving the problem statement.
To enhance dependability of the study, a case study framework has been used (e.g. Eisenhardt, 1989; Yin, 2009; Ponelis, 2015). A detailed and explicit description of research methods and context has thus acquired a complete picture (Miles and Huberman, 1994) of the study impacting confirmability. Moreover, all interviews have been recorded and transcribed in detail, and datasets used and/or analyzed are retained and available for reanalysis. Correspondingly, peer reviews have been part of the publishing processes for article 1 and 2 to uphold quality of the study. However, as article 3 is forthcoming in the publishing process, valuable feedback has been received from my supervisors.
With qualitative research comes the responsibility to recognize and deal with ethical issues. The next section addresses ethical challenges and the role of the researcher.

### *2.2.6 Ethical challenges and the role of the researcher*

Ethical challenges are relevant in all stages of research (Sanjari, Bahramnezhad et al., 2014). Research ethics involves respect for vulnerable individuals, imbalanced power relations (e.g. awareness of being in a powerful position) and placing someone at risk (Hatch, 2002). Moreover, it implies informed consent procedures such as promising confidentiality, anonymity, and communicating benefits of research towards participants (Creswell, 2013). Additionally, it involves researcher's potential impact on participants (and the opposite), as well as researchers recognizing the importance of the subjectivity of their own lens, and admitting the true owners of any data collected (Creswell, 2013; Sanjari, Bahramnezhad et al., 2014).

For the purposes of research participants, clarity was made regarding reasons for the study and how the information given would be used. This was important to ensure that participants were making the right decision on whether to participate in the study. In both cases, I introduced myself and my PhD project in advance of the interviews, providing information of benefits the study would have for the participants and how their participation would benefit my research project.
The interviews were recorded and transcribed in detail. Hence, it was important to request informed consent from each respondent prior to the study. Accordingly, it has been essential to communicate and keep the promise of anonymity and confidentiality. The interview transcriptions were sent by email to which the respondents were free to depart from. As I had a three-month placement at the hospital, this work involved acquiring in-depth knowledge of the innovation situation at the hospital (emphasis on employees) and creating a report. The findings from the interviews were presented for the division management and employees at one of the hospitals´ locations in January 2020. Apart from participating in workshops on behalf of both cases as part of the problem statement process, I did not have any relationship with the participants prior to the interviews that could impact their answers.

As all case participants knew I was present as a PhD fellow to assess the innovation projects/situation, it is uncertain whether my role triggered participants to share or hold back information. However, as my goal was to explore the complexities of innovation projects, this was something I perceived to be valuable for the actors taking part in the study from insights at the workshops, as well as from the conversations prior/related to the interviews. For the hospital case, this related to the hospital management's wish for enhanced understanding of laboratory employee's perceptions and needs in relation to facilitate innovation implementation success and further organizational development. For the employees, it involved a better working environment and being heard/seen by management. For the actors in

the energy transmission tower case, study value involved increased understanding of ways to enhance aluminum product development opportunities, as well as ways to acquire a higher level of product realization. Considering this, it has been important for me as a researcher to meet the actors´ needs within the case studies, and be authentic and honest about my role as a PhD fellow, communicating the nature and benefits of the study. Table 2 illustrates an overview of my thesis research dimensions subject to the research onion (Saunders, Lewis et al., 2019).

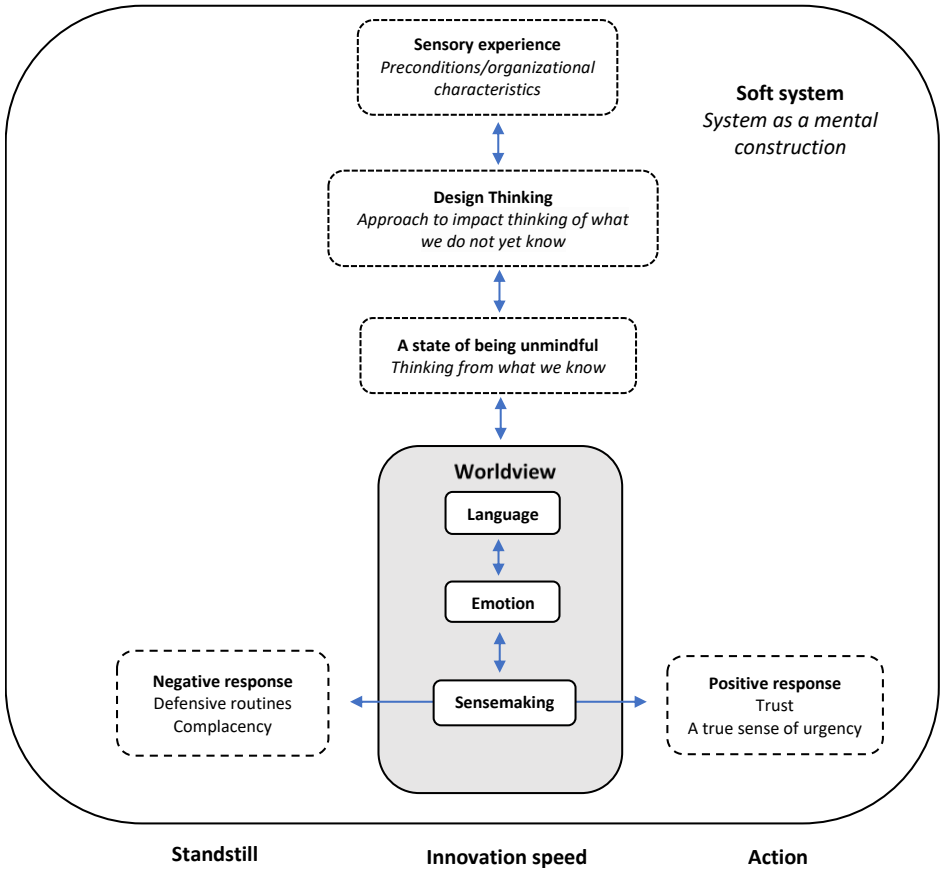
*Table 2. The thesis research dimensions*

| **Philosophy** | **Approach to theory development** | **Methodological choice** | **Strategy** | **Time horizon** | **Techniques and procedures** |
|---|---|---|---|---|---|
| Interpretivist | Inductive and deductive | Mono method Qualitative | Case study | Cross-sectional | Literature review (conceptual article 1)<br><br>In- depth interviews<br><br>NVivo coding (article 2)<br><br>Manual color coding (article 3) |

## 3 Theoretical framework

To be able to place my research findings within a larger meaningful context, this section lays forward the theoretical framework for the thesis, followed by the background for how the research questions were structured. The main constructs of the thesis, and the elements and link between them representing the soft system and thus actors' worldviews are *preconditions/organizational characteristics (sensory experience), the state of being unmindful, emotion, language* and *sensemaking.*
The collection of elements and the link between them are from my findings, seen as an important but novel addition to our understanding of how employees view the innovation system they are part, and will be discussed in relation to both cases for innovation speed. Furthermore, I contribute with additional variables challenging established system boundaries, and the understanding we make mentally to create systems: *trust, a true sense of urgency, defensive routines,* and *complacency*. The variables are found to be important results for the sensemaking part of the process. I call the collection of elements *a worldview process* which I acquire two outcomes: *standstill* and *action* in relation to innovation speed, depending on the variables (figure 2).
As such, the thesis contributes to the innovation speed literature by exploring human mechanisms from two different innovation contexts. This understanding seeks to enhance the awareness of the importance of considering organizational and human aspects when wanting to increase innovation speed. The thesis thus present important insights and suggestions subject to actors' different worldviews and connects this understanding to the innovation speed literature.
The elements and variables of the worldview process will be explained more in depth in the following sections. An elaborated version of figure 2 involving context specific variables are presented in table 6.

*Figure 2. Theoretical framework for system understanding with variables for innovation speed (a worldview process)*




## 3.1 Worldviews and the nature of meaning in soft systems

### *3.1.1 How organizational communities frame identity and meaning creation*

Of relevance to my thesis is an understanding of the preconditions for organizational and interorganizational language and identity, and how this shapes the way meaning is created. The development of organizational identity and worldviews in this sense involves interaction and learning within social relationships. In the light of this, meaning creation may derive from what Lave and Wenger (1991) describe as a Community of Practice (CoP), associated with mutual engagement, joint enterprise, and individuals shared repertoire e.g. (Wenger, 1998) (Li, Grimshaw et al., 2009; Blackmore, 2010). This view builds on "Forms of life" in which language is used (Wittgenstein, 1953; Ennals, 2016).

The limits of language (Wittgenstein, 1921; Tang, 2011) may in this way derive from interaction and tension between individuals (e.g. between novices and experts), facilitating professional identities which decides what humans pay attention to, as well as what they learn (Brown and Duguid, 2000). Rather than making novel solutions to finish a goal, a CoP group may be interpreted as a system to gain and enhance existing skills (Cox, 2005; Li, Grimshaw et al., 2009). In this case, worldviews may be developed within the community system.
CoPs have been argued to be homogeneous, involving members subject to the same discipline (Fischer, 2001). Gherardi (2006) thus suggested the term community of practitioners, to emphasize community as an *effect* of the practice performed by group members. As there are many CoP groupings and sub-groupings that might be found (Amin and Roberts, 2008), there is no agreement in relation to the definition on (what is and is not) a true CoP group (Li, Grimshaw et al., 2009).

The way a community is managed (e.g. decentered or hierarchical, open, or closed to new input and change) may decide an organization's way of dealing with innovation and creativity from "the cross-fertilization of ideas" (Amin and Roberts, 2008). The authors emphasized the dynamics of innovation and knowledge creation, stressing homogenization as "unhelpful". Moreover, they identified four communities/groups with distinctive properties and specific modes of knowing in action: Craft-task-based (aesthetic and embodied knowledge) (Lave and Wenger, 1991; Orr, 2016), Professional (specialized knowledge from education/training) (Ewan, Louise et al., 2005), Epistemic/creative (expert or high creativity standards/codes) (Lindkvist, 2005) and Virtual knowing (codified and tacit knowledge mediated through technology) (Ellis, Oldridge et al., 2004; Amin and Roberts, 2008). Relevant for this thesis is *professional* and *expert or high creativity* communities, as these were the modes of knowing and thus characteristics that best reflected the case findings (e.g. actors and context). The two modes of knowing (community characteristics) are described in table 3.

*Table 3. Modes of knowing in communities (Amin and Roberts, 2008)*

| **Professional (Ewan, Louise et al., 2005)** | **Epistemic/creative (Lindkvist, 2005)** |
|---|---|
| Implicit relations<br>Tacit conventions<br>Imitating/observing actions of experts<br>Shared worldviews from verbal communication (e.g. CoP-specific language)<br>Protectionist roles (barrier to radical change)<br>Using artefacts | Mobilization of variety<br>Ambiguity/uncertainty<br>Autonomy<br>Individual expertise<br>Self-centeredness<br>Object orientation<br>Not sharing tasks<br>Unshaped professional identities through joint work<br>A lack of loyalty to group members<br>An absence of obvious social dynamic of cohesion and mutuality |

From the modes of knowing, alignment and codification of tacit knowledge and making it explicit (Nonaka and Takeuchi, 1995) becomes essential, and is part of the collective sensemaking process (Amin and Roberts, 2008). Enhancing communication between actors may thus be done through collaboration tools (drawings, data, reports, briefings) that internalize and share objectives towards a common direction (Creplet, Dupouet et al., 2001; Amin and Roberts, 2008). However, facilitating a common direction requires understanding of other actors and may best be reached from finding *accommodation* (Checkland, 2000).

### *3.1.2 Towards accommodation from picturing the world*

In terms of finding a common direction, a fault within scientific literature, related to cope with human complexity and SSM, is that it assumes an outcome of finding consensus. However, true consensus is rare, and usually related to issues in which individuals are more indifferent about (Checkland and Poulter, 2010). An essential element in SSM is thus that of *accommodation* (compromise) as opposed to consensus, as it moves individuals towards decision making (Checkland and Poulter, 2010). Hence, action is taken from finding accommodation among individuals based on their history, culture, relationships, and aspirations (Checkland, 2000). SSMs purpose is in this way to achieve common concerns or compromises that individuals can live with, not to end debate (Checkland, 1981). This is in this thesis an understanding of what accommodation of worldviews means in light of the relevant actors told experiences. One way of reaching this kind of common understanding from accommodation could be done by providing "pictures" of the world (Checkland, 2000). As this thesis emphasizes soft systems from two cases in relation to organizational and interorganizational actor relations, *Design Thinking* is chosen as an approach for actors to enhance implicit understanding of other actors´

worldviews (involving visualizing language) in relation to innovation speed and will be described in section 3.4. However, to understand how Design Thinking connects to soft systems, the next section describes the concept of systems thinking.

## 3.2 Systems thinking

*"The performance of a system doesn't depend on how the parts perform taken separately, it depends on how they perform together – how they interact, not on how they act, taken separately. Therefore, when you improve the performance of a part of a system taken separately, you can destroy the system."* (Ackoff and Emery, 2017).

Systems thinking is stated as a paradigm learning method subject to systems theory (Richmond, 1994). It is a *way of thinking* and a *language* for understanding interrelationships framing behavior in systems as well as action (more in tune) with our economic and natural world (Senge, 1994; Senge, 2008). Hence, systems thinking is a mental attitude, a logic, an approach as well as a technique for constructing models (Senge, 1990; Mella, 2014).
As complexity may be handled at different levels, systems thinking is one such approach from "a combination of interacting elements organized to achieve one or more stated purposes" (INCOSE, 2015). Systems thinking is thus connected to the way actors frame and follow-up strategy. This is about how organizations respond to complexity (turbulence and change) (Stacey, Griffin et al., 2000).

Two main focus areas characterize the nature of systems and their impact on system approaches: *Thinking about systems* e.g. System Dynamics (Forrester, 1961) or Viable Systems Model (Beer, 1972), and *systems thinking* e.g. soft systems methodology (Checkland, 2000), Critical Systems Heuristics (Ulrich, 2001) and Strategic Options Development and Analysis (Eden, 1988; Cabrera, Colosi et al., 2008; Reynolds and Holwell, 2010). There are many definitions with regards to systems thinking, however the two main ways of thinking about systems are referred to as "hard" and "soft" systems thinking (Checkland, 1978; Jackson, 1982; Reynolds and Holwell, 2010).

### *3.2.1 Hard and soft systems thinking*

Checkland's distinction between hard and soft systems is essential for practice, as it moves away from perceiving systems as a process to deliver a product (e.g. systems engineering as a strategic tool) (Hall, 1962) to perceiving systems as complex human activity systems (understanding problem situations) (Checkland, 1981). In this sense, the evolution of systems thinking, and practice has been described in relation to their difference in system field focus (Midgley, 2000). First, systems views emphasized concrete problems and solutions (Reynolds and Holwell, 2010). In this sense,

Systems Engineering (SE) is perceived as "hard" system thinking, where interactive systems may be engineered to reach their goals (Checkland and Poulter, 2010) (e.g. a productive system). Hard system thinkers believe in systems that exist independently from an observer (Rose, 2002) e.g. a word model outside ourselves. Traditional views of such systems (e.g. Marxist beliefs) thus portray systems as influencing other social phenomena (e.g. social relations, ideologies, and legal systems). Hence, the system is given rather than emphasizing human perceptions of the system. "It is not the consciousness of men that determines their existence, but their social existence that determines their consciousness."(Marx, 1859). Marx definition of alienation in a capitalist society is thus an example of dividing workers from the machines/work, other individuals (e.g. competition) or any decisions made (Ollman, 1977). Hence, alienation was an objective means of the workers context of "surviving" in capitalism "where the individual self-awareness of his or her condition was not prerequisite". Practice configurations in this way are viewed as governing social orders (Adler, 2019) where social structures act as communities of practice that facilitate collective meanings (Adler, 2005). The system context was later emphasized, as system engineering techniques showed that it was difficult to capture the complexity of human affairs (e.g. management situations) (Checkland, 2000).
Traditional thoughts of systems (e.g. the thoughts of Marx) has thus helped with distinguishing hard from soft ways of thinking about systems and provided clarity and understanding with regards to positioning the thesis within the theoretical paradigm of soft systems. Consequently, an emphasis is placed on understanding human mechanisms (e.g. told experiences) of importance for system understanding, commitment and action (innovation speed).

Soft systems on the other hand, focus on humans as well as their perspectives in relation to various issues (Reynolds and Holwell, 2010) (no objective reality). Hence, moving away from problems and solutions towards a problematical situation in terms of managing the problem. The SSM concept derives from the field of Systems Engineering (SE), but has a background in holistic thinking (holistic reaction against the reductionism of natural science) (Checkland, 2000). SSM was introduced by Checkland in 1972 (Wang, Liu et al., 2015) and is described as "an organized process of thinking your way to taking sensible 'action to improve' the situation" and "a process based on a particular body of ideas, namely systems ideas. Ideas useful in dealing with the complexity of the social world" (Checkland and Poulter, 2010). Hence, it involves addressing interactions between parts of a whole. SSM is stated to be inspired by Vickers appreciative system in the construction of the social world (Jackson, 1982). Appreciative systems are "the interconnected set of largely tacit standards of judgements by which we both order and value our experiences" (Vickers, 1973). The appreciative system thus decides how one

perceive or value different situations, make instrumental judgements and performs executive action (Jackson, 1982). Emotion is thus stated as a powerful trigger for significant learning to be present (Checkland and Poulter, 2010).

SSM seeks to identify system activities as well as create system models by involving actors, owners and customers of a system (Lehaney & Taylor, 1997). Moreover, the approach is based on intervention with regards to the content of a problem as well as the intellectual process of the intervention (Checkland, 2000). Hence, SSM involves making sense of what is practiced through interaction (Checkland and Scholes, 2000; Novani and Mayangsari, 2017).
SSM uses different tools that aid the intervention (Checkland & Scholes, 2000). Two of these tools are *Rich picture diagrams* and the *mnemonic CATWOE* (Customer, Actor, Transformation (structuring data/information), Weltanschauung or worldview, Owner, Environmental constraints) (Novani and Mayangsari, 2017). A Rich picture is a detailed visual representation of the problem situation involving drawings, symbols, and relationships. Hence, there are no rules in relation to what to include. The CATWOE emphasizes understanding essential elements that constitute a human activity system, involving the participants to structure the problem (formulating a root definition). Worldview in SSM thus involves understanding the bigger (problem) picture (one worldview of a problem) and reaching an agreed solution to meet needs (Novani and Mayangsari, 2017).
SSM thus stresses individuals' meaningful actions (purposefulness of activity based on perspective) (Flood, 2000). This is performed through a seven-stage process of inquiry which organizes and explores the situation by using "intellectual devices" creating structure to the discussion; "models of *purposeful activity* built to encapsulate pure, stated worldviews" (Checkland, 1981; Checkland and Poulter, 2010). The seven steps are as follows (Rodriguez-Ulloa, R., et al., 2011):

1. Identifying the problem situation that demands attention
2. Expressing the problem situation using a Rich Picture Diagram
3. Facilitate a human activity system that offers insight into the problem situation creating "root definitions". In this step, the CATWOE (Customers, Actors, Transformation process, Worldview, Owner, and Environmental constraints) analysis is performed
4. Build conceptual models of the systems in the root definitions
5. Comparing the conceptual model with real world contexts to facilitate debate and change
6. Make changes to the model by accommodating the interests of various actors involved (e.g. changing attitudes, structures, or procedures)
7. Take action to implement the model and solve the problem

Hence, it is an ongoing and organized process of thinking to learn and manage future challenges (e.g. organizational change) (Checkland, 2000) and capture the purpose within the system. The seven steps thus involve four milestones (Sharma, Zhang et al., 2019):

- Addressing the problematical situation
- Formulating purposeful activity models
- Using the models for discussion to achieve feasibility
- Taking action to improve the situation

The main use of SSM is when there are different views in terms of defining a problem. The approach thus emphasizes a system as an interrogative device facilitating debate among actors (Checkland, 1981; Checkland and Scholes, 1990).
Soft systems thinking has been used across management disciplines and within social sciences in general to understand the complexity of management (Checkland and Holwell, 1998). In this view, social reality is not given, but structured and restructured (Checkland and Poulter, 2006).
SSM is used in any human situation involving thinking about acting purposefully (Checkland and Poulter, 2010). It emphasizes what is behind taken for granted worldviews that impact opinions (Checkland and Poulter, 2010). Hence, SSM is stated as a reflective practice, as it involves *sensemaking* to address complex situations mentally from the various tools used in SSM (e.g. rich pictures) (Walker, Steinfort et al. 2014; Ninan, Phillips et al., 2019). Hence, perception is placed outside oneself. The next section describes the concept of sensemaking as well as its meaning subject to SSM.

### 3.3 Sensemaking

The sensemaking concept is defined as "the ongoing retrospective development of plausible images that rationalize what people are doing" (Weick, Sutcliffe et al., 2005). Further, it is "the making of sense" and "structuring the unknown" as stimuli is provided (Weick, 1995). Hence, it is about translating circumstances into an explicitly comprehended situation involving words as "a springboard into action" (Weick, Sutcliffe et al., 2005). As sensemaking emphasizes equivocality, it facilitates a search for meaning to deal with uncertainty (Helms-Mills, 2003). Moreover, as meaning materialize in sensemaking, it impacts identity and action (Helms-Mills, 2003). As such, sensemaking is stressed to involve language and communication as well as an exchange of action and interpretation (Laroche, 1995; Lant, 2002). Weick developed new insights on organizational sensemaking, involving aspects of organizing. He proposed seven sensemaking properties; identity, retrospect, enactment, social contact, ongoing events, cues and plausibility (believability) (Weick, 1995).

### *3.3.1 Sensemaking in SSM*

Sensemaking is stressed as one of the central achievements of users of SSM, by becoming aware of one's own thinking (meta level thinking), increasing the richness of thinking (Checkland, 2000). SSM emphasizes the notion that what makes us human are more abstract levels above social processes (e.g. worldviews). I therefore seek to understand actors sensemaking by facilitating an exploration of how they create meaning by emphasizing relevant elements applicable for framing system understanding. From an SSM perspective, sensemaking is described as the outcome of previous experiences, genetics, and social processes (e.g. negotiating and re-negotiating perceptions and interpretations). Systems are thus perceived as the process of a "consciously organized learning system" where interpretations of problems are human judgements and may change along with the SSM process (Checkland, 2000). Differences in worldviews may therefore result in previously taken for granted assumptions being questioned at a later point. SSM may as such be viewed as a framework to make sense of experiences from mentally negotiating a problem situation (Checkland and Poulter, 2010).

### *3.3.2 Towards a collective mind*

The way meaning is created may derive from actors´ objectives (e.g. focus) as different organizational aims may provide different mental processes regulating effort (e.g. response) (Weick and Roberts, 1993). For complex organizations and in times of crisis, sensemaking may develop negotiated collective belief structures (Deazin, Glynn et al., 1999). Acquiring common sensemaking (Weick and Sutcliffe, 2007; Biggs and Preiser, 2019) is therefore stated as an important task for project managers in project organizations (e.g. aligning interests). This is because project actors may have different power-knowledge relations that frame project reality (Flyvbjerg, 1998). Power relations are as such integral to the construction of social reality. Actor's self-interest (e.g. contractual specifications) may thus involve various power agendas; technical (e.g. scope, time, and cost), financial, political, and aesthetic objectives. Some projects continuing with minimal consultation may in this way have negative impacts for their environment (Flyvbjerg, 2014). Conventional system understanding is stated to favor automatic and simple systems connected from suspicion and redundancy (Weick and Roberts, 1993). However, cooperation is compulsory for the development of mind (Weick and Roberts, 1993). Heedful (e.g. mindful) action from a collective mind is relevant in this matter, as it reduces fear of failing and error from understanding the environment (Perrow, 1984). This is because it involves interrelating activities, constructing mutually related fields. Heedful performance is in this way about connecting thinking, feeling and willingness (action is modified), and involves actors' attentiveness, interest, passion, consistency, purposefulness and placing one's heart into something. Trust is thus stated as a central factor linking attentive systems together facilitating collective

mind (Weick and Roberts, 1993). Nevertheless, what differentiate innovative firms from less innovative ones is a frame that motivate collective sensemaking (Dougherty, Borrelli et al., 2000). The following section thus seeks to provide a distinction between SSM and DT to understand how DT may contribute to an understanding of worldviews and from this, its applicability to innovation speed.

### 3.4 Design Thinking

*"A systems approach begins when first you see the world through the eyes of another" (Churchman, 1968)*

The concept Design thinking was created in the late 1950s and is subject to the design engineering and science fields. One of the first models was developed by Herbert Simon in 1969 (Plattner, Meinel et al., 2015). Rather than problem-focused thinking that emphasizes limitations and obstacles, Design Thinking encourages visual thinking to develop creative and practical solution-focused thinking, removing mental obstructions (Nichol, 2016).

Emphasizing iteration, human-centeredness, and action-oriented processes for innovation (Blomkamp, 2018), it is a structured process to explore ill-defined problems (Mahmoud-Jouini, Midler et al., 2016). This enables a "real dialogue" between parties, creating mutually inclusive solutions (Kummitha, 2019). Hence, it enhances user experience, reorients management attitudes, and influences organizational performance (Boland and Collopy, 2004).

As such, DT emphasizes accessibility and relevance for innovative, creative and strategic problem solving across different disciplines (Shapira, Ketchie et al., 2017). DT is defined as a systematic process of thinking, and has mainly been associated with studies related to product/service design, processes as well as business models (Lamba, 2019). However, recent studies have applied the concept to strategy and leadership (Lamba, 2019).

Creativity and abductive reasoning (an act of wondering as opposed to observing) are stated as traits of DT (Fischer, 2015). Moreover, DT is found to enhance self-awareness, uncertainty tolerance, mindfulness and awareness of process, abductive thinking, team knowledge, risk tolerance and creative confidence by envisioning new things (Chen and Chou, 2021).

As such, Design thinking is a tool for creative thinking (imagination) as well as an organization structure (Fischer, 2015). The DT process of the Hasso-Plattner-Institute of Design involves five modes which may be used in any order: identification of insight (empathize), defining problem statements (define), ideate possible solutions (ideate), prototype solutions (prototype) and testing of solutions (testing) (Hasso-Plattner Institute of Design, 2010; Design Thinking Bootleg — Stanford d.school, 2021):

- *Empathize* involves understanding through observing and engaging (interviews/conversations) with other individuals to acquire empathy in the context of the design problem/challenge (physical and emotional needs, how they *think about the world*, and what they perceive as *meaningful*). As many stories are embodied in artifacts, using the environment (e.g. someone's home or work) may facilitate context and thus deeper questions.
- *Define* is about creating clarity and focus to the design process from what is learnt about the user and context. Hence, it involves making *sense* and synthesizing the information gathered to facilitate problem statements. Specific individual insights thus provide advantages to leverage and handle specific design challenges. It involves observing people, questioning behavior or certain feelings, making connections to a larger context. As such, defining frames the problem and captures individuals' hearts and minds.
- *Ideate* is the transmission from problem identification to creating solutions. It involves generating solution concepts (wide range of ideas) by combining the acquired user understanding with the imagination, the conscious and unconscious mind as well as acquired user understanding. Ideation forms comprise uncovering unexpected areas of exploration, go beyond obvious solutions and utilize collective perspectives. It is performed by using tools such as brainstorming (with post-its) and sketching, separating the generation and evaluation of ideas (deferring judgement).
- *Prototype* is an iterative generation of artifacts to answer questions that makes it easier to solve the problem. This involves gadgets, role-play activities, post-it notes, or other artefacts users may interact with that generate *emotions* and response. Prototyping thus facilitate communication as it enhances creative thinking and understanding of an idea. Moreover, prototyping allows failing quickly. Hence, it is possible to test possibilities before investing in an idea.
- *Testing* involves the feedback acquired from the physical prototypes. This makes it possible to enhance understanding and gain empathy for users as to why an idea is working or not. As such, testing involve user interpretation and the creation of experiences. The testing may take place within a real everyday context and is a chance to refine solutions, learn about the user and reframe the problem. The process is in this way iterative.

DT has been applied for various purposes e.g. social innovation (Pohl, Pearce et al., 2020) and organizational (product) innovation capabilities (Rauth, Carlgren et al., 2014; Liedtka, 2015; Appleyard, Enders et al., 2020), supply chain management operations (Brown and Katz, 2009), user-centric design in urban communities (Kumar, Lodha et al., 2016), patient care quality (Brown, 2008), improving

departmental communications (Lin and Eichelberger, 2020), and enhancements in organizational strategic decision making (Brown and Katz, 2009; Cipolla and Moura, 2011).

The difference between SSM and DT is that SSM captures the present problem situation and seek understanding of perspectives and solutions (Checkland, 2000; Sharma, Zhang et al., 2019). Hence, systems thinking stresses interdependence, abstraction, regulation, differentiation, and multi-finality (Patel and Mehta, 2017) that seeks to harmonize improvement across an entire system. Typically, SSM practitioners communicate with stakeholders to derive their "worldviews" of an *existing* system to determine consensus regarding the problematic situation (Sharma, Zhang et al., 2019).

DT primarily focus on *what does not yet exist*, instead of explaining what is (Liedtka, 2000). Hence, it stresses how value is created in the first place. As such DT starts with the vision of a better future in mind, not various problems that needs to be solved. Hence, removing mental obstacles simplifies new growth (Nichol, 2016). As DT is a prototype driven process (e.g. successive iterations/feedback) involving ideation and multiple perspectives, it enhances efficiency (Liedtka, 2011). As such it combines what we already know into something different. In this way systems thinking is stated as a *concentric circle around DT* (Patel and Mehta, 2017).

The next section describes the theory development of the research questions.

### 3.5 Structuring the research questions

Studies within SSM have taken two main approaches: action-oriented approach (finding accommodations to enhance action and improvement) and emphasizing SSM as a sensemaking approach to address system complexity (Allen, Colligan et al., 2000; Howard, Vidgen et al., 2007). As opposed to organizational cognition, an assumption in the systems approach is thus that meaning is socially constructed (informants worldviews co-exist) (Howard, Vidgen et al., 2007). However, critical account towards SSM is its tendency to emphasize on practical problem solving in soft systems rather than enhancements in the theories to which it belongs (Jackson, 1982). SSM is in this way not about finding solutions to solve real world problems, but about the process of engaging with this complexity from learning about the problem situation (Checkland and Poulter, 2010). Furthermore, the SSM framework is mentioned to not capture a full description of the real world, being described as not normative, but "ideals", truthful to *one particular worldview* (Rodriguez-Ulloa and Paucar-Caceres, 2005). Rich pictures may also be a source for misunderstanding and conflicting point of views as unstructured or confusing images and metaphors may be hard for third parties to interpret (Bell, S., et al., 2019).

Additionally, most studies applicable to SSM are retrospective, stressing the frameworks application/implementation to various interventions (Watson, 2012). Hence, future developments of SSM are stated to change depending on forthcoming

problem situations to which it is applied (Jackson, 1982) (e.g. information age). Enhancing the framework by emphasizing more integrated conceptual frameworks for interdisciplinary (context specific) collaboration is thus stressed to be needed subject to real projects (Maher, Maher et al., 2018).

Furthermore, achieving multi-organizational collaboration is challenging, as the inability to reach shared understanding in terms of agreeing on the problem framing is stated as a central issue (Eden and Huxham, 2001; Franco, 2007). However, this complexity may be explained from the notion that as systems involves (sub) systems, actors may follow certain codes which close them off from their environment (closed system) (Luhmann and Barrett, 2012). In this view, the system does not control actors, but mirrors nature as actors act from observing third parties and according to their own "codes of valid operation" (Autopoietic systems). These are systems reproducing themselves from within themselves (self-organizing processes) (Luhmann, Baecker et al., 2013; Lies, 2020). Hence, resistance towards change processes derive from own rules or "codes". This may from Wittgenstein's (1953) view be described from humans following their own "collectively created, self-referring patterns" framed by using language (Bloor, 2002). Nevertheless, as single organizational contexts are the most studied with regards to SSM (Franco, 2007) more emphasis on relationships (e.g. holistic management) in interorganizational systems is stated to be of future value (Allen, Colligan et al., 2000).

From this view, the thesis seeks to explore the concept of worldviews from the *perspective of collaborating actors*. More specifically, it seeks to capture important mechanisms (impacting accommodation) for innovation speed. Especially, since SSM assumes the presence of an underlying *willingness* amongst participants to reach accommodation (Green and Simister, 1999). In this way, the thesis does not seek to give answers or solutions to how innovation success is reached, use the SSM framework for practice, nor seek enhancements to the framework. Rather, the thesis addresses the essence of SSM with regards to Rich pictures and CATWOE in relation to understanding worldviews. A detailed description of all the seven steps within SSM is thus outside of the boundary for the thesis.

The thesis thus contributes with enhanced insight in relation to actors' understanding of the systems of which they are part (e.g. meaning creation/sensemaking and worldviews) understood as essential for innovation speed.

An important point in terms of worldviews, is that individuals may painfully and unconsciously develop worldviews resulting in a sense of comfort with this perceived world (Checkland, 2000). However, having an asymmetry in system understandings (worldviews) may provide various barriers to the pace of innovation. From this perspective, I argue that DT may be a significant approach and a mediator to impact actors' emotions as well as understanding of worldviews. This is because

as SSM emphasizes an existing system, DT involves creating visions of what is to come. As actors may visualize and face their risk and fears by pre-experiencing a situation, it may impact the way actors view a system. Design Thinking is in this way suggested to impact interorganizational meaning creation, facilitating actor's *awareness* of own and others´ worldviews. However, as the thesis emphasizes DT characteristics for the purpose of worldviews and innovation speed, detailed notions of the use of DT tools and DT implementation is left outside of the boundary for this thesis.

To understand actor's' worldviews for innovation speed the following research questions have been asked:

- *In what way do system perspectives (worldviews) impact innovation speed?*

- *How is system structure (organizational vs. interorganizational project cooperation) significant for worldviews?*

- *What is the role of Design Thinking for worldviews and innovation speed?*

Section 3 has set out the theoretical framework for the thesis. The next section answers the research questions by discussing the articles´ findings. The discussion is written in a way that addresses the case studies with a basis in soft system understanding. As such, an emphasis is placed on the concept of worldviews, Design Thinking, language, emotion and sensemaking (figure 2). In the discussion, I present *a new understanding of soft systems (worldviews) of importance to innovation speed*, by bringing insights from a comparison of the two different empirical case-studies (contexts). In this sense, I contribute with an exploration of the following additional theoretical elements*: trust, a sense of urgency, defensive routines, and complacency*, perceived as significant for how actors understand (meaning creation) systems. The elements are described in the following discussion but explained in depth in article 2 and 3 (section 6.2 and 6.3). Equally important, this understanding may act as preconditions for purposeful activity in seeking accommodation and action (e.g. innovation speed) between actors. Accordingly, my research lays forward various elements of importance to innovation speed from the context of SSM and thus organizational and interorganizational worldviews.

## 4 Results and discussion

In this section I discuss the two cases (article 2 and 3) (table 4) considering Design Thinking (article 1) as an approach to enhance understanding of asymmetrical worldviews (e.g. towards accommodation). These insights are significant to our knowledge of soft system thinking, as they enhance understanding of how actors view the systems they are part and the type of thinking (sensemaking) that goes into an innovation process. In this way, the insights present a novel contribution of important elements and their connection not previously described in relation to innovation speed (figure 2). As this thesis holds three articles (table 4), I will first present the articles and explain how they are connected.
Article 1 is a conceptual paper investigating Design Thinking's applicability as a collaboration tool for innovation speed. To understand DTs role for innovation speed subject to organizations, article 1 facilitated the need to acquire empirical understanding of various barriers to innovation in organizations seen from the actor's standpoint. From my research, the social and thus human centered aspect associated with soft systems thinking (e.g. understanding what is behind worldviews) was something that seemed to be missing from the innovation speed literature. This was also relevant from the practical findings in my cases. Additionally, the soft systems literature was mentioned to lack an emphasis on interdisciplinary collaboration (Maher, Maher et al., 2018) and interorganizational system relationships (Allen, Colligan et al., 2000). Correspondingly, the SSM framework was mentioned to lack a full description of the real world, emphasizing only one particular worldview (Rodriguez-Ulloa and Paucar-Caceres, 2005). As such, article 2 and 3 explores actors' system perspectives (worldviews) from two different empirical case studies (contexts), and how a difference (asymmetries) in these perspectives may impact innovation speed. Finding various mechanisms from the case studies of importance to innovation speed has thus, together with insights from article 1, contributed to a novel understanding of actors' worldviews, as well as DTs role for worldviews among actors.

To answer the research questions, the following discussion is divided into three parts based on the findings from the articles. Articles 2 and 3 (case studies) are discussed separate based on the article's context specific findings and their relevance to SSM (worldviews). Further, key implications with regards to worldviews from the two cases are discussed against Design Thinking and innovation speed specifically. The arguments in the two first case discussions seek to give a context specific answer to the first and second research question about actor worldviews. The third discussion combines the arguments developed from the two cases against Design Thinking and suggest an answer to the third research question. An overview of the findings (portraying worldview process differences) is presented in table 6. Finally, the thesis´

theoretical and practical implications are presented. Followed by possible research limitations and suggestions for further research. The main arguments on behalf of the three articles which answers the research questions are summarized in table 5.

*Table 4. Overview of the articles*

| **Article number** | **Article title** | **Journal and publishing date** | **Authors** |
|---|---|---|---|
| 1st article | Studying Design Thinking as a Forthcoming Source to Innovation Speed | Published July 2019 in *Proceedings of the Design Society International Conference on Engineering Design*<br><br>Presented at the International Conference on Engineering Design (ICED) Delft, The Netherlands August 2019 | Christina Marie Mitcheltree<br>Halvor Holtskog<br>Geir Ringen |
| 2nd article | Enhancing innovation speed through trust: -A case study on reframing employee defensive routines | Published February 2021 in the *Journal of Innovation and Entrepreneurship* | Christina Marie Mitcheltree |
| 3rd article | Towards a sense of urgency for innovation realization:<br>-A case study on complacency asymmetries in interorganizational relations | Forthcoming in the *Journal of Innovation and Entrepreneurship* | Christina Marie Mitcheltree |

*Table 5. research questions and answers based on the thesis discussion*

| | |
|---|---|
| ***In what way does system perspectives (worldviews) impact innovation speed?*** | Actors perceive systems from their own worldviews. Worldviews are a complex state of being as it involves thinking (sensemaking) from what we know (our own language) framing understanding of our own world (e.g. system) and of the world of others. In organizational and interorganizational relations, being mindful of worldviews (involving trust, a true sense of urgency and understanding of preconditions), is important for innovation speed, as the opposite may facilitate negative expectations of future events (involving emotional tension, negative sensemaking, defensive routines and complacency) dividing the community (innovation standstill). Innovation success thus require a balance in innovation outcome and may be reached by facilitating a neutral innovation starting point. This involves translating language (mental pictures), positive emotions and reasoning (sensemaking) to move forward (innovation action) and may be enhanced from Design Thinking (DT). |
| ***How is system structure (organizational vs. interorganizational project cooperation) significant for worldviews?*** | System structure may impact worldviews by the way actors belong to language (from project intent and work identity). An interorganizational system structure may thus to a larger extent provide barriers to the way actors belong to language, providing system separation. The more actors/elements to be unmindful towards of importance to an end goal, the more actors will be limited to their own language. This provides barriers to the translation of language and common worldviews. This is because actors´ sharing similar intent and work identity (belonging to language) may create own communities on which their sensemaking is based. This may result in biased decisions from language barriers, unmindfully influencing the system negatively. For the purpose of innovation speed, it might thus be easier to gain a common worldview when actors *already identify and belong to the same language* (as in the organizational case). |

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| ***What is the role of Design Thinking for worldviews and innovation speed?*** | DT due to its visual and practical abilities, can translate and align language by picturing it. Consequently, transforming actors sensemaking process by becoming mindful of own and other's needs within the system by pre-experiencing (involving sensing/emotion) future events (impact thinking of what we do not yet know). Enhanced awareness may increase clarity, understanding/empathy, and trust towards own needs/abilities as well as the needs of others (reducing negative emotions from evolving). Consequently, focus may be redirected from self-interest seeking behavior/narrow vision towards a broader understanding and connection to the collective system (between actors). This involves a higher self-awareness of own role within the system which may trigger commitment. Hence, DT may enhance the limits of language in collaboration by moving actors´ experience and sensemaking from emotion. As such, DT is suggested as a valuable extension of SSM. |

## 4.1 Hospital case

### *4.1.1 Trust and innovation acceptance*

The hospital case explores an innovation implementation (organizational innovation) case subject to new blood analysis instruments at four of the hospital's laboratories (section 6.2). The implementation introduced by the hospital division management sought to enhance blood analysis efficiency and meet patient needs in better ways. The case emphasizes laboratory employee experience and perceptions with the new organizational system stressing defensive routines (defensive reasoning and action strategies) (Argyris, 1991) and trust as two opposite responses to innovation implementation and acceptance. Innovation speed (pace of innovation) is relevant in this matter as making fast decisions and achieving common objectives is important in urgent hospital situations. The ability to trust management was therefore found to be significant for innovation acceptance.

*Picture 1. Part of the new instrument at one of the hospital laboratories (private photo)*


*Picture 2. Overview of the new instruments (private photo)*

Facilitating a social environment and space for employee participation (Bohm and Nichol, 1996; Fulmer and Keys, 1998) and trust creation is understood to be of value to innovation speed. This is because it may enhance employee understanding of management and the innovation, framing positive expectations (Clegg et al., 2002) of the innovation implementation being beneficial. Trust is as such viewed as an outcome of the sensemaking processes subject to positive worldviews and is suggested as an important element (system protector) towards accommodation (Checkland, 2000). Trust will be discussed in relation to Design Thinking to answer research question two in section 4.3.

As the hospital study shows, contextual factors e.g. a traditional organizational style, a lack of employee participation (e.g. not being heard or seen by management) and complex organizational structures involving a lack of managerial capacity to address needs/postponement, facilitated a *disconnection* between employees and management. This is assumed to place barriers to trust generation, leading to various defensive mechanisms on behalf of the employees (hindering innovation adoption). To answer research question one and two, the thesis presents a novel and contextual understanding (Amin and Roberts, 2008) of worldviews. This is done by investigating four defensive routines on behalf of the laboratory employees found as a result of taking *responsibility* (Probst and Büchel, 1997) with regards to the innovation situation: *focusing attention towards something else, professional pride, seeking meaning,* and *self-criticism.* This is thus an addition to the understanding of how organizations respond to change and complexity (Stacey, Griffin et al., 2000). As different communities were described from the basis of characterization and actions (e.g. expert or high creativity communities) (Amin and Roberts, 2008), I contribute with an enhanced understanding of the "why" of reflexive processes that underlie worldviews. This is performed on behalf of both case studies to show how it impact employees/actors (positive/negative) response, decision, and action towards innovation (implementation/realization) success (e.g. innovation speed). Accordingly, I describe a worldview process (figure 2). For the hospital case, the elements (figure 2) are discussed subject to defensive routines in the next section.

### *4.1.2 How defensive routines impact worldviews*

Due to no extra resources being provided in relation to the organizational change, in connection with postponement of management meeting needs, and them having to reach analysis goals (organizational characteristics), employees felt frustrated and ignored (emotional tension). Moreover, the fact that the employees not directly involved with the innovation did not feel prioritized, might indicate a feeling of unfairness; managers "rewarding" some employees, and "punishing" those not directly involved with the innovation (perception of power use). This had resulted in a perceived division between employees. Furthermore, new routines colliding with

old ones led to *language shifts* which in this case did not make sense to the employees; not "belonging to language" (Wittgenstein, 1953; Rhees, 1959). The new situation was in this way viewed as a barrier for being present.

Interestingly, I found *timing* as a significant factor for the development of worldviews (sensemaking) and innovation speed. This was in relation to the timing of employee involvement, as well as having unresolved issues present within the same time frame as having to comply to organizational innovation change. Moreover, *proximity* e.g. to a customer (justified as a strength on behalf of the employees) was found to be significant for the sensemaking process regarding what was perceived as risky (may link to language). Not understanding the reasons for change as well as not feeling heard by management may therefore enhance fear (e.g. of bad habits being formed among customers) and uncertainty towards the innovation. Thus, there existed a relationship between emotional tension e.g. fear of not being available, predicting future negative consequences (sensemaking) and detachment (e.g. alienation) (Ollman, 1977) from management and the innovation. Hence, I argue that inner conflicts from being drawn in opposite directions can facilitate *organizational language barriers* within the organization structuring different worldviews. In effect, detachment may impact the need for control and self-interest-seeking behavior (Bachmann and Zaheer, 2008), viewed as a type of negative sensemaking (e.g. reasoning) impacting employee negative response. Similar to sensemaking as a "springboard into action" (Weick, 1995; Weick, Sutcliffe et al., 2005), I perceive (within both cases) sensemaking as a *catalyst or decision point* for action when emotion is involved. Organizational characteristics and type of emotion thus impact actors' decisions from sensemaking. Sensemaking in this way is assumed to decide whether action is taken or not. Building on Bachmann and Zaheer's (2008) argument of self-interest seeking behavior, I stress that self-interest seeking reasoning may enhance employees' sense of responsibility towards their customers. Consequently, defensive strategies may be developed, directing *focus and loyalty away from the innovation efforts* (towards standstill) (figure 2). This argument complements the knowledge of how actors may resist change by following own codes of valid operation (Luhmann, Baecker et al., 2013; Lies, 2020), acting from self-referring patterns framed by language (Wittgenstein, 1953; Bloor, 2002).

#### *4.1.3 Work titles as a source of belonging*

Employees expressed a concern of not being able to use their education, declaring self-protection of work titles and clear job boundaries. *Protecting professional pride* (feeling superfluous) is thus viewed as part of the sensemaking process of seeking control and *work-related meaning* within the system. This is because it involved justification (Lerner and Tetlock, 1999; Schillemans and Smulders, 2015) of

strengths, personal causes, and protection (Argyris, 1985) of the self (e.g. identity) (Lave and Wenger, 1991). Hence, identity was found to link to work titles. As such, the way actors belong to language (Wittgenstein, 1953; Rhees, 1959) may be regulated from uncertainty towards one's own performance and the sense of being voiceless regarding the ability to impact decisions (lack of participation). Equally important, work titles were found significant for the laboratory community; "we are [profession] to analyze blood tests". Consistent with a community being an effect of the practice performed by group members (Gherardi, 2006), I found that a disconnect towards management can strengthen the community among actors performing similar work (experiencing similar emotional tensions). In this way, emotions are assumed to link to actors feeling of self-worth and pride, as well as previous routines and the time devoted for personal causes or [profession] education. As such there existed a retrospect (Weick, Sutcliffe et al., 2005) element to the sensemaking process, involving the need to gain control of the situation, mean something and be seen. Consequently, I argue that innovation change can threaten an actor's self-worth connected to work purpose (Perrow, 1984; Flood, 2000) as it triggers inner conflict in terms of actors view of themselves and the specific language attached to their work titles.

As such, implicit understandings (worldviews), uncertainty and a division of organizational language and community is linked to employee vulnerability. *Meaning* is in this way created within the process of justification and protection of job purpose, which is understood to increase the gap between employees and the innovation (dividing the organizational community). Accordingly, the identity developed within e.g. a laboratory community (Brown and Duguid, 2000) is connected to emotion and sensemaking which, unaddressed, can direct focus away from innovation efforts (leading to defensive strategies).

Employees seemed unaware of the pressures the managers were experiencing in relation to reach innovation implementation measures (governed by others). Moreover, complex multi-location laboratory structures might play a significant role for the level of communication. Although this may be true, not knowing whether an experienced behavior (e.g. on behalf of management) will continue in the future, may enhance defensive strategies from *anticipations/expectations* (Lerner and Tetlock, 1999; Schillemans and Smulders, 2015). Hence, I argue that responsibility can be *self-inflicted*, based on being unmindful (facilitating neutral anticipations) from uncertainty and disconnect towards the innovation/management. As the threat of being accountable enhances self-criticism and justification (Schillemans and Smulders, 2015; Tetlock et al., 1989), my findings indicate a relation between feeling responsible (self-inflicted responsibility/not being threatened) of the lack of presence towards the customers, and *self-criticism.*

## 4.2 Energy transmission tower case

### *4.2.1 True urgency, connecting to the heart of others*

The energy transmission tower case was an interorganizational industrial research project in Norway subject to aluminum substitution (section 6.3). The project consisted of eight organizations: a Norwegian state-owned customer, a network association, a researcher, a university, three regional manufacturers and a material and process manufacturer.

*Picture 3. The aluminum energy transmission prototype (picture taken from one of the actors' websites)*

*Picture 4. Energy transmission tower parts in aluminum (private photo)*

Like the hospital case, this study looked at barriers and enablers for innovation speed from an exploration of the concept's *complacency* and *a sense of urgency* (Kotter, 2008) for product innovation.

In a high-pace world having a sense of urgency is essential for successful organizational change (Kotter, 2008). Moreover, as innovation speed is relevant to keep up with industry needs (e.g. reduce costs) (Higson, Patrick et al., 2002), I link urgency to the progress and pace of product innovation (a sense of urgency needs to be present for innovation realization to occur).

Change requires a true sense of urgency deriving from motivation and action by having connected emotionally to the heart of others, awakening emotions from experiences others can relate to (Kautt, 2009). Change thus occurs when modifying actor's perception (Kotter and Cohen, 2002; Bolisani and Bratianu, 2018). Hence, a sense of urgency hinders actors to resist change by facilitating a space to feel and see the reason for change (Champbell, 2008). However, complacent attitudes (thoughts and feelings of own behavior) (Kotter 1996, 2008) are when actors feel content and self-satisfied in the state of being unaware of trouble or dangers (Kotter, 2008). Complacency is thus viewed as an opposition to true urgency and is as such detrimental to innovation speed.

Trust (stressed to be missing within the true urgency literature) (Huges, 2016) was also in this study found as an important dimension for urgency creation and

innovation speed. However, I found too much collaboration (from e.g. trust) among some actors to enhance complacent attitudes. This is consistent with previous research (Rossetti and Choi, 2005; Squire, Cousins et al., 2009).
The findings thus stress various complacency mechanism asymmetries among the actors associated with *role understanding, competence, project intent, risk,* and *trust*. These dimensions are understood to represent the organizational environment from where the actors base their opinions, subject to the in-depth interviews performed.
My argument implies that these asymmetries facilitate urgency gaps (variations of what constitute complacency) between the actors, which places barriers to innovation speed and realization. From the energy transmission tower article's literature review on true organizational urgency, I found a co-operative innovative dimension to be missing. Moreover, I did not find the concept of true urgency within the industrial material substitution domain. Hence, I present insights on valuable knowledge regarding *how* and *why* complacency develops (MacQueen, 2019), overcoming inertia (Kim, Oh et al., 2006; Le Ber and Branzei, 2010) and collaborative friction in interfirm knowledge transfer (Le Ber and Branzei, 2010). Further, I connect these insights to industrial interfirm true urgency development, which I stress relates to a context-based understanding of *commitment* and *cooperation*. Hence, I present possible reasons (preconditions) and responses to complacent feelings/behavior which are perceived as important ingredients to the worldview process (figure 2).

To answer the first and second research question, I will discuss worldviews in relation to the implications of the complacency asymmetries found (e.g. preconditions for innovation speed) (*role understanding, competence, project intent, risk,* and *trust).* As the hospital case addressed worldview understanding in relation to innovation implementation and one organization (laboratories subject to the same hospital), the transmission tower case provides a contextual worldview understanding subject to a collaborative community of interorganizational actors (e.g. experts) (Amin and Roberts, 2008) for product innovation. Moreover, as the elements for innovation speed are different among the two cases (trust vs. urgency and defensive routines vs. complacency), they are connected and serve a similar purpose, with regards to the impact on actors' positive or negative response and action for innovation speed (figure 2).
By comparing the two cases, I have given an overall answer to how actors view systems and the implications for innovation speed (table 5).

### *4.2.2 How complacency impact worldviews*

Kotter's (1996, 2008) signs of complacency was used in this case to recognize what could facilitate true urgency and complacent behavior within the project. One of the

signs of complacency is *internal focus* and thus not acknowledging organizational *threats*.
As the actors in this case mainly operated separately, it placed barriers to the sensemaking process (meaning deriving from actors´ objectives) (Weick and Roberts, 1993) in relation to understanding what and why some decisions were made in the project (e.g. confidentiality). Similarly, I found time and freedom to solve the project task important for worldview development, as it facilitated postponement (Kotter, 2008) of solutions, close-co-operation, and meetings to the end of the project.
As collected belief structures may derive from crisis or complex organizational structures (Deazin, Glynn et al., 1999), this was only true (in both cases) for actors whose identity (Lave and Wenger, 1991) was linked to common work titles (familiarity). However, in organizational or interorganizational systems, a community division (e.g. disconnect) may provide interorganizational language barriers. This may make tacit knowledge transfer difficult, hindering the development of collective mind (Perrow, 1984) within the system (hindering innovation speed).

Under those circumstances, I argue that pre-decided and given project roles may be one reason for actors' judgement (Checkland, 2000) and negative response, leading to different objectives/focus (Weick and Roberts, 1993). For instance, the customer in this case was state-owned. In effect, they had to follow precautions in relation to e.g. investments, safety, material weight, Norwegian climate, and were bound to consider open competition and follow the law of public procurement (e.g. tenders). Moreover, they aimed at building a whole electricity grid with the energy transmission tower (pylon) project (long-term vision). Whereas the researcher perceived the project as a research project, intending to focus on calculating the aluminum pylons durability (short-term vision/narrow focus). The university on the other hand, had a PhD role with research responsibility, hence they needed to publish generic research. Thereupon, I argue that the development of worldviews resulting in complacent attitudes or behavior may not be self-inflicted. However, as my case shows, it can facilitate a sense of alienation (Ollman, 1977) from having different power agendas (Flyvbjerg, 2014) and a lack of group involvement. This may frame the *way* (language) *understanding* (sensemaking) is made of other actors' preconditions and needs (system understanding). Different understanding (tacit understanding) of what was important for the pylon development was thus found to link to role and identity (belonging to language) (Wittgenstein, 1953; Lave and Wenger, 1991). This resulted in community separation and complacent behavior which influenced actors´ attention span (Brown and Duguid, 2000).

In the light of this, there was a language inconsistency between actors, in relation to project intent and competence (e.g. the customer's lack of knowledge on aluminum and the researcher on pylon needs) that enhanced worrying (emotional tension) within the project.
To clarify, the customer was afraid that they would not be able to produce the product elsewhere/feeling stuck due to intellectual property rights. On behalf of the regional manufacturers, the customer having to follow rules of public procurement created unclarity and uncertainty of production future. Hence, not knowing may regulate the way actors belong to language. Like the hospital case, sense derived from "codes" (Luhmann, Baecker et al., 2013; Lies, 2020), and self-referring patterns (e.g. Wittgenstein 1953; Bloor, 2002), which I argue is created from a state of being unmindful. Hence, I stress that this state of mind may result in reluctance to be involved in a project as well as hesitance with going forward (e.g. time and resources placed into a project), impacting negative sensemaking (standstill). Negative sensemaking is in this case viewed as the way meaning develops (thinking) from the basis of language. Consequently, uncertainty/lack of future vision, being unmindful of what is going on or what is needed (understanding of other's worldviews) may frame actor language, and thus the perception of the project (involving emotion). In this case it impacted the way the actors made sense of the project system (disregarding understanding of other's needs), resulting in actors performing complacent behavior (e.g. sticking with the safe) (Kotter, 2008).
Accordingly, my findings indicate that not being aware of other actors' project role, intent and risk, or being unsure of e.g. future production possibilities (not seeing possibilities), may result in making sense from assumption (e.g. actors assuming other actors lack of interest), and thus not committing to the cooperation (standstill). Further, it may facilitate becoming vulnerable and reluctant to share information or take risks. Therefore, as this case shows, actors might take advantage of backup plans which might involve sticking to old ways (Menon , Chowdhury et al., 2002). This resembles actors' action from expectations of future events (Lerner and Tetlock, 1999; McEvily et al., 2003; Schillemans and Smulders, 2015). However, foreseeing (assuming) negative consequences from information asymmetry (Dawson , Watson et al., 2014) and being unmindful, can as my case shows, result in biased decisions. Consequently, leading actors to underestimate others' abilities (e.g. partner disillusionment/askew perceptions) (Siegel, Waldman et al., 2003; Le Ber and Branzei, 2010) missing opportunities to prosper (Kotter, 2008) (standstill).

### *4.2.3 The paradox of unawareness*

Like the hospital case and self-inflicted responsibility, unclarity of project ownership and project leader roles (e.g. minimal project consultation) (Flyvbjerg, 2014) was found to facilitate actors to take responsibility of project ownership. However, as some actors had several project roles, this was found to limit the actors overall

project vision as actors were diving into their own preferences and tasks independently of others. Moreover, there was a connection between taking responsibility from sticking to own ways, and perceived lack of competence on behalf of other actors within the project. Hence, responsibility from a lack of clarity and uncertainty may be detrimental to a community (e.g. innovation speed), as it creates distance and unawareness of other actors' worldviews (moving away from a collective mind) (Perrow, 1984). These findings were consistent with complacent behavior such as silo thinking and being inattentive to needs/the overall situation (Lieberman and Montgomery, 1988; Pinedo -Cuenca et al., 2012). Nevertheless, the case gives valuable insight into how circumstances may be translated (Weick and Sutcliffe et al., 2005) and acted upon. In this sense, I stress the importance of clear project roles and neutral leaders to consider the overall project vision (McLean, Anthony et al., 2017).

Furthermore, a relationship was found between group separation, uninterest in engaging with others/closed to external input, narrow vision (e.g. short-term vs. long-term vision), and actor's' perception of what was perceived as valuable. This differed within the project based on perceived role, intent, competence and what was looked upon as necessary within the project (understanding limited to own language). Not knowing (unclear visions) is therefore viewed to enhance actors' sense of risk within a project (emotion).
Correspondingly, the complacent behavior of being detailed focused on behalf of one actor (inward attitude) (Sherrat, Sherray et al., 2020) was found to be interpreted as competitive by another actor (e.g. not considering the whole project picture). Actors not aware of other actors' perception of them (seeing oneself as rational or not acknowledging threats) (Kotter 1996, 2008) is thus viewed as detrimental to innovation speed, as it might give off negative signals within the community. This may, as this case shows, impact the way the other actors search for meaning and handle uncertainty (Helms-Mills, 2003) resulting in cooperation reluctance.
Moreover, my findings indicate that portraying detailed focused attitudes (e.g. from project role) can be perceived as indifference by other actors. Indifference was also found in terms of perceiving the project as unimportant or irrelevant (due to unclear vision and roles), as well as waiting for other actors to take the leap. The latter was relevant for the regional manufacturers in this case, as taking risks involved larger personal consequences with eventually not being given long-term production possibilities (playing it safe) (Kotter, 2008). Hence, actors playing it safe were in this case more focused on their own competence, avoiding big goals and visions in relation to the project, framing new "codes of valid operation" (Lave and Wenger, 1991) from self-protection (Argyris, 1985). As such, *complacent behavior may be perceived as a type of defensive strategy deriving from defensive reasoning (e.g. sensemaking)* (Argyris, 1991). A lack of dialogue can in this way produce signals of

threat, facilitating some actors to become passive and withhold information (self-protection). This is perceived as negative for trust creation, as well as the worldview process.

### *4.2.4 Trust, a complacent attitude?*

Trust is stated to reduce uncertainty, enhance dialogue, fast decision, and transfer of tacit knowledge (Almeida and Kogut, 1999). As such, I perceive trust as an important dimension for defensiveness and complacency as it enhances understanding of actors' project intentions. On the contrary, trust is argued as a filter for external information as lower investment is associated with familiar partners (Uzzi, 1997) (leading to overconfidence) (Jean, Sinkovics et al., 2014). Complacency thus links to trusting relationships as problems are not as likely to be addressed (Villena, Revilla et al., 2011). Consistent with this, and the hospital case, I found an *us* versus *them* (cultural attitude) among actors having similar roles which, for the energy transmission tower case, resulted in blaming (Kotter, 2008) other actors for problems. Complacent (superior) attitudes as opposed to defensive (from feeling responsible/more personally invested) may thus be the reason for lower self-criticism in this case (when comparing the cases). Equally significant, having low risk/investments involved in the project generated a more trusting and laid-back behavior. In the light of this, as being confident and safe was based on role, and previous experiences (Kotter, 2008), it was (by one actor) mentioned as facilitating trust and new connections among actors.

For this reason, I argue that having self-righteous attitudes may enhance unawareness within the project e.g. not knowing how you are being portrayed by others (lack of insight of other actors' roles/investments/long term goals). Hence, trust is found to connect to one's own perception of project role, and is as such viewed as a complacent attitude, deriving from a cultural assumption of similarity and familiarity as well as being less (personal and/or financial) invested. This is not consistent with previous research stressing trust to enhance collaborative routines (Gulati, 1995; Elfenbein & Zenger, 2014; Ligthart, Oerlemans et al., 2016) or reduce knowledge asymmetry (Almeida & Kogut, 1999) in product innovation. Trust (trust gap between participants) is as such found to be detrimental in interorganizational innovation in some instances, as it can facilitate a false confidence of success, creating distance towards other actors (e.g. norm conformity and own worldviews) (Lang, 2009). Hence, it may postpone problems making it more difficult to realize follow up projects (Pinedo-Cuenca et al., 2012; McLean, Antony et al., 2017). Correspondingly, laid-back attitudes were true in relation to impacting other actors' perception of a lack of project contribution. This may impact trust, commitment, and the sense of urgency within a community negatively.

From my findings in the energy transmission tower case, I view complacency as *an unmindful characteristic of interorganizational relations, from a basis of asymmetrical preconditions. As such, it is a disconnection among actors due to a tacit understanding (e.g. individual perception) of other actors in the light of self-interest and vulnerability.* From the case discussions, this understanding is relevant also for the hospital case when comparing the two cases, and in the light of perceiving complacent behavior as a type of defensive strategy. However, being unmindful (e.g. preconditions for change) in the process of sensemaking may not be self-conscious. In fact, in my cases, being unmindful is viewed as *not being consciously unaware* and is as such pernicious to innovation. In effect, I argue that it is a consequence of lost understanding (in the process of sensemaking) between *sensory experience* (Maurice, 2013) of dynamic preconditions/organizational characteristics and understanding of others´ worldviews, involving language and thinking from what we understand/know. Closing this gap may thus increase certainty of future events and commitment to move forward.

Equally important, as being unmindful can separate and narrow organizational/interorganizational vision from different worldviews, it can make actors unaware of how their actions are detrimental to the organizational system. Under those circumstances, I argue that being unmindful impacts language and thus the way sense is made of a system. This is because it may lead actors to fill the meaning void from e.g. responsibility, redirecting focus and innovation speed in other (undesirable) directions (enhancing system disconnection). Uncertainty and being unmindful of e.g. the premises of change or actor intent, are in this way perceived as important factors for the development of worldviews and understanding of systems, as it regulates emotion and sensemaking. Moreover, as we have seen, being unmindful facilitates defensive routines and narrow vision (community division) towards what is perceived as meaningful; further hindering understanding of worldviews.

The next section answers the second research question and thus how system structure (context) is significant for worldviews.

### *4.2.5 System structure and the impact on worldviews*

System structure in this case equals organizational versus interorganizational project cooperation structure, and thus the difference in worldviews.

Even though the cases stressed different concepts (defensiveness versus complacency, trust versus true urgency), they show similarities. This is in terms of actors' negative response towards protecting work identity and work titles/role when facing something or someone challenging their existing beliefs. This is understood to be increased within the state of being unmindful.

In an interorganizational setting, the protecting role was motivated by competition/skeptics (as opposed to cooperation), role intent and risk (having more to lose) which created self-centered ways of responding, providing language barriers. Whereas in the organizational setting, actors protecting work titles/role was more personally motivated and related to professional pride, self-criticism, being seen/means something. Moreover, defensive/complacent reasoning and behavior (responsibility) towards what was perceived as meaningful seemed to be directed towards others (customers) in the organizational case, versus towards the self in the interorganizational case. The level of self-criticism and self-awareness thus seemed to differ between the cases, based on previous routines and the *intent* of being responsible. As such, actors sharing similar intent and work identity (belonging to language) seemed to create their own community.

The sensemaking process may thus result in biased decisions from language barriers (enhancing group separation), unmindfully influencing the system negatively.
Since actors in both cases responded with protecting work titles/role, what differentiated organizational from interorganizational actors was the motivation and reasons (sensemaking) to perform defensive/complacent behavior. In this regard, as the thesis´ cases draw on two different sectors, I found too little or too much organizational/work freedom (traditional vs autonomy) significant for defensive behavior and innovation speed, leading actors to take responsibility. In this way, the findings in the study challenges the Norwegian Work Life Model, as too little or too much autonomy, responsibility and trust may provide barriers to innovation speed. Hence, even though one would like to think the model enables trust, my case shows that there are many different mechanisms within and between organizations that decide whether trust is created. The issues with finding a balance in work autonomy are relevant today (Baer, Frank et al., 2021). As such, and in line with the Norwegian way of living, language games, and the Duck-Rabbit picture (Wittgenstein, 1953), I argue that the model may be implicitly understood to enhance trust, deriving from individual and collective tacit knowledge.
In the light of this, trust was found as a valuable element in terms of language barriers and community separation. Within the interorganizational case, trust enhanced a false sense of success (complacency), dividing the community (the way actors belonged to language separated the group). Hence, trust gaps can be detrimental to common worldviews. As trust was motivated by familiarity (role) and having low risk/investments in the interorganizational case, trust within the organizational case was found to be reflexive, motivated by organizational characteristics (e.g. traditional management style). Nevertheless, unfamiliarity, and change (threatening existing beliefs) influenced actors' response towards what was familiar (complacent behavior). As such, trust is understood to be redirected and shared within the

community from Design Thinking (e.g. sharing the meaning of language through DT).

A disconnect towards management or other actors was found to be detrimental to innovation in both cases. However, innovation speed in these contexts requires all actors to operate as a system. As this may be true, language barriers, being responsible and protecting work titles may be more detrimental to innovation speed within the interorganizational context in this case. This is because as there are more actors/elements to be unmindful towards of importance to the end goal, more actors belonging to their own language may provide barriers to the overall system cooperation. For this reason, I argue that it might be easier to redirect focus towards the innovation, when actors *already identify and belong to the same language* (as in the organizational case). Nonetheless, this is where Design Thinking comes into play.

Nevertheless, organizational characteristics and different preconditions (e.g. power agendas) (Flyvbjerg, 1998) in the light of not knowing, may enhance negative expectations of future events involving emotional tension, negative sensemaking and defensive routines/complacency. In this way, Design Thinking is suggested as an approach to being mindful, as it capture implicit worldview information, enhances dialogue, awareness and understanding. From this view, DT may enhance trust and a sense of true urgency impacting the way actors take purposeful action from meaning in language (stopping negative sensemaking from developing).
The next section answers the third research question, presenting the concept of Design Thinking and its role with regards to symmetric worldviews and innovation speed.

### 4.3 Design Thinking's role for worldviews and innovation speed

Innovation involves uncertainty, risks, and fear, among other emotions, providing barriers to innovation performance. The inability to acquire a shared understanding (agreeing on problem framing) in organizational collaboration is thus looked upon as a challenge (Eden and Huxham, 2001; Franco, 2007). Therefore, innovation implementation success require trust and understanding of language (e.g. collective mind). In this section, I address trust and a sense of urgency as important elements for innovation speed and positive worldviews. Further, I suggest Design Thinking as a human centered (Brown, 2008) approach to enhance positive emotions from dialogue (Kummitha, 2019), a true sense of urgency (Kotter, 2008), insight, awareness and understanding (Mahmoud-Jouini, Midler et al., 2016) of preconditions/organizational characteristics.
My results propose that having precondition asymmetry, and not being mindful of these asymmetries, might facilitate an unbalance in the innovation outcome

(impacting innovation speed) from negative reasons to trust. This mirrors the collection of research stressing effort (response), meaning creation and mental processes as deriving and being regulated from actors´ objectives (e.g. focus), and different organizational aims (Weick and Roberts, 1993). Thereupon, I stress the importance of providing a neutral starting point between actors towards accommodation (Checkland, 2000), as it may impact whether actors move forward in the right direction or not. This is because a large gap in preconditions (which impact actors' emotions and sensemaking) might influence actors to continue in the same manner (e.g. a project) indefinitely. Hence, trust and true urgency is argued as important ingredients for positive worldviews (innovation speed) and understanding between actors.

### *4.3.1 True urgency from trust*

Trust is described as a form of expectation that limit the sense of risk of performing an action (Bradach and Eccles, 1989) and others not operating in self-centered manners (Madhok, 2006). Within SSM, trust connects systems together and facilitates collective mind (Weick and Roberts, 1993). Accordingly, it influences the density and stability of social structure (McEvily et al., 2003). True urgency on the other hand reveal what triggers actors´ drive, responsibility, and commitment, and involves sensing and feeling from experience (Kotter, 2008). Hence, *trust is found to be one element driving true urgency*, enhancing worldview understanding. As such, the trust mechanisms found in the hospital case and the urgency enablers found in the energy transmission tower case both serve a similar purpose, for what might facilitate positive system response and action (e.g. accommodation). In contrast, a false sense of urgency involves being proactive and alert, but from feelings of anxiety, contentment, frustration, or anger (e.g. facilitating burnout) (Kotter, 2008). Hence, it is understood to impact worldviews negatively.

In the hospital case, trust was found to be important for innovation speed and viewed as reflexive; a consequence of positive emotions based on organizational characteristics (e.g. management decisions, dialogue, participation/involvement). However, in the energy transmission tower case, trust is found to be a consequence of urgency enablers (e.g. from interorganizational dialogue). Only significant for innovation speed in the absence of precondition asymmetries (e.g. trust asymmetries).

There are many variants of trust, however, some view trust as connected to expectations of being heard, positive responses and from receiving benefits (Clegg et al., 2002). Moreover, it links to the probability of beneficial actions (Gambetta, 1988) and expectation of balance in future relationship exchanges (McEvily et al., 2003). Directing focus and loyalty away from the innovation, or performing

complacent behavior, may thus be the result of the ability to foresee negative consequences (from present or previous sensory experiences) (Weick, 1995). Having asymmetric preconditions or feeling that information is being filtered/needs postponed, can thus frame negative future expectations of an innovation implementation/co-operation. Hence, in this case, actors in both cases (from uncertainty/being unmindful) found their own ways of reducing emotional tension by taking responsibility, directing focus towards what was perceived as important and meaningful (dividing the community). I therefore argue that communicating needs e.g. preconditions from the start (Romme, 2003; Drejer and Jørgensen, 2005) (timing) of the innovation implementation/project is essential for trust creation and a true sense of urgency. This is because enhanced clarity/performance certainty, innovation understanding and training, as well as feeling understood, may limit actors need to cope, and hold on to what is familiar/manageable. Moreover, it may reduce the need to justify and compensate for experienced and assumed weaknesses (on behalf of the self and others). For this reason, I suggest Design Thinking as an approach that can balance tension creating mechanisms, and reduce the sense of competition from enhanced understanding of actor related language (e.g. intentions), and thus clarity of what is perceived as important. Awakening awareness and gaining clarity of the larger project picture is thus believed to trigger trust and a true sense of urgency.

Moreover, as defensive reasoning is linked to defensive strategies/complacent action, I suggest that gaining clarity/awareness of tension-creating mechanisms/preconditions for complacency can impact selfless reasoning to trust, due to positive expectations (positive emotions) of actors facilitating innovation benefits (enhancing true urgency). As such, defensive reasoning is understood as a type of sensemaking, and part of the process to trust other actors and the innovation process; a positive outcome of selfless reasoning (sensemaking) and the act of reducing emotional tension and defensive reasoning (e.g. complacent attitudes). Hence, the sensemaking process is made clearer from DT (e.g. storytelling, prototyping) (Carlgren, 2016) as it emphasizes engagement, create recognition (meaning) and an environment to experience needs and potential benefits (e.g. reducing risk reluctance and altering more traditional organizational communities). In terms of seeing and addressing employee perceptions in advance of e.g. an innovation implementation/project, DT provides the opportunity to regulate possible outcomes (trust or defensive routines/complacency). As DT is a prototype driven process (e.g. successive iterations/feedback) involving ideation and multiple perspectives (Liedtka, 2011), it may alter separate worldviews. Let me explain the difference between SSM and DT to give a better understanding of how DT may impact worldviews and innovation speed.

### *4.3.2 Design Thinking, a better starting point for innovation cooperation?*

SSM emphasizes collective problem definitions (Checkland, 1981; Checkland and Scholes, 1990) and meaningful action (Flood, 2000) from providing rich pictures (Walker, Steinfort et al., 2014; Ninan, Phillips et al., 2019). Hence, it seek to improve entire systems (addressing problematic situations) from deriving existing system worldviews between actors (Patel and Mehta, 2017). SSM thus seek to capture main structures and viewpoints of an ongoing situation/process to recognize issues (Checkland and Poulter, 2010), providing systems ideas to help structure thinking (Checkland and Poulter, 2010).

In contrast, DT emphasizes *what does not yet exist* (Liedtka, 2000). It involves different verbal (post-its), visual (brainstorming, images) and practical (prototyping and personas) tools. The tools stimulate the imagination (Seidel and Fixson, 2013) and make abstract ideas tangible from vivid manifestations of the future through accurate feedback (Liedtka, 2014). In effect, it can impact actor perception (Tschimmel, 2012), reveal unstated needs through dialogue, detect risks (Mahmound-Jouini et al., 2016) and reduce interfirm conflicts (Seidel and Fixson, 2013). For this reason, I argue that *SSM is a more structured process to problem solving than DT. As such, SSM to a larger extent, places boundaries to the translation and understanding of language.*

In relation to innovation speed, trust and true urgency are suggested as important ingredients to redirect the defensive strategies (responsibility) or complacent behavior (narrow focus), back towards the innovation or the project community (proximity is altered towards what is important for the overall community). In the light of this, I perceive Design Thinking as an approach to guide actors to trust (reasoning to trust impacting true urgency) as it may enhance expectations of feeling heard, supported and gaining clarity of needed resources in the future (enhance beliefs of future support) (McEvily et al., 2003). As DT may enhance the sense of predictability (seeing possibilities), acceptability (addressing/agreeing on expectations), and uncertainty tolerance (McEvily et al., 2003) within a community, I stress that as DT enhances understanding and empathy, it can reduce defensive/complacent barriers between actors, facilitating a sense of involvement (co-creation) (Seidel and Fixson, 2013) and connection (dialogue). Accordingly, it provides a better starting point for co-operation and accommodation from a basis of true urgency (commitment).

Furthermore, DT may be used at different stages of an innovation process (Mahmound-Jouini et al., 2016). Moreover, to increase the value of DT, it can be mixed with other methods (Tschimmel, 2012; Liedtka, 2014; Carlgren, 2016). However, as the employees in the hospital case took responsibility on such a high level when they were not expected to, and the actors in the energy transmission tower

case were assuming actor abilities and project consequences, the findings stress the importance of communicating needs early. This, to reduce misunderstanding, feelings of alienation/disconnection, facilitate positive attitudes and selfless reasoning to impact action and innovation speed positively. As prototyping or personas makes it easier to visualize an idea, it may drive out fear for failing (Tschimmel, 2012) as well as of the unknown. Consequently, I state DT as a proactive way of building group confidence under uncertainty by pre-experiencing possible visions/solutions. Hence, facilitating quick communication and saving time for problems down the line (e.g. investing less resources). Equally important, DTs visual traits might make it more comfortable to share difficult thoughts between actors.

Under those circumstances, I argue that worldviews can be changed by overcoming defensive routines/complacency and reduce uncertainty from trust by pre-experiencing experiences (Boland and Collopy, 2004) between actors. Consequently, DT may provide clarity of important actor characteristics (what e.g. accommodation of worldview means) that reduce emotional tension (Donald, 1959) and the continuation or development of false urgency (e.g. burnout, fear, or discouragement). Accordingly, I stress that DT has the ability to structure what is common in language, share objectives towards a shared direction (Creplet, Dupouet et al., 2001; Amin and Roberts, 2008), limiting the sense of disconnect, as well as enhancing work-related meaning within a community. Similarly, as DT involves verbal (e.g. post-its) as well as non-verbal (pictures) communication, it may enhance the limits of language in collaboration by moving actors´ experience and sensemaking from emotion (figure 2).

#### *4.3.3 Thinking from what we do not yet know*

For the purpose of worldviews and innovation speed, I suggest DT as a mindfulness approach (becoming aware) to understand our own language and worldviews better (self-awareness) as well as the language and worldviews of others. As such, DT provides reflection/reasoning, collective mind/belief structures and codification of tacit knowledge within a community (Nonaka and Takeuchi, 1995; Deazin, Glynn et al., 1999; Weick and Sutcliffe, 2007; Biggs and Preiser, 2019). Important information (from spontaneous prototyping or brainstorming) addressing language and worldviews may thus be received (from activity), beyond asking questions (Carlgren, 2016). My argument derives from the process of sensemaking, as this is about developing plausible images that impact rationalization and the making/structuring of sense (Weick, 1995). For this reason, I argue that DT is a visual tool for the process of sensemaking (search for meaning) (Helms-Mills, 2003) in action, as it may structure and translate language into something visible/explicitly comprehendible within a community. Moreover, my argument derives from the state of being unmindful. Which is perceived as a state of mind and a state of being

involving *thinking from what we know*. This kind of thinking regulates language and emotion, which I perceive as preconditions for sensemaking. Therefore, I suggest DT as an approach to *impact thinking, of what we do not yet know*.

As DT involves sparking imagination, it can trigger mental images and understanding in the present moment. By visually and physically being able to structure the future into something manageable (pre-experiencing and discussing challenges), DT can enhance understanding of other's needs, augment self-awareness, and positive visions of the future. As such, DT can transform the sensemaking process by shifting the focus from the self (e.g. narrow vision/self-interest), a consequence of being unmindful, towards collective thinking (from clarity, understanding/empathy, and trust). This may reduce negative emotions from evolving (e.g. dwelling and holding grudges). As such, it can enhance awareness of project role/goals/competence which may minimize judgement (e.g. self-criticism) of the self and others, as well as hinder defensive routines and complacency from developing.
Managerial action may thus be taken through DT as a system strategy to frame expectation and willingness (Green and Simister, 1999) towards the innovation. For this reason, my results suggest that *DT is a valuable extension of SSM*, not only for problematic situations, but as a strategy for structuring systems or communities (for enhanced innovation performance) in advance of any important task requiring accommodation.

As the thesis focuses on the implications of DT for innovation speed, I have emphasized DT characteristics and philosophy, if you will, for the purpose of worldviews for innovation speed. In the conceptual article 1, I recognized a need for empirical evidence on barriers to innovation to increase understanding of optimal utilization of DT in various situations. As such, I have performed an explorative study (article 2 and 3) with regards to recognizing essential barriers and enablers for innovation speed in different contexts (as a source for comparison). Consequently, I have found important case specific cues to enhance understanding of DTs usefulness in relation to worldviews in these settings. For this reason, detailed notions of the different DT tools and the implementation itself is left outside of the boundary for this study. Then again, I acknowledge that there may be challenges with regards to using DT for innovation speed. For example, knowing when to stop e.g. brainstorming/reflexive practices and when to move on, not being able to debate and reflect in a matter that emphasize solution focused thinking, or knowing when to stop questioning ideas or processes (Seidel and Fixson, 2013). Moreover, challenges may involve mixing DT with existing organizational practices, as well as DT being a misfit with more measurement driven cultures (Carlgren, 2016).
Table 6 presents the worldview process differences found between the cases.

*Table 6. Worldview process variables applicable to system structure (context)*

| **Context** | **Hospital case (organizational context)** | **Energy transmission tower case (interorganizational context)** |
|---|---|---|
| | Emphasis on employees within four of the hospital's laboratories | Eight individual industrial organizations |
| **Type of innovation** | Innovation implementation project (organizational innovation) subject to new blood analysis instruments at four of the hospital's laboratories | Research project subject to aluminum substitution with regards to an energy transmission tower (product innovation) |
| **Goal** | Laboratory employee experience and perceptions with the new (ongoing) innovation implementation project | Actors experience with a finished research project |
| **Sensory experience** Preconditions/organizational characteristics impact level of awareness | • Traditional organizational style<br>• Complex organizational hospital structure<br>• Lack of participation<br>• Not being seen/heard by management<br>• Lack of managerial capacity to address needs/postponement | • Autonomy<br>• Role understanding (impact interest/power agendas)<br>• Competence<br>• Project intent (what is perceived as valuable)<br>• Risk<br>• Trust<br>• Working separately<br>• Lack of dialogue<br>• Time and freedom (influenced complacency) |
| **Design Thinking**<br>1. Approach to impact thinking of what we do not yet know<br>2. Enhances dialogue, awareness, understanding, empathy and positive emotion | **Trust** (Driving true urgency) | **A true sense of urgency (**Driven by trust) |
| | • Influence selfless reasoning to trust (positive expectations)<br>• Communicating needs/preconditions from the start of a project<br>• Facilitate quick communication/saving time for problems later<br>• Facilitates a neutral starting point/clarity<br>• Limits actors to hold on to what is familiar (coping)<br>• Reduce the need to justify/compensate for assumed weaknesses<br>• Balance tension creating mechanisms<br>• Enhance the sense of cooperation and involvement (common worldview) | |

| | | |
|---|---|---|
| | • Makes the sensemaking process clearer (structure what is common in language)<br>• Pre-experiencing/visioning innovation benefits (drives out fear for failing)<br>• Enhance beliefs of future support (predictability, uncertainty tolerance)<br>• Guide actors to trust impacting true urgency<br>• Build group confidence<br>• Enhance work-related meaning and commitment | |
| **A state of being unmindful**<br>1. Not knowing impact how actors belong to language<br>2. Being unaware removes the ability to change something | • Not understanding reasons for change<br>• Unaware of the pressure's managers were having<br>• Lack of communication with managers<br>• Responsibility may be self-inflicted based on being unmindful | • Not understanding why some decisions were made<br>• Lack of future vision<br>• Not knowing what is needed (understanding others´ worldviews)<br>• Information asymmetry<br>• Unaware of others perception of oneself/not acknowledging threats |
| **Language**<br>1. Triggers emotions/reaction<br>2. Places limits to understanding/awareness | • New routines colliding with old ones (language shifts)<br>• Organizational language barriers (inner conflicts/drawn in different directions)<br>• Not belonging to language<br>• Lack of customer presence felt risky<br>• Following own codes of valid operation/ self-referring patterns (impact sensemaking)<br>• Belonging to language from role and work identity | • Interorganizational language barriers/inconsistency (hindering collective mind) (from different roles/intent)<br>• (codes and self-referring patterns)<br>• Belonging to language from role and work identity<br>• Understanding limited to language (what was perceived as necessary)<br>• Own perception of project role from unawareness (self-righteous attitudes) |

| | | |
|---|---|---|
| **Emotion**<br>1. Influence the way sense is made<br><br>2. Influence how language is understood | • Disconnection (towards management/innovation)<br>• Frustration<br>• Fear (bad habits forming)<br>• Uncertainty<br>• Vulnerability | • Disconnection/alienation (among actors)<br>• Hesitance with moving forward<br>• Reluctance to be involved<br>• Uncertainty<br>• Fear<br>• Vulnerability<br>• Risk reluctant<br>• Indifferent |
| **Sensemaking (catalyst/decision point for action)**<br>1. Meaning develops (thinking) from the basis of language and emotion<br><br>2. Sensemaking influences feelings and language | • Did not feel present towards the customers<br>• Timing (involvement/postponement)<br>• Proximity to customer<br>• Predicting future negative consequences<br>• Need for control (self-interest/reasoning)<br>• Sense of responsibility<br>• Protecting professional pride (justification/protection)<br>• Individual and group work identity linked to work titles<br>• Seek work-related meaning<br>• Be seen/mean something (self-worth/pride)<br>• Retrospective dimension<br>• Us versus them attitude from similar roles | • Collective belief structures linked to actors whose identity linked to common work titles (familiarity)<br>• Tacit understanding of what was important linked to role and work identity<br>• Making sense from assumption (lack of awareness of actors' role/intent/risk and future vision)<br>• Being unaware of own behavior may impact how other actors search for meaning/handle uncertainty<br>• Us versus them attitude from similar roles |

| | | |
|---|---|---|
| **Negative response**<br>In the absence of dialogue, awareness, understanding, empathy and positive emotions | **Defensive routines**<br>• Taking (self-inflicted) responsibility<br>• Focusing attention towards something else, professional pride<br>• Self-protection<br>• Seeking meaning<br>• Self-criticism | **Complacency (understood as a defensive strategy deriving from defensive reasoning/sensemaking)**<br>• Postponement of solutions<br>• Self-centered<br>• Superior attitudes<br>• Sticking with the safe<br>• Biased decisions<br>• Underestimate others´ abilities<br>• Take responsibility<br>• Playing it safe<br>• Passiveness<br>• Withhold information<br>• Trust |

### 4.4 Theoretical contribution

The main contribution of this research is presenting the dimension of *worldviews* (subject to soft systems) (Churchman, 1968; Checkland, 2000) to the innovation speed literature (Kessler and Bierly, 2002; Markman et al., 2005; Damanpour and Schneider, 2006; Chen et al., 2010; Milan et al., 2020). As such, the thesis introduce a human-centered understanding of innovation speed, by exploring the "codes" (Luhmann, Baecker et al., 2013; Lies, 2020), *language* (Wittgenstein, 1953; Rhees, 1959) and *sensemaking* (Weick, 1995) of organizational actors on behalf of two different innovation collaboration communities (Lave and Wenger, 1991).

Actor's ability to understand others is understood to be limited to their own world understanding (e.g. language). Moreover, resistance towards change processes derive from own rules (codes). Therefore, the ways actors learn in social relationships or communities (CoP) are based on professional identities regulating focus and practice (Lave and Wenger, 1991) e.g. "codes of valid operation" (Luhmann, Baecker et al., 2013; Lies, 2020). Hence, the mechanisms presented in this thesis represent context specific characteristics and their dynamics, based on the different case communities. Thereupon, as the SSM framework was stated to only being truthful to *one particular worldview* (Rodriguez-Ulloa and Paucar-Caceres, 2005), the thesis enhances understanding of interdisciplinary (context specific) collaboration (Maher, Maher et al., 2018) as well as relationships in

interorganizational systems subject to soft systems (Allen, Colligan et al., 2000). For this reason, I present *a new understanding of soft systems and thus worldviews of importance to innovation speed* from exploring the following additional theoretical elements*: trust, a sense of urgency, defensive routines, and complacency*, perceived as significant for how actors understand (meaning creation) systems (figure 2). In essence, I show possible reasons (preconditions) as well as positive and negative responses perceived as essential to the worldview process and hence innovation speed.

Furthermore, I introduce an extension of the CoP term. CoP is in this way viewed as a type of soft system and thus social practice (Amin and Roberts, 2008) relevant for language and identity development (e.g. learning) among actors sharing a *common innovation purpose* (e.g. innovation community perspectives). However, language in this case is viewed from the concept of worldviews understood from actors' told experience of the systems they are part. The contribution thus involves actor specific ingredients perceived as essential in terms of the dynamics in relation to organizational and interfirm learning (e.g. knowledge creation) for innovation speed. Design Thinking (Mahmoud-Jouini, Midler et al., 2016) is in this regard suggested as a sensemaking tool *(an extension of SSM)* to visualize/pre-experience a situation, enhance awareness and understanding, translate/align language, bringing actors worldviews together (make it easier to reach accommodation) (Checkland, 2000).

For this reason, enhancing insights of the complexities involved (important elements and their connection) with actors´ understanding of the systems they are part, present a novel contribution to our understanding of innovation speed applicable to modern organizations.

### 4.5 Practical contribution

The thesis has contributed with information perceived as valuable for project participants and organizational managers seeking to enhance innovation performance. Applicable to the VALUE project, implications thus relate to industrial outcomes and knowledge of how value may be added to more competitive, engineered aluminum products.

Moreover, the insights are seen as beneficial for organizations such as The Norwegian Research Council when supporting research projects in Norway. Hence, the findings may challenge traditional project beliefs (formal and structural forms of co-operation) that help in the process of finding appropriate project participants.

As the need for innovation speed is high in relation to technological advancements, decision making, change and meeting customer needs (e.g. urgent hospital situations), it places pressure on organizational actors. This is especially true as change require common objectives and commitment on behalf of all involved actors within a system. Successful innovation implementation and acceptance thus requires

managers that know how to connect with their employees, boost creativity, trust, and develop a true sense of urgency among actors. Similarly, there is growing evidence for the value of workplace innovation practices which empower employees and established practices, leading to increased workforce health and engagement (Totterdill, 2015).
As projects often involve actors with divergent preconditions and worldviews (involving language), it may slow down innovation progress. For this reason, my findings provide essential details of the complexities of innovation projects as to how actors make sense of the systems of which they are part. By acquiring a contextual understanding of two different innovation communities, managers may improve their understanding of how actors may respond to change and innovation. Accordingly, the research contributes with various elements of importance to innovation speed, from the context of organizational and interorganizational worldviews.

Equally important, as providing a neutral starting point between actors is seen as important for innovation (e.g. towards accommodation), having asymmetrical worldviews may enhance negative expectations of future events. As actors may be unaware of implicit worldview information on behalf of other actors, being unmindful can result in language inconsistencies, facilitating negative emotions, sensemaking and defensive routines/complacency that are detrimental to the innovation process (biased decisions). Therefore, I suggest Design Thinking as an approach to enhance actors understanding, trust and awareness of own and others´ worldviews (picturing/aligning language). As DT tools are relational propositions (representations) that can enhance creativity and abductive reasoning (Fischer, 2015), I argue that it is an approach to form a common picture of the world and its challenges by reducing fear of failing (Perrow, 1984) from understanding the (project) system (e.g. enhance expectations of feeling heard and supported). As such, DT may be used in the initial stages of e.g. innovation implementation planning or a pre-project to limit negative emotions, expectations, and behavior from taking shape (providing unnecessary time and costs). This may impact individuals to set aside their own assumptions about reality, and/or be more open to acquire insight of other's needs, facilitating thinking and understanding of a particular system/world. Consequently, DT may be used as a proactive way to enhance cooperation under uncertainty by pre-experiencing possible visions/solutions (trigger imagination and thinking from what we do not yet know). For this reason, DT may provide a social environment for dialogue, participation, and project clarity where actors feel heard/understood, supported, and empowered.

### *4.5.1 Limitations and further research*

As the findings from this study derive from two single case studies, the results are context specific, and may be difficult to generalize. Firstly, there may be more and different theoretical elements applicable to worldviews other than language, emotion and sensemaking. As the concept of worldviews was chosen, based on the SSM literature on the background of enhancing innovation speed, other human centered concepts could be chosen subject to soft systems. For example, it could relate to exploring the concept of group identity (Lave and Wenger, 1991; Brown and Duguid, 2000) and cultural attitudes that could be a barrier to finding accommodation (Checkland, 2000).

Further, an emphasis could be placed on the contrast between hard and soft system mechanisms, power relations (Flyvbjerg, 2014) and the impact on collective sensemaking (Weick and Sutcliffe, 2007; Biggs and Preiser, 2019) for innovation speed. As this study found trust, true urgency, complacency, and defensive routines to be predominating factors among actors, these elements are complex and could change depending on actor asked, method used or context. Hence, further research could relate to studying deeper individual characteristics (e.g. psychology) impacting innovation speed placed outside of the boundary of this paper.

Furthermore, as this has been a case study involving in-depth interviews, taking the case forward could involve forms of participatory action research. This may involve further exploration and empirical evidence with regards to using Design Thinking tools within industrial organizational/interorganizational settings in relation to the accuracy/effect of language translation, and impact on collective worldviews (e.g. in relation to accommodation) for innovation speed. In this sense, as there has been limits to what could be achieved in this thesis, acquiring a complete account of the early and late Wittgenstein in relation to language and Design Thinking could be an area for further research.

Equally important, as the context/preconditions and concepts chosen among the cases are different, they may impact the findings in this study. As such it can be challenging to compare cases. However, from my study, I found complacency to be a type of defensive strategy deriving from defensive reasoning/sensemaking. Moreover, trust was found as an important factor for the creation of true urgency. As such, it was possible to find similarities as well as differences as to the way actors made sense and responded within the cases. As organizational structure (traditional vs autonomy) was found to be significant for defensive behavior and innovation speed, there is a need to find the optimal balance of autonomy that hinders defensive/complacent attitudes and behavior from taking shape. To ensure generalization, more similar cases (contexts) need to be investigated. Perhaps, with one of the main emphasis being on the Norwegian Work Life Model,

managers/participants' acknowledgement of co-workers' existence (hard or soft ways of operating a system) and optimal balance of work autonomy.

## 5 Conclusion

This study has explored the complexities of two innovation cases (contexts) to enhance understanding of actors' worldviews for innovation speed. Innovation speed is in this case subject to the pace of innovation progress, in relation to innovation implementation and innovation acceptance of importance to innovation success (e.g. innovation realization and adoption). As previous literature in relation to speed and innovation has mainly emphasized economic and management factors, this study is written in the context of the Norwegian Work Life Model, emphasizing the importance of the human aspect of innovation collaboration. This is based on the notion that in innovation projects, actors often have different preconditions and thus worldviews, where meaning and sensemaking of the organizational system they are part, is limited to the actor's own language (e.g. from mental pictures) and understanding. As such, different system perspectives (worldviews) may provide barriers to innovation speed.

The thesis presents a novel contextual addition to the understanding of actors' worldviews of importance to innovation speed by exploring the elements: *trust, a sense of urgency, defensive routines, and complacency*, perceived as significant for how actors create meaning and respond to innovation and change. For this reason, it suggests a framework with valuable insights applicable to the innovation speed literature, and for those participating, managing, or seeking to arrange innovation projects. Furthermore, in facilitating a space for actors' voice and meaning, Design Thinking is suggested as a human centered approach to create awareness, trust and understanding of worldviews among organizational and interorganizational actors.

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# Paper I

**6 Presentation of the articles**

**6.1 Paper I**

## Studying Design Thinking as a forthcoming source to innovation speed

Christina Marie Mitcheltree; Halvor Holtskog; Geir Ringen

**Abstract**

With complex technology-intense industries follows an ever-increasing need for rapid innovation processes. Yet, innovation speed and the time from idea to product realization can vary and be unpredictable. Design Thinking (DT) is suggested as a key driver to impact the speed of product innovation within product development projects. To understand and aid the road from early ideas and concepts to value-added products, this paper will provide a literature study on how Design Thinking can facilitate improved product innovation performance through innovation speed. The paper seeks to develop an overview of new insight on DT applicability for improved product innovation capability. This is done by identifying components that comprise DT´s innovative ability and appropriateness to product development contexts beyond the early creative phases of product development. As DT emphasize on visualization and re-framing problems, it contributes to enhanced clarity, meaning and confidence in ideas and decisions. DT in this way may impact strategy formulation and speed up complex innovation processes by pre-experiencing future situations.

Keywords: *Design methods, New product development, Innovation, Communication, Visualization*

## 1 Introduction

Design Thinking has increasingly been identified as a creative way to innovation capability. It has mainly been relevant to problem framing and idea generation in the early phases of innovation. However, it is unclear from the literature whether DT is applicable to innovation speed in later stages of product innovation processes, hence overcoming innovation barriers. This study emphasizes on Design Thinking as a forthcoming source to innovation speed. Design Thinking (DT) as a methodology is known as a mindset and a collection of tools to achieve product or service innovation (Liedtka, 2014; Tschimmel, 2012; Carlgren, 2016; Brown, 2008; Meinel et al., 2011). The goal is to analyze research to acquire a greater level of understanding of DT applicability to speed within product development. Speed in this sense is related to looking at the DT conditions in which time may be reduced. Hence, DT tools may enable, or hinder action taken within a project depending on context.

Speed from a process innovation perspective in today's society is interesting as on the one hand, smart manufacturing processes (e.g. industry 4.0) are expected to operate rapidly to create value. However, poorly made decisions and actions may delay the process. Establishing rapid innovation processes that contribute to enhanced performance is thus important.

The purpose of this paper is to address DT´s usefulness as a valid tool to address innovation speed for planned processes in later innovation phases. Hence, the question: How can Design Thinking impact the speed of product innovation performance? The paper concludes that as DT provides a creative way to product and service development, it reveals valuable insights that is applicable to strategy formulation and hence innovation performance in organizations. However, the extent to which capability is generated may rely on the combination of various DT techniques, contextual factors, and whether DT is combined with other methods. Hence, assessing organizational barriers to speed may in combination with DT provide the best output. The paper thus provides a basis for further empirical research and discussion.

## 2 Methodology

This paper has followed Cooper (1986) research stages in conducting a literature review, and involves problem formulation, data collection, data evaluation, analysis and interpretation, and public presentation. Furthermore, the review is classified according to the following characteristics (Cooper, 1988): focus (research outcomes, research methods, theories, practices/applications), goal (integrate/generalize findings, resolve debates, bridge languages across fields, critically analyze previous research, identify issues, explicate a line of argument within a field), perspectives, coverage, organization and audience.

The focus of the review is outcome based, which according to Cooper (1988) is based on findings, summarizing the literature substance and drawing conclusions. For the problem formulation stage, this involves questions guiding the review and inclusion/exclusion criteria. The paper has followed Wallace and Wray (2011, p.153) framework for critical synopses and analyses of multiple literature texts, creating a comparative critical review from completed analyses. From the synopses, associated critical analysis questions were asked.

In relation to the coverage, inclusion/exclusion criteria, and for the data collection stage, Cooper (1988) selection approach of "purposive sample" is taken. Hence, examining only central and pivotal articles within the DT field related to DT´s applicability to innovation speed and efficiency within an organizational setting. DT literature was found to concentrate on the early phases of innovation, largely in relation to idea and concept generation. It was therefore a limited number of articles in the field related to DT where a connection could be made to innovation speed in later phases of product innovation. The literature chosen for analysis has been selected as the top five most relevant within DT literature to address the research question. However, to provide a solid definition of DT as a method and its challenges, other literature has been included in some parts of the review. The literature resulted from keyword searches in the academic databases Wiley and Google Scholar, and the articles chosen for in-depth analysis was chosen based on a publishing range of six years. Wallace and Wray (2011) framework is also used for the data evaluation, data analysis/interpretation and presentation stages (presenting data) of the review. However, as the authors stress that their structure is rather inflexible, there does not need to be one fixed sequence to the analysis. This paper has therefore taken a more flexible approach; drawing on some material from the critical analyses and synopses, but not all of it and not in any fixed sequence. The reason for applying the framework of Wallace and Wray (2011, p.153) is that it provided a good structure to the paper. This is because it created common themes of DT characteristics from comparing central arguments from key articles in the field of DT. Moreover, as the discussion does not go in depth on each DT technique, a categorization of DT characteristics could be made from the literature. Hence, a focus is placed on the three aspects: visual, practical and contextual factors of DT. The choice to divide the discussion into three aspects is based on an identification of similar arguments from within the literature chosen.

## 3 Results

### 3.1 Focus areas

To answer the research question the literature review is divided into six focus areas. The focus areas were selected as the most relevant to answer the research question and were derived from the literature chosen for the analysis:

- The Design Thinking concept
- DT experimentation and visualization
- Tangibility through prototyping
- Collaborative characteristics of DT
- DT and uncertainty
- Mixing methods and DT in later phases

### 3.2 The design thinking concept

Design Thinking (DT) is mentioned as a powerful methodology for innovation that integrates human, business and technological factors in problem forming, solving and design "Design Thinking" (Meinel et al., 2011). It emphasizes on user needs, multidisciplinary collaboration and iterative improvement in producing innovative products, systems and services through rapid prototyping.

One of the first DT process models was of Simon Herbert (1969) and consists of seven phases (define, research, ideate, prototype, choose, implement, and learn) (Simon, 1996). Today, there are a variety of DT models ranging from three to seven phases. However, they all share many of the same principles. For example, DT is described as a structured process of exploration for ill-defined problems (Mahmound-Jouini et al., 2016) and a human centered innovation process that emphasize on observation, collaboration, fast learning, visualization of ideas, rapid concept prototyping, and concurrent business analysis (Lockwood, 2010). Brown (2008) argues that it is a discipline and thought process that aim to use design principles, methods and tools within management and business strategy and that it can be incorporated in all process levels.

As DT started out to improve the process of designing tangible products, it has the potential to improve the management of intangible challenges involved with engaging people with the adoption of new innovative ideas and experiences (Brown and Martin, 2015). Furthermore, as wicked or "ill problems" are addressed of being too difficult to solve with analytical methods (Buchanan, 1992), the DT process as a result, is mentioned as a "co-evolution of solution and problem space" (Cross, 2011). Hence, emphasizing problem setting rather than problem solving. Problem framing, and visualization thus set DT apart from other management concepts (Carlgren, 2016; Liedtka, 2014), in this way impacting company strategies. However, little research exists on strategic contributions of DT on innovative project management on the firm level (Liedtka, 2014).

An important part in the history and thus future of DT is the HPI (Hasso-Plattner-Institute) and Stanford University Design Thinking Research Program. It engages multidisciplinary research teams to investigate the phenomena of the innovation method of DT in technical, business and human aspects and the impact on performance. The DT model of the Hasso-Plattner-Institute of Design at Stanford

represents the common DT process and consist of a series of five major stages: (re) Defining the problem (Emphasize), Needfinding and benchmarking (Define), Brainstorm (Ideate) or Bodystorm (e.g. physically experiencing a situation to create empathy and new ideas when sketching is not adequate), Prototype (Build) and Test (Learn) (Meinel et al., 2011; Weinreich, 2011).

### 3.3 DT experimentation and visualization

The DT approach emphasize on using visual images to impact individual's perception (Tschimmel, 2012). This derives from the understanding that DT tools, due to their visual ability, constitute clarity. Hence, making it easier for individuals within interdisciplinary teams to understand each other better. In this way, DT aid creative and collaborative processes (Tschimmel, 2012).

Seidel and Fixson (2013) mentions three formal methods within DT: Needfinding (embracing a problem definition or opportunity through observation, empathy and user understanding), Brainstorming (a formal framework for ideation), and Prototyping (building models to facilitate the development and selection of concepts). Brainstorming is mentioned as one of the main DT methods and accentuates on experimental approaches. It relates to a group process applying techniques that promote the search for new solutions. Hence, creating a structured environment to build on team members' ideas (Seidel and Fixson, 2013). Tschimmel (2012) argues that the method of brainstorming from a DT perspective can be classified into the variants "Brainwriting" and "Brainsketching". Hence, connecting brainstorming to collective processes where visual artifacts such as Post-it's are used. Predominance of verbal communication and presentation of thoughts out loud may from more classical ways of brainstorming be replaced by rapid visualization of ideas through drawings. This help with thinking more intuitive and flexible, assisting organization and categorization of ideas (Tschimmel, 2012). Seidel and Fixson (2013) studied high and low performing novice multidisciplinary student teams within the concept generation and concept selection phases of a product innovation project. Here, they found that brainstorming as a tool for needfinding, proved to be useful to promote the search for new solutions that would be hard through individual ideation. Moreover, brainstorming can be used as a tool to solve concept related challenges. However, in their study they found limits to brainstorming effectiveness, as less successful teams had more brainstorming sessions on average and were spending brainstorming sessions in unproductive ways. As increased brainstorming sessions impact team effectiveness negatively, the authors did not know whether an increased number of brainstorming sessions was due to having difficulties with practicing it or not. Moreover, type of assignment, phase of development and team composition was argued to impact brainstorming efficiency. Nevertheless, ensuring sufficient guidance of using design methods within organizations is thus suggested (Seidel and Fixson, 2013).

As brainstorming could lead to better solutions towards concept realization, it may provide challenges in terms of conflict and debate (Seidel and Fixson, 2013). Conflict in this sense is connected to communication in innovation projects consisting of members from a range of disciplines with various perspectives. Teams thus need to find forms of communication for efficient task work (save time). However, such ways of communication with the use of DT methods may not be explicitly covered (Seidel and Fixson, 2013). The authors distinguish between process, task and relationship conflict, where task conflict can affect team performance positively. However, for relationship conflict, the opposite was true. The various terms of conflicts are not explained, but the authors refer to Jehn et al.'s (2008) definition of conflict is not related to DT. Here, task conflict is related to conflict over the content or goal of the task. Relationship conflicts are described as disagreements and incompatibilities among group members regarding personal issues that are not task-related. Process conflict however, is described as disagreements about logistical and delegation issues such as how task accomplishment should proceed in the work unit, who's responsible for what, and how things should be delegated. Seidel and Fixson (2013) focuses attention on the process aspect, relating process conflict to the process of brainstorming. Here, conflict may develop due to teams shifting concepts by replacing various elements in response to newly arrived information. Conflict (understood as disagreement) regarding establishing a concept and the process to follow may also result in debates about later changes (Seidel and Fixson, 2013). Liedtka (2014) studied decision maker cognitive bias as a challenge for innovation. The first bias category consists of the following factors:

- Overestimation of a possible future experience of an event and it being similar to a current experience (projection bias)
- Personal preferences (egocentric empathy gap)
- Decision-makers' present state impact their assessment of an idea, resulting in under- or overvaluing ideas (hot/cold gap)
- Overreacting to specific stimuli and ignoring others (focusing illusion)

To address the projection bias, the researcher suggests developing perspective taking skills (understanding and adopting viewpoints of others) as well as the ability to imagine others´ experiences. The author mentions ethnography as a need finding tool to understand others´ past, perspectives, preferences and emotional state. This resembles Seidel and Fixson (2013) need finding method, however, to understand users´ current situation and needs to create solutions, Liedtka (2014) suggest Job-to-be done analysis as a tool. This tool asks customers what they aim to accomplish in a relevant situation, asking them to rethink an experience, describing their thoughts, reactions, and satisfaction in every step. Hence, facilitating identification of needs

not easily articulated. Being part of the user experience will make decision makers less likely to solely look at their own past experiences as the source of new ideas (projection bias), nor focus on their present state when assessing ideas (hot/cold gap). This thus fosters more valuable ideas and a wider attention focus (Liedtka, 2014). Visualization methods like storytelling or creating metaphors or analogies through imagery (visual or narrative) on Post-it notes, or whiteboards increase imaginative abilities (Liedtka, 2014). The author argues that storytelling rather than presenting data encourage decision makers to attend and make sense of data that would otherwise be missed. Combined with ethnography, it thus improves the degree of novelty and value of generated ideas due to a focus on details in the lives of those they seek to create value. Moreover, the author argues that metaphors can guide future decisions from making sense of past and present experiences. This thus reduces reliance on the past (projection bias), widening vision (avoid focus illusion), thus recognizing various preferences to create novel and valuable ideas (empathy gap).

Carlgren (2016) looks at the DIA (Discovery-Incubation-Acceleration) framework of O'Connor and Ayers (2005) for describing innovation competencies for including the whole innovation process, not just the early stages. The framework is used as a guide for the DT method. The Discovery phase (exploration) involves user research, ethnography/video-ethnography, interviews, journey-mapping, analogies (studying similar problems but in different contexts) and digital journaling (documenting and submitting daily experiences through digital videos and text) (Carlgren, 2016). By using visual tools in interviews like covering large walls with photos, drawings, Post-its and transcripts to better frame the problem, the author stresses that deeper insights can be retrieved through reframing problems and articulation of initial ideas, thus creating meaning.

Other verbal and visual tools used in DT are the Mind map and Storyboard (Tschimmel, 2012). The Mind map consists of keywords that can be associated with other words and images to gather ideas and information. It consists of labeled twigs and branches, which represents relationships. A Storyboard on the other hand, consists of a set of images or Post it´s (drawings, illustrations or photographs), shown to visualize a process or service. It is helpful in relation to elaborate a concept or testing users' interactions with a new product, service, or business model.

### 3.4 Tangibility through prototyping

Tschimmel (2012) claims that DT may be used for visualizing and testing new solutions. As acceptance of failure and mistakes are significant factors of DT, rapid prototyping with cheap materials can permit early failure. Having to cope with incomplete information and unpredictability is thus preparing designers to tackle uncertainty. Hence, DT facilitates proactiveness, drives out fear and creates a tolerance for trying and failing (Tschimmel, 2012). In contrast to using prototyping

to validate an idea, Seidel and Fixson (2013) argues for prototyping being especially in the earliest phases of product development, a method to stimulate the imagination. This was valuable in relation to both the concept generation and selection phase. Liedtka (2014) however, suggest using prototyping tools to improve customers' ability to identify and assess their own needs. Prototyping techniques thus helps making abstract ideas tangible as well as create "vivid manifestations" of the future though accurate feedback. Prototyping can in this way reduce a "say/do gap" by enabling customers/users to accurately describe their needs, making it easier to develop value-creating ideas for them. A say/do gap is described as a difficulty in articulating future needs as well as giving feedback on new ideas. This therefore limits decision makers in creating valuable ideas for their users (Liedtka, 2014). This is similar to Mahmound-Jouini et al. (2016) claim of using rapid prototyping to create demonstrators that enables effective dialogue and understanding to reveal unstated needs and expectations of stakeholders.

To get the most out of workshops, Tschimmel (2012) states that team members can prepare analogous examples and personas (fictive persons) from user research. This thus helps to develop ideas on small cards for how a possible technology could be useful. Personas is also mentioned to be used as a tool for understanding end user's problems and perspectives by exemplifying a personal idea of users. Additionally, the author suggests an Empathy Map to visualize the information acquired from Personas and/or through observation and interviews. Carlgren (2016) emphasize on acquiring valuable feedback from users beyond asking questions. Team members can thus be encouraged to give feedback through spontaneous prototyping and brainstorming in relation to different idea cards. Hence, adding on Post it´s with text and images as well as role-playing specific situations. This thus contributes to development and clarity of solutions through constructive dialogue and activity.

### 3.5 Collaborative characteristics of DT

DT tools are essential to enable designers to inquire about future situations or solutions to a problem (Tschimmel, 2012). In this way, the DT managers' techniques differ from the traditional managers, in that traditional managers mainly use verbal communication, diagrams and tables. In contrast, DT tools quicken and facilitate thinking processes through visualization of collected information about a project. Mahmound-Jouini et al. (2016) mention DT as having three perspectives: cognitive (creative/explorative activity of design), organizational perspective (stakeholders involved in the design process) and strategic perspective (the strategic process of organizations and managerial capability). They address the importance of identifying and involving relevant stakeholders in the upstream phase of complex and uncertain projects to avoid drifts of projects. Developing empathy as well as using DT tools like visualization, ethnographic approaches, journey mapping and personae

characterization, help players better imagine and apprehend experiences of stakeholders. Hence, mitigating the "say/do gap" mentioned by Liedtka (2014).

### 3.6 DT and uncertainty

Mahmound-Jouini et al. (2016) argues that as organizational decisions involve uncertainty and ambiguity, DT can be a benefit for intermediate organizational problems as analytical thinking is not enough for messy and ill structured situations. The authors argue that as DT tools support deep data collection (understood as user related insights) and idea generation, it is an effective way to frontload problem and risk detection. To reduce uncertainty, learning, knowledge acquisition and identification through hypothesis articulation and experimentation is thus crucial (Mahmound-Jouini et al., 2016). Liedtka (2014) category three bias relates to flaws in decision-makers' hypothesis testing abilities. It may relate to the context of product innovation uncertainty as it involves over optimism (the planning fallacy), inability to see disconfirming data (hypothesis confirmation bias), attachment to early solutions (endowment effect), or preference for the easily imagined (availability bias). By prototyping, in this way experience ideas based on user's feedback, may thus reduce availability bias by helping innovators as well as customers to imagine novel ideas more easily (Liedtka, 2014). Moreover, experiencing failure in advance through prototyping, where a focus is put on potential future failure factors, may impact people to put more effort in the task by being mentally prepared. By experiencing products or services in advance and evaluating multiple hypothesis (Optionality), it is possible to provide several predictions and options for the future. Moreover, it is possible to describe expectancies, individual assumptions with new ideas, and identify what the data that supported or nullified the assumptions might look like (Liedtka, 2014). Nonetheless, it makes way for reflection of experiments (success/failure) improving future performance (Liedtka, 2014).

### 3.7 Mixing methods and DT in later phases

Seidel and Fixson (2013) states that successful teams combine methods, such that it is not the quantity of brainstorming sessions but their linkage to other methods (formal and informal practices) that matter. Group or team reflexivity refers to the degree to which individuals collectively reflect upon their actions and processes (Seidel and Fixson, 2013). Team reflexive practices such as reflecting and debating over ideas, processes and changes in combination with brainstorming and/or prototyping is mentioned to increase team performance. Reflective practices that constitute reflection and debate may therefore enable or constrain conflict. Conflict in this way may thus be understood as a result of not being able to communicate through reflective practices in a manner that substantiates DTs solutionfocused thinking. However, continuing to question ideas or a process from the concept

generation to the selection phase showed itself to be inefficient (Seidel and Fixson, 2013). The authors thus suggest moving from reflexive to less reflexive behavior in the concept selection phase.

Liedtka (2014) mentions mixing DT with other literature; (team learning) and positive affects as to why DT works. Additionally, Carlgren (2016) stresses mixing methods, however she questions DT´s perception that innovations involving complexity are difficult to fit in a measurement culture. The term measurement culture is not explained. However, analytical and number driven cultures are mentioned to involve professionals accustomed to evidence-based facts. In this way challenges may relate to DT principles and mindsets clashing with organizational culture and being a misfit with existing organizational processes and structures (Carlgren, 2016).

There is limited evidence on how outcomes of DT are measured, as DT is hard to measure as a single concept (Schmiedgen et al., 2015; Liedtka, 2017). Mentioned measurements that could relate to speed are: "Immediate results" (e.g. number of implemented projects based on DT sessions), and "Working culture" (e.g. Impact of DT within the organization measured by motivation, effectiveness, engagement and team collaboration) (Schmiedgen et al., 2015). However, traceable success stories in contrast to quantitative measurements may provide context and case-specific measurements showing a more realistic impact of the role of DT (Schmiedgen et al., 2015).

As DT seems to work as a standalone process to come up with concepts, it is used more as a support in later stages. In an organizational setting, DT is missing important functions to work as a "stand-alone end-to-end" innovation process. Mixing methods could therefore provide more value to new concepts. Tschimmel (2012) adds to this argument, stating that as innovation processes usually follow some kind of road map (Stage-Gate model etc.) managers could gradually introduce DT tools into existing stages of their innovation process. When studying DT in the Acceleration (exploitation) phase of innovation Carlgren (2016) states that engaging potential users through storytelling can be used to deliver a message, create recognition and show a need for change. In contrast to pushing technical information on users, DT involves storytelling, role-play, prototyping and human centric approaches that create an arena for users to experience needs and potential benefits. As previous literature emphasizes on visual and material practices dominating in the front end of innovation, the results from Carlgren (2016) study shows that DT practices plays a significant role also in the back-end.

## 4 Discussion

To understand how DT may impact innovation speed, it has been relevant to gain insight into DTs main traits and usage. For the discussion part, it has been important

to gain further insight and clarity on how DT may impact innovation speed specifically. Hence, common DT characteristics from the analysis have been categorized into three groups: visual, practical and contextual factors of DT.

### 4.1 Visual factors

DT is mentioned as a valuable method for visualization of ideas. Brainstorming through brainwriting and brainsketching is mentioned as variants of brainstorming to facilitate this. Since the authors' choice of DT techniques varies in terms of choice and purpose, it shows a variety of ways in which DT can be used.

As actors thought processes and routines might vary, DT techniques may reduce time spent to explain various concepts for other actors in a team setting, as well as reduce disagreements, which can delay the innovation process. Hence, increasing speed and gaining process flow might be acquired due to a deeper understanding and clarity between members within the process. Moreover, a more visual in contrast to verbal fashion of brainstorming representation of ideas, may reduce barriers related to not feeling comfortable with presenting thoughts. In this way, including more members to participate in the process may enhance innovation efficiency.

Reducing misunderstanding and creating meaning for other team members as to why something should be done is argued to facilitate empathy. Whether a product development setting involves end users or not, cultivating empathy from understanding may make it easier to reach agreements and continue with an idea. In this way, it may reduce unnecessary time spent on product development related discussions or disagreements. Being heard and understood may also result in higher levels of motivation within the project. Hence, impacting efforts and the amount of time and work spent towards the innovation positively. However, involving all members and their interests is essential, as having some team members dominating the process may result in some lacking behind or not feeling included. In a situation involving the end user, a cultivation of empathy through understanding might also generate knowledge that make it easier for a product development team to get the right picture of what is needed and why. Hence, desired products may be created by avoiding unnecessary time and irrelevant resources and activity spent in the process. As DT involves co-creation, it may in this way be collectively reinforcing innovation capability, impacting speed within an organizational team setting.

As little research exists on strategic contributions of DT on innovative project management (Liedtka, 2014), DT might not only create value for the end user but for the organization as a whole. This is because as DT is thought to increase imaginative abilities and make sense of data that would otherwise be missed, it has an ability to show and capture details about individuals or their unique ideas. DT in this way may be used as a strategy to save time by revealing how valuable (or not) a partner is to contribute to a project. By knowing what needs, resources, or activity a potential partner might have for the product development, DT might assess future

conflict potential, inconsistencies and improvement areas as well as limit unnecessary time or resources spent in finding appropriate candidates. In this way, it may reduce uncertainty and risk associated with prioritizing various actors for the development process. Since brainstorming was argued by Seidel and Fixson (2013) to cause debates and in some cases conflict, and as more brainstorming could impact team effectiveness negatively, it may be a barrier to the speed of innovation. However, this issue is unclear due to the study being performed on student teams. It might thus be necessary to experiment with context (e.g. within industry and type of conflict) to find the best-suited amount of brainstorming and/or prototyping iterations to increase speed of product innovation capability.

### 4.2 Practical factors

Brainstorming focus on visualization of ideas for innovation and involves several visual idea generation techniques. Prototyping however, is the execution of these ideas into whole artifacts or personas which make it easier to see an idea or concept. Testing solutions through rapid prototyping and failing early facilitates actor experience and knowledge. Being able to frame challenges and seeing what is to come therefore limits the chances of using time on creating inconclusive products, instead improving product accuracy from realistic input. However, reflecting a realistic product might in some cases require more expensive quality materials. The question of whether or not it pays off to prototype rather than create a final product thus becomes relevant. Furthermore, prototyping is said to drive out fear for failing as well as for the unknown. As fear could be one way to hinder innovation speed, DT could be a proactive way of building confidence through chaos; seeing novel ideas for the future through artifacts/personas. Hence, pre-experiencing solutions might save time, as obstacles can be hindered from taking shape.

Since prototyping emphasize on involvement and co-creation, it is argued to make way for understanding and quick communication in real time, which may speed up the process. A critical aspect is thus to avoid drifting of projects due to not being able to participate in the same space at the same time. Hence, being involved throughout the development process (e.g. digital journaling) may enhance involvement and knowledge flow, thus impacting innovation time positively.

Being part of someone's experience is argued to give rise to new ideas and perspectives, reducing reliance on past ideas or a present state of mind. Hence, hindering innovation creativity. By practicing DT, new information and combination of ideas may contribute to inspiration and imagination. In this way, DT tools may speed up the time it takes (e.g. process) to create any radical innovation, as well as impact the amount of innovations generated within a specific timeline. Hence, outcomes of DT on innovation speed may (similarly to "immediate results" and "working culture") be related to measuring the number of innovations and time used for its creation in various contexts. Additionally, behavioral characteristics (e.g. fear,

motivation, empathy, engagement, team collaboration) should be measured together with the use of various DT tools. This may thus give an increased understanding of which DT tools and contexts leads to positive or negative outcomes related to speed. However, as events and behavior may change in time, tracing case-specific measurements may reduce risk and provide confidence in the positive impact of DT for speed.

DT is mentioned as a structured process to explore ill-defined problems (Mahmound-Jouini et al., 2016). In this way, DT tools may contribute to optimization of existing products or solving challenges within a team setting through understanding. However, by being able to view a situation or challenge from various points of view, facilitating clarity, meaning and empathy, it not only provides valuable input for product innovation but also facilitates a positive team dynamics, motivation and collaboration to be able to do so. Consequently, DT might be used as a method to create understanding and better co-operation as well as provide flexible thinking and imaginative abilities that help in thinking and acting more proactively. Hence, facilitating innovation within various stages of innovation as well as enhance company strategies for optimal innovative capability. In this way, impacting innovation speed through efficient innovation process flows.

As DT tool combinations may vary from project to project depending on the context, future research could focus on DT tools and their characterization from importance of a particular project. Hence, certain DT tools might not be necessary, and could save time in some cases. DT is thus understood as a process consisting of a series of "steps" with DT tools (which may vary) that facilitates action in order to speed up the innovation. Moreover, as being mindful of various hindrances to speed on team level is essential to speed up the innovation process, there is a need for empirical evidence on particular barriers to innovation to increase understanding of optimal utilization of DT in various situations.

### 4.3 Contextual factors

Factors that impact the value of DT can be seen as contextual factors. For this purpose, increasing the value of DTs usefulness to innovation speed is essential. Mixing methods or theory is thus mentioned as ways to do this. Looking at Carlgren (2016) study, as DT alone was not sufficient in later stages of innovation projects, it should be complemented with methods that suit the particular organization better. However, whether a mix will impact innovation speed, is not clear. What method combination generates the most efficient outcomes in terms of innovation speed, between which actors, based on situation and innovation phase thus remains to be investigated.

Impacting innovation speed within an organizational setting involves convincing its users of its value to be able to make way for a more rapid innovation pace. As DT workshops can visualize how products or methods may work or develop in various

environments, it might provide employees with confidence of its value, thus improving perceptions. Traditional organizational cultures and perceptions might in this way be changed due to DTs ability to anticipate positive or negative situations. Hence, impacting employee's perception of DT in organizations, impacting weak design cultures and the need for process control. However, as resources to facilitate the competence of DT might be an issue, pre-experiencing its value to innovation speed could be advantageous.

Reflection and debate in connection with formal methods of DT (e.g. brainstorming) were argued to impact team performance. However, the results varied between innovation phases. Hence, there is a need to experiment with finding the right amount and timing for reflection and debate in connection to the various innovation phases and DT tools used in the process. Moreover, there is a need to look into forms of communication and various types of conflicts within a DT context and its connection to innovation performance. As such, reflection, debate and types of conflict as a result of practicing DT may impact speed negatively. Having experienced professionals to guide the process may thus be the best way to facilitate positive group dynamics and innovation efficiency.

As DT stress solution focused behavior, it is dependent on positive group states. Constructing a DT environment, which aims to facilitate understanding and openness to experimentation and individual ideas, may in this way inhibit chances of the process spiraling out of control. Moreover, if process conflicts (understood as disagreements), are understood to be acceptable within a DT context, it may create a positive cooperative environment. Consequently, facilitating enhanced communication and innovation within cross-disciplinary contexts.

## 5 Conclusion

This paper has given valuable insights as to how Design Thinking as a method may impact the speed (positively or negatively) of product innovation for complex technology-intense industries. The paper gives answers on the purpose, importance and challenges of visual, practical and contextual factors of DT that may apply to strategy formulation and increase (or decrease) innovation process flow. Hence, a framework is made from the main DT insights derived from the discussion. As innovation involves uncertainty and risk, fear among other barriers will have hindering effects on innovation performance. Capturing these barriers as well as being aware of DT tools and context is therefore essential in providing knowledge that build trust and confidence in new ideas. As DT emphasis on re-framing problems and gaining feedback from users or employees in a visual as well as practical way, degree of innovation capability can be decided from the creation of knowledge, understanding, meaning and empathy. However, an important prerequisite for success is taking into account the specific organizational context and

the way DT is combined and implemented. In this way DT may be a sustainable way for organizations of the future to facilitate process and development opportunities beyond the initial creative phases of product development.

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# Paper II

**6.2 Paper II**

## Enhancing innovation speed through trust: a case study on reframing employee defensive routines

Christina Marie Mitcheltree

**Abstract**

Trust in organizations plays an essential role for efficient innovation implementation. However, trust between managers and employees is under-communicated in relation to innovation speed. Innovation speed is related to innovation adoption, concerning new ways of performing laboratory services within the health sector. The purpose of this case study is to investigate how trust mechanisms may enhance innovation speed by reducing employee decisions to perform defensive routines. The focus is related to trust as a social condition for enhancing innovation acceptance in the context of management and organizing styles subject to the Norwegian Work Life Model.

The study found that a lack of employee participation and involvement may result in emotional tension, a sense of uncertainty, disconnect, and various defensive mechanisms towards management and the innovation. Consequently, employees' attention, loyalty, and responsibility might be redirected away from the innovation.

Keywords: *Trust, Innovation speed, Innovation adoption, Organizational innovation, Defensive routines, Health care, Case study*

## 1 Introduction

Organizational innovation and change are significant for hospitals to maintain and enhance the quality of the health service offer at their laboratories. However, innovation adoption relies on managers' ability to generate trusting relationships with their employees. This derives from the notion that being involved and considered in innovation decisions may limit defensive reactions to new ways of performing laboratory service tasks. Although this may be true, multi-location organizations with complex organizational structures may make dialogue between managers and employees more difficult to achieve. In the light of this, the paper emphasizes various trust mechanisms, and their ability to reduce defensive reasoning and strategies in relation to innovation implementation in complex organizations. The paper is written within the context of the Norwegian Work Life Model. Consequently, we emphasize key elements that may enhance the pace of innovation adoption within this context.

For innovation purposes, trust is stated as "an expectancy of reasonable and positive reactions by others in response to individual innovation attempts" (Clegg, Unsworth, Epitropaki, and Parker, 2002). Hence, as innovation involves risk and effort, innovation engagement may result either from an expectation of a positive response, from believing that suggestions will be heard, or from acquiring innovation benefits (Clegg et al., 2002). However, due to disciplinary differences, there is no collective confirmed operationalization of trust (Clegg et al., 2002).
Individuals naturally resist change (Lynn & Seth, 2008). Moreover, the speed at which an organization adopts an innovation relies on innovation characteristics and contextual factors (Webb & Pettigrew, 1999). The context thus depends on individual characteristics, the nature of the industry, stage, and type of innovation. Nevertheless, an institutional perspective of adoption is argued to be socially deterministic and involves managerial action (e.g. quality of leadership), human resources, and skills (Webb & Pettigrew, 1999). An underutilization of knowledge or ideas from, for example, employees of lower rungs of the hierarchy in the innovation elaboration process (e.g. participation) may thus act as a barrier to organizational value creation (e.g. organizational products and processes) (Yang & Konrad, 2011). Therefore, organizational defensive reasoning and defensive strategies involve avoidance, preventing organizational learning and capability (Argyris, 1986). Accordingly, it may be a barrier to change (in this case innovation speed) (Riley, Cudney, & Long, 2013). Since negative emotions should be avoided, there is a need for answers to effective ways that facilitate trust, caring, and commitment in organizations (Argyris, 2004). Moreover, what processes facilitate innovation adoption, and what characterizes innovative organizations, has not been answered properly (Damanpour & Schneider, 2006).

For this reason, the purpose of this paper is to examine the concept of emotion (main emphasis on emotional tension), defensive routines, and trust to understand *how trust may impact innovation speed.* A focus is placed on how trust may provide valuable and enhanced insight for multi-location organizations within complex organizational structures facing organizational innovation and change. The paper is based on a case study related to a hospital and its laboratory service. It is the result of an investigation done during a 3-month placement at the hospital to *seek understanding* of workers' experiences with change and organizational innovation. Addressing innovation speed is related to understanding barriers to innovation, in this case emotional tension and defensive behavior, and how trust mechanisms on behalf of the laboratory employees may enhance innovation adoption in this context.

To facilitate understanding of the innovation situation, the paper starts with an explanation of the paper context. The paper does not go into depth on the Norwegian Work Life Model but seeks to gain an *understanding* of the way the hospital has organized the innovation and the consequences for employees. Second, to be able to recognize the pace of employee innovation adoption within the hospital division, the concept of organizational innovation, innovation adoption, and innovation speed is described. Hence, to know what might enable or hinder employee innovation adoption, different barriers and enablers to innovation speed are addressed. Subject to barriers to innovation speed is the concept of defensive routines. This concept is explained from emotional tension and defensive reasoning/strategies on behalf of the employees within the hospital. This behavior is understood to slow down the pace of innovation adoption (barrier to innovation), hindering organizational innovation success. Hence, for innovation adoption, we argue that negative emotions (emotional tension) and defensive routines should not occur. This requires that trust and positive emotions must be present (see Fig. 1). Following the literature review comes an introduction to the hospital case, an explanation of the method used, and a combined "Results and discussion" section. Finally, practical implications, limitations and further research, policy implications, and a conclusion are made.

### 1.1 Context

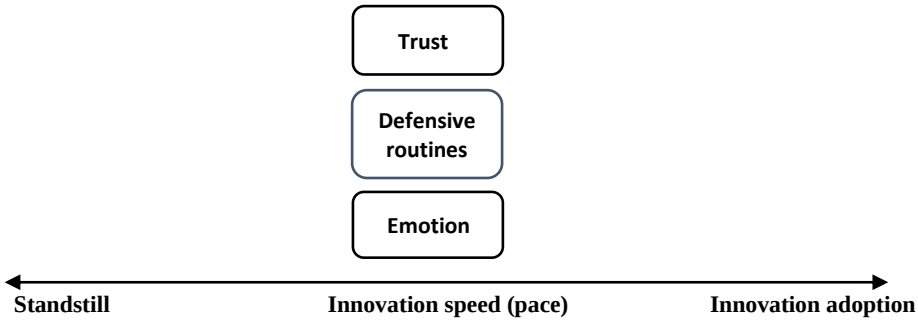
The Norwegian Work Life Model involves good working conditions between managers and employees where participation is a key factor (Ingvaldsen, Rolfsen, & Finsrud, 2012). The model contributes to a power balance between manager and employee, where co-determination for employees to plan and carry out their own working day ensures decision-making influence, involvement, and commitment. The model has thus resulted in a high level of trust between employees and management (Ingvaldsen et al., 2012). Innovation and efficiency are in this sense based on employees' rights and opportunities to take responsibility. This contrasts with other work organization styles, e.g. scientific management, where competition and the

ability to innovate were characterized by a focus on economic efficiency (Levin, 2012).
As there are complexities involved regarding employee motivation and managing improvement and progress in organizations, the following "Literature review" section seeks to highlight important aspects for employee innovation adoption.

## 2 Literature review

In this section, a theoretical framework is provided to understand how trust may enhance innovation speed towards innovation adoption. The theoretical framework is structured as shown in Fig. 1. Figure 1 displays a *speed line* measuring *innovation speed* (pace). A high level of innovation speed leads to *innovation adoption*, whereas a low level results in a state of *standstill*. The process is as such a dichotomy and understood as continuous. To achieve a high pace (innovation speed) of innovation adoption, we argue that there are mainly three factors that need to be considered: *emotion, defensive routines,* and *trust.*

*Figure 1. Innovation speed line with contributing factors for innovation adoption*




*Emotion* may be directed two ways (either towards standstill or innovation adoption) depending on different variables. *Defensive routines* will in this case only be directed one way as they are understood to reduce innovation speed. *Trust* may be directed both ways. The movement either from left to right on the speed line is thus dependent on these three factors. Consequently, for innovation adoption to occur, *emotion* should be at a positive level, *defensive routines* should be avoided, and *trust* needs to be present. Trust and defensive routines are in this way discussed as two opposites towards innovation adoption: a higher level of trust reduces emotional tension, which reduces defensive routines and thus enhances innovation adoption pace. In effect, trust acts as a countermeasure (overrules) for emotional tension and defensive routines. In contrast, a lack of trust facilitates a sense of disconnect which may enable emotional tension and defensive routines towards the innovation, consequently reducing innovation adoption pace.

As a high level of innovation speed is understood to impact innovation adoption in this case, we acknowledge that a low or standstill level of innovation speed may be necessary in some instances for change to take place. Moreover, there exist difficulties with changing all variables impacting innovation adoption at once. For an elaborated version of Fig. 1 showing contributing variables to innovation speed as well as the connection between emotion, defensive routines, and trust, see Fig. 3.

## 2.1 Theoretical framework to understand innovation speed

### *2.1.1 Organizational innovation, innovation speed, and adoption*

Organizational innovation is described as "a new or significantly improved knowledge management system implemented to better use or exchange information, knowledge, and skills within the firm" (Sapprasert & Clausen, 2012). Organizational innovation may be subject to the *adoption* of any type of novelty in an organization. Innovation speed may be looked upon as "the time elapsed between (a) initial development, including the conception and definition of an innovation, and (b) ultimate commercialization, which is the introduction of a new product into the marketplace" (Kessler & Chakrabarti, 1996; Murmann, 1994). Hence, innovation speed involves the stimulating activities performed between initial ideas and the final product and is significant to create and sustain competitive advantage (Kessler & Chakrabarti, 1996). Innovation thus involves carrying *the occurrence* into practice (implemented or institutionalized) (Van de Ven, 1986). From an organizational point of view, innovation speed is associated with successful change by acquiring a *true sense of urgency* among a large enough group of people (avoiding negative emotions and complacent behavior) (Kotter, 2008). Innovation speed is as such dynamic and may vary according to various factors. Decision involvement is argued to make it easier for commitment and acceptance (Vennix, Akkermans, & Rouwette, 1996), as well as facilitate a sense of dignity, community, and meaning (Weisbord, 1987). When introducing a new solution, Romme (2003) argues that involvement and participation should be done from the start for those who will carry out a new solution. Therefore, ignoring input from others (associated with traditional methods) can lead to a sense of uneasiness and a lack of trust (StachowiczStanusch, Amann, & Mangia, 2017).

For the purpose of the hospital case, an emphasis is placed on organizational innovation (e.g. the new instruments and way of performing blood tests analysis), and the mechanisms in place (trust and defensive routines) which may enhance or hinder innovation adaption, adoption, and realization. Innovation speed in this case relates to the pace of innovation adoption which may impact the overall efficiency of the innovation implementation. Thereupon, organizational innovation relates to the new laboratory service situation, the degree of employee participation/involvement, and thus the pace of innovation adoption.

The next section will address some important barriers to innovation by looking at defensive responses from emotion and thus emotional tension.

### *2.1.2 Emotional tension and defensive routines*

Organizational changes might facilitate challenges regarding social structures and relationships (hindering innovation). Earlier studies addressing defensive routines in organizations (e.g. Whyte, 1949) on social structures of restaurants are important examples of how activity coordination is essential in connection with business growth. Emotional balance between employees may thus be provided from compensation; with an increase in one activity, one needs to decrease activity for the employee in other areas (Whyte, 1949). Furthermore, behavior from emotional tension is addressed in Donald's (1959) study on a group of machine operators.

More recent views on defensive routines have been related to organizational theories of action, and how these theories may hinder or contribute to learning in organizations (Argyris & Schön, 1974; Argyris & Schön, 1996). Defensive routines from this view are described as "thoughts and actions used to protect individuals', groups', and organizations' usual way of dealing with reality" (Argyris, 1985). It involves defensive reasoning and action strategies that seek to avoid embarrassment or threats (Argyris, 1991; Argyris, 2002). Defensive reasoning is about thought processes and cognitive rules that facilitate action (Argyris, 1991; Argyris, 2002).

Defensive routines have been described in various ways. For example, it may involve mixed messages (inconsistency) (Argyris, 1986), self-censorship (e.g. silence), and performing unilateral control through defensive reasoning approaches (Argyris, Putnam, & Smith, 1985). Defensive silence has been mentioned as deriving from fear of personal losses from speaking up (Dyne, Ang, & Botero, 2003). This is especially true for organizations where managers have given signs of not being interested in input from lower levels within the organization (Dyne et al., 2003; Hornstein, 1986). In the light of this, rational self-interest-seeking behavior is stated to derive in contexts where actors are detached from everyday routines (Bachmann & Zaheer, 2008). As separated activity/focus and lack of dialogue are associated with challenging social environments, facilitating dialogue and frictionless "cooler" environments may refocus group attention and attention towards the "living social processes that sustain them" (Bohm & Nichol, 1996; Fulmer & Keys, 1998).

Being accountable is mentioned as both an enabler and a barrier to organizational learning (Schillemans & Smulders, 2015). From this view, organizational learning and institutional accountability arrangements impact relationships (e.g. between an actor held to account and a forum holding the actor accountable). For instance, individuals tend to judge and make decisions based on accountability anticipation, e.g. *expectations* of having to justify feelings or beliefs to others (Lerner & Tetlock, 1999; Schillemans & Smulders, 2015). In effect, the threat of being accountable may

enhance *self-criticism* and *defensive bolstering* (e.g. justifying positions to which one feels committed) (Schillemans & Smulders, 2015; Tetlock, Skitka, & Boettger, 1989). Nevertheless, conditions for learning relate to management structure (macro-level) and self-criticism from an actor's anticipation of being accountable.

The decision to trust is understood to derive from reasoning (Argyris & Schön, 1996). As a result, defensive reasoning may hinder innovation speed. For this purpose, an emphasis is placed on employee experiences, and what may constitute defensive reasoning and strategies from an organizational perspective. To enhance the pace of innovation adoption by reducing defensive routines, the next section will introduce the concept of trust.

### *2.1.3 Different perspectives on trust*

Gambetta (1988) explains trust as "the probability that he will perform an action that is beneficial or at least not detrimental to us is high enough for us to consider engaging in some form of co-operation with him." Bradach and Eccles (1989) describe it as a form of expectation that limits the risk of an exchange partner acting opportunistically. Similarly, trust is argued to guard against opportunistic behavior by "encouraging individuals to suspend judgment of others" (McEvily, Perrone, & Zaheer, 2003). It has thus been defined as mutual confidence that actors within an exchange will not exploit others' vulnerabilities (Sabel, 1993). In this way, it is the perceived likelihood of another actor not operating in a self-centered manner (Madhok, 2006).

Trust is argued to influence "the density, multiplexity, stability, and non-redundancy of social structure." In this view, *delayed reciprocity* is mentioned (McEvily et al., 2003). Delayed reciprocity and stability are about trust, explained to facilitate expectation of balance in future relationship exchanges (serial equity). This then minimizes the need for value or compensation coherence in single exchanges (enhances ability to manage uncertainty) (McEvily et al., 2003).

### *2.1.4 Different dimensions of trust*

Interpersonal trust is argued to involve two dimensions: cognitive and affective factors (Chae, 2016; McAllister, 1995). As cognition-based trust is about perceived expertise (confidence in others ability) and reliability of a partner (e.g. track record and reputation), affective-based trust involves emotional bonds (e.g. concern, caring, and faith in the trustworthy intentions of others) (Chua, Morris, & Mor, 2012). Hence, the type of trust provides different outcomes (e.g. variables) (Chua et al., 2012; McAllister, 1995). Context is critical to understand trust, and various forms of trust may be mixed based on the situation. Therefore, conceptualizing trust in one form within a relationship is critical, as it may miss the rich diversity of trust in organizational settings (Rousseau, Sitkin, Burt, & Camerer, 1998). Recognizing that

different relationships have various variations of trust, which may vary in terms of degree and setting, is thus important. This paper seeks to provide a contextual description (case) of trust, discussing the implications of trust for innovation speed within organizations. In addition to a contextual definition of trust, the paper emphasizes an affect-based notion of trust between managers and employees. However, an emphasis is placed on the told experiences of hospital laboratory employees regarding the innovation situation. Thereupon, to understand the innovation situation as well as the role trust plays in innovation adoption, the hospital case will be introduced next.

## 2.2 The case

### *2.2.1 Case background*

This case is based on a project (starting in 2015) involving the laboratory service and the implementation and centralization of new laboratory instruments for analyzing blood samples on behalf of a public hospital (enhance efficiency). The study is inspired by the hospital management's wish for enhanced understanding of laboratory employee's perceptions and needs in relation to facilitate innovation implementation success. The hospital operates in different geographical locations. This paper emphasizes four of these locations.

The hospital project report from 2018 states that work processes and organization should be developed in connection with increased automation and collaboration, both internally within the hospital laboratories and with the primary health service (clinics). All the laboratories related to one of the hospitals' divisions were thus to have new analysis equipment adapted to various needs in place within the end of 2017. The project was divided into the following milestones:

- Project organization and project plans.
- Organization of a new workflow from patient needs, competence needs, and collaboration with the clinics.
- Acquisition of new analytical equipment.
- The implementation of new analytical equipment.
  *Due to, for example, complaint handling, the supplier contract was delayed and signed in March 2018. The project was decided to be completed after signing the contract, consequently transferring the responsibility for the equipment implementation, training of staff, method validation, routine operation, and disposal of old equipment to a new project subject to the operational organization.*

A project group was developed where one employee (subject coordinator) from each of the laboratory departments was represented. The subject coordinator from each group could thus contribute to decisions, efficient information flow, and coordination within the project. Furthermore, working groups (representatives/employees from each of the disciplines/geographies) would provide input with regard to requirements specification and choice of solution. Various dialogue meetings on behalf of the procurement and project information plans (e.g. status and orientations) were presented every half year at different locations. Additionally, project information plans (e.g. status and orientations) were presented every half year by the division director and/or project manager at different locations.

As part of the project with regard to the project distribution of blood samples from the primary health service, there were two models that were examined by the hospital division. The first model was related to the continuation of the current division of labor associated with separate laboratory analysis operations (current model). The second model consisted of collecting samples from the primary health service (associated with different geographical areas) and sending them to one of the hospital division laboratories (integrated model). The choice of model was based on an investigation of the organization in 2017 where an emphasis was placed on the consequences of the integrated model for service, quality, staff, and finances.

From the hospital division decision note (2017), the hospital division board concluded that a replacement of laboratory equipment would collectively represent an efficiency improvement that could be utilized in better quality, collaboration between laboratories, service, or financial savings. The alternative was to introduce a greater degree of automation of the sample flow. In this case, the investment need would be higher; however, with such a solution, it would be possible to achieve a more efficient operation. The report concluded that it would be most profitable to centralize most of the sample analyses to one location. Moreover, other analyses would be performed at the different hospital locations. However, analyzing samples from the internal hospital polyclinic would be done locally at each hospital division with new automated instruments. The procurement was carried out through a competition, where the supplier complied with various criteria and requirements specifications on behalf of the hospital. Hence, the innovation in this case is tailored to the hospital division needs, and thus related to the new way for employees to produce blood test analyses.

The new model distribution was proposed to provide the opportunity for professional specialization and establishing specialized expertise in the various areas. The centralization was mentioned as appropriate with regard to an optimal automated process from sampling to sample filing (reducing manual transfers and waiting time), in effect contributing to acceptable and predictable response times with regard to

blood samples. By collecting, automating, and centralizing most of the analyses from the primary health service, it would enhance the capacity at the hospitals that no longer performed those analyses. The plan was thus to use this capacity for other quality and service-enhancing measures, hence strengthening the service initiatives towards polyclinic patients as well as the primary health service. At the same time, an emphasis would be placed at maintaining a good physical working environment, including training, service, and maintenance services.

The division director decided on a step-by-step development of the laboratory services through an integrated model that would form the basis for further organizational development and procurement. The project was mentioned to start with the replacement of equipment. Hence, a centralization and automation of tests from the primary health service would be initiated over a 2–3-year period.

### *2.2.2 Challenges that emerged from the project*

With regard to a workshop at the hospital in 2019, it was mentioned that the project was divided into two parts. Part 1 was completed and consisted of laboratory instruments/machines. Part 2 was the part that the hospital was facing (2019) and involved the organizational change/logistics. Nevertheless, the project was planned to be finished in May 2021.

Some challenges that emerged at the workshop based on the new model were related to competition, laboratory employees (e.g. emotions), and primary health care needs. In the light of this, the research has been aimed at understanding factors that contribute or hinder innovation adoption and thus efficient operation of the hospital's laboratory service (sending, analyzing, and delivering blood samples to the primary health service). The laboratory service consists of the hospital divisions (subcontractor), primary health service (customer), and private laboratories (competitors). However, the main emphasis is placed on how the innovation impacts the hospital division's (laboratory) employees and thus their experience with the present laboratory service. Therefore, mapping the needs on behalf of the hospital division's employees was performed through in-depth interviews.

From the challenges that emerged, it is essential to understand what is really behind the respondents' answers. The focus has thus been related to emotions, and how trust as a condition for innovation can affect the speed (e.g. pace of innovation adoption) of innovation. The role of trust between individuals for innovation, and what type of trust in this context contributes or hinders innovation adoption, has therefore been relevant. Consequently, by addressing barriers (e.g. defensive routines) to innovation on behalf of the hospital division employees, one can perhaps create an environment for innovation and change.

### *2.2.3 The actors*

Below is a description of the various actors relevant to the project. However, this case is limited to the interviews on behalf of the division's employees.

***The hospital and the hospital division (public operator/subcontractor/innovation holder/ project owner*)**

The hospital consists of specialist health services. The hospital is organized with different divisions focusing on various health care areas. This case is thus based on one of these divisions (consisting of four laboratories placed in four different geographical locations) and their ongoing project.

***"Quality assurance"***

This company has a mission to improve the quality of the medical laboratory activities conducted. Therefore, it contributes to the other actors' trust in that blood samples are analyzed and handled the right way before, during, and after analysis.

***Primary health service (customer/partner)***

The primary health service consists of the medical offices in the region that (to a greater or minor extent) uses the hospital's laboratory services (e.g. transmission, analysis, and delivery of blood tests).

***The competitor (private actor/subcontractor)***

The case considers one of the hospital's central competitors. This competitor was mentioned in the interviews with the hospital division employees.

An important difference between the hospital and their competitor is the fact that the hospital has two missions: taking care of patients at the polyclinic as well as handling the laboratory service towards the primary health service. However, their competitor only handles laboratory services. Hence, there is a difference in resource utilization and prioritization between these actors.

## 3 Methods

For this paper, a qualitative investigation involving a case study and semi-structured interviews has been performed to understand how organizational innovational change impacts employee defensive routines and trust creation towards management.

The concept of trust has been argued to be *stretched* having a high level of abstraction and covering a broad dimension of meaning (Singh & Sirdeshmukh, 2000). Hence, changing the focus from *what is trust to which trust and when* has thus been argued to solve the confusion (Singh & Sirdeshmukh, 2000). Appropriate definitions of trust are argued to be highly context dependent (Goudge & Gilson,

2005). Hence, qualitative, or experimental methods are common (e.g. semi-structured interviews, focus groups, or ethnographic approaches). These methods facilitate elaboration and a more detailed understanding of, for example, relationship experiences (Ozawa & Sripad, 2013).

By gaining insights on the experiences and needs of laboratory employees with the innovation at a specific point in time, important cues could be addressed to understand how trust may impact innovation adoption in this context. Moreover, the study facilitates insights which can make way for a more generalized quantitative study involving a larger health care network.

There was no relationship between researcher and participant prior to the interviews that could impact the study. A description of the research design and methods is explained as follows.

### 3.1 Research design and method

To explore how trust may impact innovation speed, it has been essential to gain an in-depth understanding of the complexity of the laboratory service situation. Developing a contextual basis to describe and interpret emotions and their impact on innovation adoption has thus been important. In this sense, a case study approach has been used to develop a picture of the laboratory employees' experiences with the innovation in their everyday setting (Yin, 2009). The case study approach is divided into three types: intrinsic (learning about a unique phenomenon), instrumental (gain a broader understanding of a phenomenon from a specific case), and collective (studying several cases at once) case studies (Stake, 1995). This study follows the description of an instrumental case study, as it involves gaining understanding of the context and impact of a realistic innovation implementation project on behalf of hospital employees. Moreover, as case study research emphasis on *how* and *why* questions, it is suitable for descriptive or exploratory studies (Myers, 2009; Ponelis, 2015). The study therefore seeks to address *how* employees have been affected by the innovation, *what* cues/mechanisms are contributing or hindering innovation speed and trust, as well as interpretations of possible reasons to *why* the mechanisms are important in this context. In this way, it acquires an interpretivist understanding of the meaning of employee experiences (Glaser & Strauss, 1968; Ponelis, 2015) within an organizational context.

Explorative and interpretive case studies usually develop descriptive frameworks and emphasis on the *number of cases, data collection techniques, unit of analysis, role of prior theory,* and *analysis methods* (Eisenhardt, 1989; Ponelis, 2015). To be able to assess the complexity of the laboratory situation, one case study has been chosen (Yin, 2009). In terms of *data collection techniques,* interviews are stated as the primary source of data for case studies (Yin, 2009). The data collection was divided into two phases that linked the contextual setting with employee experiences. Phase 1 involved acquiring knowledge about the hospital project (context and

organizational structure), and to understand what factors were perceived as important for the innovation implementation. Hence, it involved workshop participation and meetings, as well as project documents (e.g. project reports). Phase 2 involved 1-h face-to-face interviews at the various laboratories which sought to gain in-depth insight into employees' needs and perceptions, building on insights from phase 1.

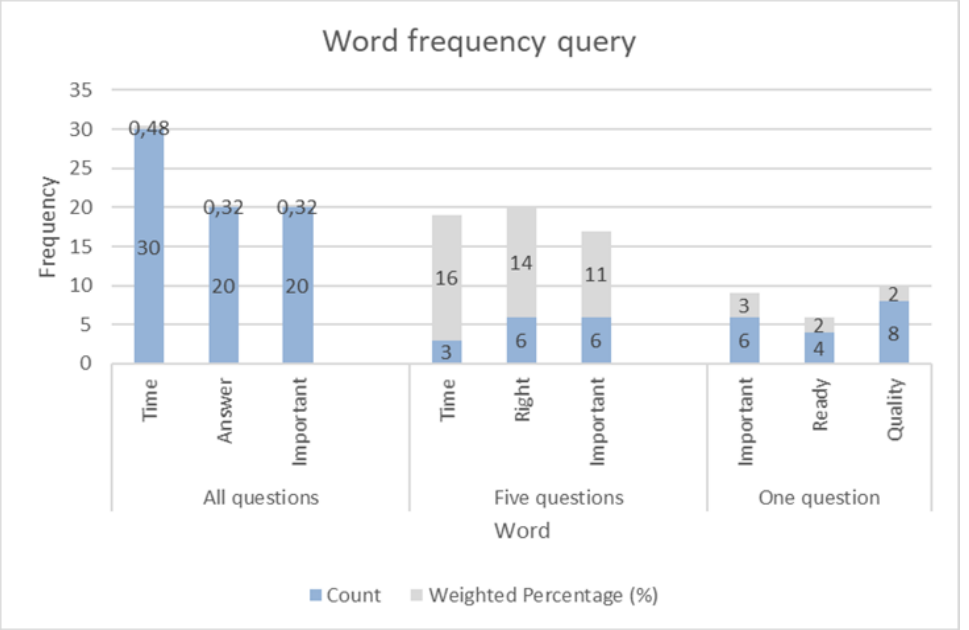
In relation to the *unit of analysis*, the in-depth interviews were performed with five key employees (women) from four different laboratories subject to the hospital division and the geographical area of study. The employees were chosen based on the division management's suggestions (e.g. chosen from convenience and relevance to the study aim). However, the choice to have five participants was based on the complexity of the study, time considerations, and the value of gaining in-depth knowledge of employees' experiences. As the interviews were recorded and transcribed in detail, ethical considerations involved communicating the promise of confidentiality and information (e.g. reason) about the interview as well as requesting informed consent from each respondent. Moreover, the interview transcription was sent by e-mail to which the respondents were free to depart from. To be able to find various trust-creating mechanisms, the interviews were based on a semi-structured interview guide, created to facilitate a conversation surrounding the laboratory service network and relations. The Actors-Resources-Activities model (ARA model) (Håkansson & Snehota, 1995) with its emphasis on assessing the strength of actor bonds, resource ties, and activity links in organizational networks was thus chosen as a starting point and inspiration to develop interview questions. The questions provided an overview of the laboratory context as well as the important relationships, resources, and activities within them. Questions were related to important quality/value elements as well as missing work-related factors. Moreover, trust was stressed as an important component of actor bonds and an essential factor for enabling or hindering actor behavior in relation to each other (e.g. interaction) (Håkansson & Snehota, 1995). As the ARA model made it possible to understand the *bigger laboratory picture*, it was possible to narrow down the focus on understanding trust as a concept for innovation adoption within manager-employee relationships. To facilitate a basis for comparison between stated trust mechanisms on behalf of employees as well as trust mechanisms interpreted from the interview conversations, employees were asked one question directly related to what they thought as important trust-generating factors. Phenomena within qualitative research are usually created from the meaning participants place on them (Daher, Carré, Jaramillo, Olivares, & Tomicic, 2017).

In terms of *data analysis and interpretation*, there are various systematic procedures researchers may use. For example, an inductive approach starts with an area of study and allows theory to emerge from the data (Strauss & Corbin, 1990; Thomas, 2006).

It involves summarizing raw data, creating relationships between research goals and raw data findings, and developing a theory or model about the visible structures or experiences present in the data (Thomas, 2006). A deductive approach test if the data is consistent with earlier assumptions or theories identified or constructed. Moreover, many studies use both inductive and deductive approaches (Thomas, 2006); in this way, case studies support theory building (Yin, 2009) as well as theory testing (Eisenhardt, 1989). This study has taken inspiration from a combination of both approaches when analyzing the data, starting with an inductive approach involving a research question and the topic "trust." The starting point was thus to understand what constitutes trust (trust mechanisms) on behalf of hospital employees in a specific organizational context (e.g. describing a picture of the phenomenon of trust being studied). Hence, *the role of prior theory* was subject to the analysis and interpretation (e.g. trust and defensive routines cues) part of the process as it was chosen after the interviews. An exploratory approach could in this way provide a descriptive framework (Rowley, 2002) as the interpretation part of the study started with only an assumption of various trust cues. Further, a deductive approach was conducted for the purpose of the discussion, and to be able to create implications. In this way, relevant literature was selected based on the inductive findings.

To develop a deep understanding of the specific case "seeking the phenomenological essences" (Bazeley, 2007), the inductive findings were based on an inductive coding process (Chandra & Shang, 2019). As such, the *analysis* of the interviews was performed in NVivo. Codes (in this case various mechanisms assumed as important for trust generation) were developed based on Word frequency query and Text search query, emphasizing the words most frequently mentioned from the interviews and the words surrounding context (Fig. 2). Moreover, "coding is usually a mixture of data [summation] and data complication … breaking the data apart in analytically relevant ways in order to lead towards further questions about the data" (Coffey & Atkinson, 1996). As coding is stated as a cyclical act (Saldaña, 2016), providing an enhanced understanding of the data thus required an iterative process of recoding, as well as a dividing of the first code cycles into less and more refined codes.

*Figure 2. Word Frequency query in NVivo. The Word frequency query displays the word count and the words weighted percentage*




Moreover, to interpret the meaning of the codes to understand what mechanisms could impact trust generation, it was relevant to understand "what was going on" (Bazeley, 2007). How the respondent perceived the situation, what was happening, what they were trying to achieve, and how they were trying to achieve it (Emerson, Fretz, & Shaw, 1995; Saldaña, 2016) were thus relevant questions in terms of acquiring direction in terms making the codes. The inductive coding process (Chandra & Shang, 2019) thus made it possible to highlight important features of the data which facilitated the creation of various categories. These categories, when linked/compared with each other, simplified an understanding of patterns and connections within the data, which facilitated the development of the study's themes and concepts (Bazeley, 2007).

### 3.2 Validity

The analysis method the researcher uses to understand the respondents' experienced reality has important implications for what results are communicated (Law, 2004). Regarding qualitative research, Kirk and Miller (1986) argue that validity is about "whether the researcher sees what he or she thinks he or she sees" in this way facilitating evidence within the data for interpretation. Hence, transparency and rigor are important elements (Tuval-Mashiach, 2017) and may be acquired from explicitly reporting how one accomplished what was achieved (Crawford, Leybourne, & Arnott, 2000). Providing a *detailed description* of the interview and analysis process

has thus been essential. Furthermore, NVivo has been stated to add rigor to the analysis process (e.g., providing rapid and accurate searches, ruling out human error). Hence, validity regarding the results has been subject to the following (Elaine, 2002):

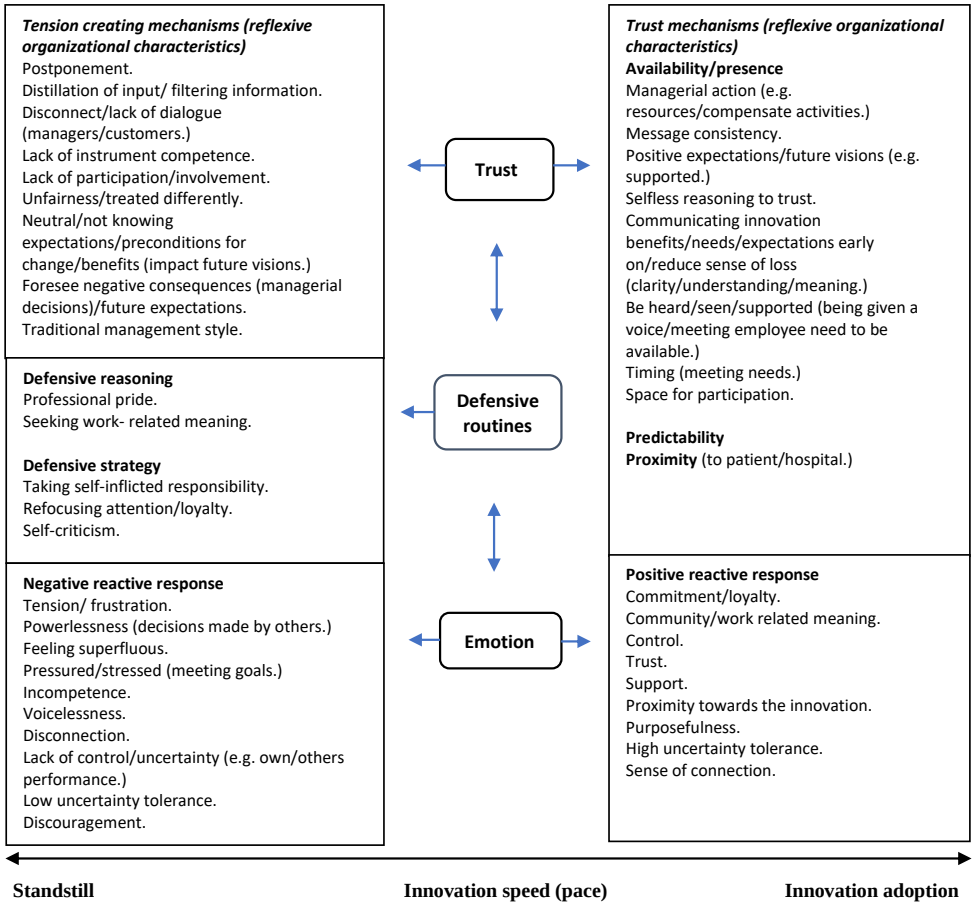
- The possibility of finding all instances of a specific usage (from large datasets).
- Combining manual and automatic processes for a thorough interrogation.
- The ability for rapid coding enhances confidence with data interpretation.
- NVivo makes an overview of what is going on easier, facilitating a seamless starting point for data analysis and interpretation. As researchers may interpret data differently, this enhances trustworthiness, rigor, and quality of the study.

The analysis process in NVivo has provided structure and confidence in the mechanisms developed. For this purpose, by performing three queries in NVivo (emphasizing different questions) (Fig. 2), it appeared that most of the factors under the question that was directly related to trust also emerged from the other words from the Word frequency query and Text search query. For this reason, it contributed to confidence and meaning regarding the trust mechanisms developed. Moreover, by using quotes from the interviews, the findings are grounded in the evidence.
According to Walsham (1993), validity of case estimation builds upon "the plausibility and cogency of the logical reasoning used in describing the results from the cases, and in drawing conclusions from them." As the findings from this study derive from a single case study, it is context specific and provides in-depth insight, and the possibilities of generalizing the results are therefore limited. The two following "Results and discussion" section seek to highlight important findings (variables) and their importance for the innovation speed process (see Fig. 3) in the light of the theoretical framework (see Fig. 1).

## 4 Results and discussion

To provide a contextual background that facilitates understanding for employee defensive reasoning and behavior (reactions) within the hospital case and the innovative environment (and how trust may address this), the innovation implementation and employee involvement situation will be discussed. The first part of the discussion explains the project environment. Hence, it involves insights made from given project reports and documents, as well as notes made from participating in a project workshop at the hospital in the fall of 2019. The second part of the discussion involves analysis of the in-depth interviews that followed.

*Figure 3. Innovation speed line with contributing factors **and variables** for innovation adoption*




### 4.1 Background- framing the problem

To increase automation and collaboration internally and with the primary health service, the hospital division invested in new automated laboratory instruments in each of their laboratories. The organizational innovation in this case thus relates to employee experience with the implementation of the new way of performing laboratory analysis.

The innovation is twofold and emphasizes a new way of working (automation/instruments/centralization) as well as innovation adoption of the new work situation. The innovation implementation project resulted in a shift in laboratory equipment and work processes at the hospital laboratories. Employees at the hospital laboratories that were not part of the centralization thus performed other

and fewer analyses. Hence, the new implementation situation had an impact on work routines and workload.

Various milestones were created for different purposes throughout the project. Relevant for this paper are the milestones involving implementation of new analytical equipment, which responsibility was transferred to another project. A main emphasis thus revolves around employees' experiences with the implementation situation.

Positive implementation factors for the purpose of the laboratory employees related to dialogue meetings and the creation of project groups for the different laboratories to complete the project. Hence, one employee from each project group would act as a messenger between division management and the employees. In this matter, employees would be able to provide input regarding the project. From the hospital decision note (2017) (involving laboratory employee feedback), the choice of a new work model (instruments) was based on estimated consequences for service, quality, staff, and finances. However, consequences for employees related to more time to perform various routines. The step-by-step (2–3-year period) development of the laboratory service was stated to start with equipment replacement, followed by a centralization and automation of tests. However, the step-by-step introduction in addition to factors related to the board decision process had postponed the goal of having equipment in operation by 2017.

The first project milestone involved innovation implementation tasks related to acquisition of laboratory instruments and organizational development. However, from the project report, the organizational development part seems to have started with patient and primary health service needs, the skills needed to meet these needs, and appropriate work allocation and organization in the new workflow.

At the workshop, it was mentioned that the first part of the project involved implementing the instruments at the hospital laboratories. The second part of the project involving the organizational change (transportation and logistics of the samples) had just started with an estimated finish in spring 2021. From this insight, an assumption is made that the decision to implement the new instruments took place before considering employee's needs. The instrument implementation was stated to ensure efficient and safe routine operation of all new equipment with good plans for training. Supplier training services on behalf of employees were thus stated to be included in the instrument procurement. However, it is unsure whether the training of employees had taken place before, during, or after the instrument implementation. As some employees stated a lack of instrument competence, that learning of the new instruments had been slow (see Table 2), and that some employees within the interviews had been busy the last years with training, it seems that the instrument training had not been optimal (not done before the implementation). In the light of this, the concept of involvement became relevant. As measures were performed to

inform and include employees in the implementation (meetings, project groups, consequence measures), the possibility to participate seems to have involved giving inputs regarding an already decided implementation plan.
Several issues on behalf of the employees appeared at the workshop. For the purpose of this paper, three clusters were relevant: *personnel*, *employee emotions,* and *management*. From the employee's utterances at the workshop, there seemed to be tension due to unresolved issues, uncertainties, and negative emotions regarding the new work situation. Input on behalf of the employees is stated in Table 2.

As a focus is placed on the employee experiences in this paper, some input points stressed by managers and employees on behalf of one of the cluster's *management* have been gathered (see Table 1). Gathering points on behalf of both management and employees seeks to form a comprehensive picture of the hospital situation. In this sense, including insights on behalf of management seeks to provide perspective regarding the implications made. Moreover, the points served as an important starting point for the employee interviews that followed.
The facilitating factors from Table 1 indicate that management (like employees) was facing pressure regarding the innovation situation. As the project had taken longer time than anticipated, the situation seemed overwhelming.
Moreover, the lack of resources (e.g., time) had placed pressure on managers to prioritize task which involved optimal operation of the new instruments and upholding service promises towards the primary health service (e.g., performing a *rematch* of the project part 1). In effect, the challenges from the first part of the project seem to have created more operational work in part 2 of the project. The problems in part 1 may thus be one reason for why management was lacking capacity to develop the relations with employees. Moreover, lack of coherence between laboratories (see Fig. 3) and gathering the laboratories to one community (see Table 1) were mentioned. Consequently, the complex organizational structure and installing various analysis instruments at different locations at once could have made dialogue and facilitating optimal learning of the new instruments more difficult.

*Table 1. Issues communicated at the workshop on behalf of the cluster "management"*

| **Facilitating factors for employee response** | |
|---|---|
| **Capacity pressure** (time/economy/instruments) | **Management**<br>Part 1 of the project has not gone well. To little capacity as all equipment was changed at once.<br>Part 2 of the project is related to the success of part 1: "We should have been up and running the production in the spring of 2019, we are behind! How can we boost this timewise?"<br>New automated instruments have not performed well. Part 2 is about collecting and transporting the blood samples (reducing transportation times.)<br>Management is pressured economically.<br>Economically focused.<br>Little time and capacity to be a leader (a lot of administrative work due to, for example sick employees.)<br>Managers feel like organizers.<br>Managers have many different tasks: Adjusting what has been tough for the employees (project part 1), consider customer needs, enhance service (response times) and gather the laboratory to one community.<br>Tiresome process for management with lacking resources and various project related challenges (too many projects are connected to each other.) |
| **Opportunities**<br>Change for the better (strengthen bonds/relations) | Achieving closeness (bonds) to employees (hindered due to a lack of time.)<br>Get rid of negative emotions (help employees.)<br>Revitalize enthusiasm (towards entering a new project.)<br>Being a visionary (stated as important.)<br>The hospital need help to address the workflow in each laboratory (transferring labor, job safety and shifts need to match.) |

Innovation adoption was argued to be socially deterministic, involving managerial action, human resources, and skills (Webb & Pettigrew, 1999). Moreover, not considering ideas from individuals of lower rungs may be a barrier to innovation (Yang & Konrad, 2011). As innovation in this sense was in relation to innovation creativity, not being open to employees' needs may awaken innovation resistance from negative emotions. However, employees had strong opinions of the organization striving towards becoming a visionary (also stated in Table 2). As this was mentioned to relate to "striving to be the best in the world, not just small changes," it may indicate a wish and motivation towards putting in the work of becoming a leading actor (if the right resources are in place). As negative emotions regarding the continuation of the project were stressed on behalf of employees,

resources may relate to a larger extent of being able to participate and being heard with regard to the project (e.g., more dialogue and transparency). Moreover, stressing managers' economic focus may mean a wish for closer relations (e.g., consensus with other actors within the organization) and being seen to a larger extent by management. Nevertheless, effects from part 1 of the project seem to have impacted part 2 negatively, changing work roles and workload on behalf of managers and employees alike.

The managers seem to be aware of the various frustrations and wanted to empower employees towards project continuation (willingness to change). However, the pressured situation seems to be a barrier for this purpose.

Next, insights on behalf of the cluster's *personnel* and *employee emotions* will be discussed (see Table 2).

Employee emotions from Table 2 indicate a lack of motivation and burnout from negative experiences and aftermath of the first part of the project (the term *burnout* was mentioned within the interviews). As the first part involved issues regarding learning and operating the instruments and the new routines that followed, it seems to have awakened negative emotions on behalf of the laboratory employees, which continued into part 2 of the project. This included bitterness (from part 1), reluctance to change, enhanced self-centeredness (e.g., "what is in it for me?"), and feeling superfluous in relation to poorly operating instruments and the lack of instrument competence (impacting professional pride and organizational loyalty).

As involvement and participation should be done from the start by those who decide on a new solution to facilitate commitment and acceptance (Romme, 2003), it seems that this has not been done in a timely manner. The decision to implement the new equipment and centralize some of the analysis to one location before considering employees' (who directly work with the solution) needs from the start might thus hinder innovation speed.

*Table 2. Issues communicated at the workshop on behalf of the clusters "personnel and employee emotions"*

| **Employee response** | | |
|---|---|---|
| **Capacity pressure** (time/instruments/new routines) | **Personnel**<br>Employees do not have time to think about anything else but the new routines, employees are sick and do not have time to do the job they are intended to do.<br>Employees are burned out from working overtime and there is a bitterness from the previous project part 1.<br>Learning the new instruments have been slow (no use of Virtual Reality (VR) or Augmented Reality (AR) technology.)<br>As the new solution make it possible to free resources, there is still a need to hire more expensive competence.<br>A strong professional pride may be present.<br>Employees need to adapt routines to their own workday. There are too many tasks for each employee.<br>Employees have a locked mindset (e.g. what is in it for me?) One must consider the whole. | **Employee emotions**<br>Employees are tired and unable to take risks in relation to continuation of the project (part 2.)<br>The project loyalty is weakened.<br>Instruments do not work as expected. When instruments (automation line) do not work, this impact employees professional pride/honor negatively.<br>Feeling superfluous for lack of competence in relation to operating the new instruments (which are not working optimally) (e.g. wounded professional pride.)<br>Need to create motivation.<br>"We must believe in the solutions that provide better service to hospitalized patients".<br>Resistance to changes/negative emotions.<br>Negative emotions are difficult to get rid of (stated to be inherited between employees).<br>E.g. rumors between employees of them not being allowed to perform certain tasks:<br>"We are not allowed to do …".<br>(The managers want to know how to get out of this in a stronger manner.) |

| | | |
|---|---|---|
| **Opportunities** | Striving to be the best in the world, not just small changes.<br>Being a visionary is missing.<br>Get employees to see the opportunities in the project regarding safety delegates and employee representatives. "Is this enough? Where are the opportunities?"<br>Willingness to change. How to make employees think differently? | Feelings of organizational measures being handled too late.<br>Too much work pressure.<br>This project (part 2) is an opportunity to operate differently. |
| **Hidden input** | Distillation of input; not everything seems to show (information on behalf of employees).<br>Input from project meetings was *filtered* and in-dept arguments got lost. | |

This is because not feeling included or being able to participate with the decision from the start may create a sense of reluctance towards the new solution. Negative rumors shared between employees may thus be the result of a disconnect (lack of dialogue) between management and employees which may keep the reluctance to change alive.

The sense of dignity, community, and meaning (Weisbord, 1987) was argued to be affected in this matter (impacting commitment and solution acceptance). The findings seem to complement this literature. In terms of dignity, the fact that employees felt superfluous by not having enough instrument competence (slow learning progress due to work overload) and having a reduced sense of professional pride in relation to the instruments not working as expected (not trusting the instruments), it may reduce innovation speed. The same is relevant from having a locked mindset (e.g., "what is in it for me?"), as it may reduce employees' ability to feel a sense of community and meaning with the innovation. Similarly, some input on behalf of employees from previous meetings was stated as "filtered" such that some project-related arguments got lost. In effect, the organizational change phase (part 2 of the project) did not seem to firstly include employee's needs. Hence, the sense of only being partly considered in the solution together with the feeling of input being "filtered" may in this case be one reason for the negative response towards participating in the second part of the project. Filtering employee feedback may thus be a barrier to innovation adoption as it excludes important information (e.g., needs/suggestions) on behalf of the employees, slowing down innovation progress. Barriers to innovation speed may in this sense be the result of (1) a

combination of managers not having the capacity (due to a "rematch" of the project part 1) to consider employee's needs and (2) employees not feeling heard. Hence, the stressful experiences from the project's part 1 result in managers having to address various negative consequences in the project's part 2. This postponement, together with a lack of employee participation due to prioritizing operational tasks (employees not feeling heard), may provide negative consequences for the pace of innovation speed. As it is unclear what has been filtered, not feeling heard may contribute to negative emotions and a lacking sense of meaning towards an efficient continuation of the project (innovation speed). Not feeling heard and feeling overlooked are therefore understood as contributing factors for negative responses (e.g., defensiveness) towards the continuation of the project (e.g., innovation speed).

Management clearly states a wish to empower their employees. For this reason, this paper looks at how trust may rebuild and turn defensive responses towards a willingness to continue the project (e.g., positive responses) in relation to the innovation situation. In this sense, the insights from the first part of the paper (e.g., workshop and various project documents) have given relevant knowledge on issues which frame the laboratory service context (see Table 1). Moreover, the issues are understood as contextual factors which might facilitate defensive responses and thus behavior towards the innovation.

To gain a deeper understanding of employee's experiences with the new laboratory service situation, in-depth interviews were performed with key laboratory employees at each of the four laboratories. The next section involves these conversations and the assumingly defensive behaviors that derived from the told experiences (interviews). The three words most frequently mentioned from all the interviews were *time, answer,* and *important*. Additionally, the words *important* and *time* appeared in two of the other analyses. Therefore, an extra emphasis is placed on these words and their meaning. By performing these analyses, it was possible to focus the interview content to answer the research question and create trust mechanisms. The results from NVivo are presented in Fig. 2.

The trust mechanisms are understood to be essential factors that impact employee trust generation towards management and the innovation (see Fig. 3). Moreover, as part of the various trust mechanisms, an assumption of facilitating factors for defensive behavior is created and is understood to impact trust in this context. The discussion is based on the trust mechanisms, as well as facilitating factors that are understood to place barriers for trust generation (e.g., contribute to defensive behavior) (see Fig. 3). As defensive behavior is believed to reduce innovation speed in this paper, the insights provide a basis for how trust may impact innovation speed from defensiveness. To answer how trust may impact innovation speed, the next sections will address defensive routines and trust from the in-depth interviews.

### 4.2 Defensive routines

Defensive routines are argued to involve reasoning (e.g., thoughts and cognitive rules) and action strategies which seek as protection to avoid embarrassment, pain, or threats (Argyris, 1991; Argyris, 2002). For the purpose of this paper, an emphasis is placed on defensive routines (defensive strategies and reasoning) from what is told within the interviews. However, as defensive reasoning involves mental processes, only an assumption could be made of employees' defensive reasoning. What is described as facilitating factors for defensive routines is thus understood as the responses from the interviews (involving emotion) which may impact defensive reasoning and strategies, consequently impacting trust generation and innovation speed negatively.

Bachmann and Zaheer (2008) mention self-interest-seeking behavior resulting from detachment from routines. However, self-centered reasoning may in this case result from the combination of not feeling heard/overlooked by management (disconnect/lack of dialogue between managers and employees), as well as upholding professional pride. This is due to a lack of competence and/or the sense of being superfluous regarding operating instruments, which have resulted in a lack of loyalty towards the continuation of the project (see Fig. 3).

Emotional tension may rise in organizations where a compensation for new activities is not provided (Whyte, 1949). In this sense, activity coordination was stressed as important in times of business growth. For this purpose, as employees were feeling burned out due to the changes in routines, it seems that there is a need to compensate activities to regain emotional balance. As negative rumors were present and stressed to be *inherited* between employees (see Table 2), the sense of *not being allowed* to do certain activities might have contributed to transferring tension between employees and units (Whyte, 1949), collectively "slowing down" (e.g., hindering) innovation speed.

From the in-depth interviews, negative responses portraying tension regarding the new situation resulted in one noticeable (key) defensive strategy: *taking responsibility*. Moreover, this strategy contained various subcategories of defensive routines (e.g., defensive strategies and reasoning). As the interview results are categorized into what is assumed as mechanisms impacting trust creation, an explanation of the defensive routines will be performed for each trust mechanism (availability, predictability, proximity, and one question of trust) (see Fig. 3). In this matter, taking responsibility firstly involved self-interest-seeking behavior (Bachmann & Zaheer, 2008), and separated activity/group attention (Bohm & Nichol, 1996; Fulmer & Keys, 1998). The lack of dialogue with management thus seems to impact employees' *attention towards something/someone else* (e.g., the primary health service), *professional pride*, and *seeking meaning*. Moreover, the sense of feeling responsible facilitated *self-criticism* (Schillemans & Smulders, 2015; Tetlock et al., 1989). The four subcategories of defensive routines subject to

*responsibility* will be discussed and addressed with relevant trust literature as follows.

### *4.2.1 Focusing attention as a result of responsibility*

As no additional resources had been added regarding the organizational change, the employees who had extra tasks did not have time to do this, nor inform the primary health service regarding routine errors. Employees were therefore afraid that bad habits would be formed.

*"I have worked overtime to be able to order items and have them available, so it's a very unbearable situation. There are limits to how much you can handle. And then we have always said how important it is that we act on these things (…) that we have an updated laboratory handbook, that we hold courses, get to travel and inform and that we are active in relation to these things."*

Some employees did not feel heard or prioritized. The answer indicates that employees may have felt discouraged and pressured to reach analysis goals, as management had waited to handle the challenges they were facing. At the same time, new knowledge needed to be acquired on behalf of handling the new instruments and routines.

Employees who were not directly involved with the new instruments did not feel prioritized. Hence, employees might have felt frustration and a lack of control (uncertainty) from not feeling supported in relation to the new situation. Moreover, it may be the sense of not being able to be sufficiently *available* towards the primary health service. Therefore, it had raised concern (emotional tension) towards management and the innovation (disconnect/detachment from management), consequently resulting in self-interest-seeking reasoning in terms of enhanced responsibility (defensive strategy) towards the primary health service. Employees were thus directing focus away from the innovation efforts (e.g., redirecting attention and loyalty) from self-interest and disconnect with management, and the innovation.

### *4.2.2 Professional pride and seeking meaning as a precondition for responsibility*

The innovation situation led some employees to be afraid of not being able to use their education and what they were trained for. In this way, employees seemed to perform self-protection regarding work titles by demonstrating clear boundaries of what their job really was all about.

*"We are [profession] to analyze blood tests, which is why we have chosen this profession. It's something about maintaining an interesting position for everyone so we don't lose staff or get in trouble with the recruitment."*

Employees felt a great deal of uncertainty about an unclear situation where some of the premises for the change and co-operation were not known. In this sense, *redirecting* loyalty towards the primary health service seemed to be a defensive strategy by taking control of the situation from *responsibility*. Hence, with a lack of managerial support and task direction, employees were protecting professional pride (and the sense of feeling superfluous) from creating work-related meaning. Redirecting attention in this way may thus be a result of tension from not feeling heard by management. Therefore, taking responsibility seems to be the result of seeking meaning (professional pride) and gaining control of the unclear situation. Hence, in this case, self-interest-seeking behavior may be described as self-interest-seeking reasoning. This is because it involves thought processes which seem to somewhat justify and manage the overwhelming situation by creating meaning. This type of reasoning may guide (come before) responsible behavior (defensive strategies) (see Fig. 3). Consequently, as defensive routines are described to hinder learning in organizations (Argyris & Schön, 1974; Argyris & Schön, 1996), it may hinder innovation speed by redirecting attention (e.g., loyalty) from self-interest-seeking reasoning.

Being a member of "Quality assurance" was stated to provide assurance (e.g., predictability) in that routines would be performed in the right manner. However, uncertainty towards own performance and not being in the position to make decisions seemed to impact employees' sense of pride in being portrayed as a skilled employee. As a result, the employees became more aware of their own strengths and weaknesses. Hence, they attempted to communicate their strengths by identifying factors that distinguished them from their competitors, namely *proximity* to the hospital and the patient. One employee pointed out a personal and passionate cause over the last 15 years for maintaining test samples (especially when it was cold outside) during transportation. Employees therefore took responsibility and were loyal towards their customers by defending their position from justifying strengths. Justifying weaknesses from strengths in the context of responsibly may therefore be a type of defensive reasoning. Adhering to and taking responsibility for personal causes, despite a lack of compliance, may thus provide evidence for employees' need to make sense of the situation, mean something, and be seen. In this way, the fact that employees participated in regular meetings without feeling heard (e.g., from the sense of information being filtered) may indicate a sense of voicelessness (involuntary silence). Innovation speed and thus organizational capability may in this case be reduced from voicelessness and a lack of participation.

### *4.2.3 Self-criticism as a result of responsibility*

As a result of the innovation and the new routines, the hospital division's laboratories had a strong wish for change, in relation to being given more time to provide better laboratory service towards meeting primary health service's needs (wished this was

perceived as an important task). In this case, some employees were self-critical (blaming themselves) for feeling *responsible* for the lack of presence. One employee took the blame (self-criticism) for not listening properly and not understanding the primary health service needs.

*"…and then there is the doctor's office visits that are far too rare. That is because I do not allocate my time properly."*

The employees knew that the hospital had enough resources. However, the fact that they did not feel prioritized (without understanding why) may have provided frustration due to the sense of being treated differently (e.g., unfairly).

*"I want us to change to be able to provide more services, but some issues are placed at a level that we have no control over. Then there is no use."*

Nevertheless, the current regional solutions were considered to be an impediment for being present.

Being accountable was stressed as both positive and negative for learning (Schillemans & Smulders, 2015). However, as the employees in this case did not seem to be accountable for the lack of dialogue with the primary health service, they might have felt responsible due to the pressured situation. In this way, it may be possible that employees were taking responsibility due to not knowing managers' expectations as well as the uncertainty towards own performance (lack of dialogue/disconnect towards management). Not knowing the preconditions for change, uncertain environments and tension may frame anticipations of management and/or the innovation which limit positive expectations (e.g., Clegg et al., 2002) with regard to the innovation (e.g., needs not being met). As not knowing might make it harder to create expectations of what might happen in the future, it seems that this uncertainty had impacted actors to enhance defensive routines. The responsible strategy may act as a defensive mechanism to protect (e.g., a sense of risk reduction from believing that the experienced behavior would continue into the next part of the project) and gain control regarding the unclear situation. Hence, a defensive strategy from anticipations may be *self-inflicted responsibility* in relation to *neutral anticipations* from uncertainty and disconnect towards the innovation/management. In this sense, justifying weaknesses from strengths in the context of responsibly might be a form of defensive bolstering. Nevertheless, as responsibility (defensive strategy) is positive towards tasks related to the primary health service, it does not contribute to innovation speed (e.g., redirecting attention).

The next section will discuss how variations of trust may impact innovation speed, by reducing defensive routines.

### 4.3 Increasing innovation speed from trust

For the purpose of trust, this concept was stated to vary depending on degree and setting. Understanding *what type of trust* is present is therefore relevant. To overcome defensive routines and facilitating change, acquiring an awareness of the mechanisms driving trust and tension on behalf of the employees has been important to know how innovation speed may be increased.

In this case, trust seeks to increase innovation speed (adoption). As redirecting attention and loyalty (an outcome of taking self-inflicted responsibility) is understood to be a defensive strategy that reduces innovation speed, finding the right trust mechanism that reduces emotional tension and the sense of disconnect, enhances work-related meaning, and focuses attention on the innovation is important. What is described as trust mechanisms (see Fig. 3) are from the interviews and analysis understood to be important factors that impact employees' experiences and thus emotions (e.g., tension) towards the laboratory service. For this reason, as trust initiatives (e.g., trust mechanisms) are understood to impact emotions and defensive routines and thus the ability to trust, there exists a connection between the three variables *trust*, *emotion*, and *defensive routines* (see Fig. 3). However, it is important to keep in mind the complex multi-location laboratory structure (e.g., lack of coherence) and the challenges with the instruments, which in this case seems to have placed barriers for the management and employee dialogue and connection.

How the various trust and tension-creating mechanisms may impact trust, and reverse defensive routines in this context, will be explained next.

Trust was stated to be associated with expectations of being heard, of positive responses, or from receiving innovation benefits (Clegg et al., 2002). Furthermore, it was stressed to link to the probability of beneficial actions (Gambetta, 1988). Not being able to be sufficiently available towards the primary health service and not feeling heard, prioritized, or been given enough resources (compensate activities) to perform all the needed tasks are therefore understood as tension-creating mechanisms. These have thus enhanced uncertainty towards the innovation and the way management has handled the situation. Redirecting attention and loyalty away from the innovation might in this sense be impacted from employees being able to foresee negative consequences of management decisions. As employees might feel they are in a better position (proximity to the primary health service/competence) to know what is best for their customers, not being considered may place a barrier to trust generation.

As the tension had been physically experienced by the employees over time (e.g., burnout), discouragement had been formed from not feeling heard (e.g., experienced negative responses from management). The combination of having communicated needs, and the sense of important issues being filtered and addressed at a later point, may thus have framed future expectations towards management in a way that had

limited the belief that the innovation was beneficial (disconnect) (benefits are less likely to happen). This belief may thus have contributed to employees finding their own ways by taking responsibility (defensive strategy/action) from self-interest, e.g., professional pride (defensive reasoning). This is to reduce tension in terms of directing attention towards what is perceived as important (proximity to the primary health service), and which provide benefits (in this case work-related meaning, e.g., professional pride/feeling superfluous/competent/personal causes and situational control). Attention and loyalty, which are perceived as conditions for trust generation, are in this way directed towards the primary health service, by making sure they were doing things the right way (responsibility as a defensive strategy for self-protection) (Probst & Büchel, 1997). For this reason, innovation speed may be enhanced from trust by communicating innovation benefits towards employees from the start (e.g., Romme, 2003) of the innovation implementation. This is because enhanced clarity/performance certainty, innovation understanding, and training as well as feeling heard may limit employees' need to cope, hold on to what is familiar/manageable (e.g., previous routines), and having to justify and compensate for their experienced and assumed weaknesses. However, innovation speed is only assumed to be enhanced if mixed messages (Argyris, 1986) are avoided in this case. This is because tension was created by not having experienced the told benefits (e.g., being given more time for favored tasks) during the project part 1. As being given more time was one of the original ideas with the innovation (communicated in meetings), challenges and the uncertainty with part 1 of the project had made this benefit difficult to comply. Consequently, addressing this issue at a later point in time had triggered defensive responses regarding the innovation situation. Time therefore seems to be an important dimension in this case in terms of tension creation, and a factor which may impact when a message becomes *mixed* and when defensive reasoning starts. Knowing this boundary is meaningful for message consistency/predictability, which is understood as significant for trust and innovation speed in this case. Creating a space for employee participation where employees feel heard is understood as essential to reduce negative rumors and self-interest-seeking reasoning and tension. In this way, trust generation is understood to start when tension-creating mechanisms are reversed (taking action) by management (see Fig. 3). The amount of tension-creating mechanisms addressed might thus state something about the level of trust generated between management and employees, impacting the probability for innovation adoption. As defensive reasoning is connected to defensive strategies/action, reversing tension-creating mechanisms may impact selfless reasoning to trust (e.g., overruling defensive self-interest-seeking reasoning) due to positive expectations of management facilitating innovation benefits. Hence, defensive reasoning may be looked upon as part of the process to trust management and the innovation. In this way, trust may be perceived as an outcome of employees' selfless reasoning, due to the act of reducing emotional

tension (tension-creation mechanisms), disconnect, and defensive reasoning towards management and the innovation. In this way, the defensive strategy of responsibility may, from trust, be redirected back towards the innovation (alter the sense of *proximity* towards the innovation), consequently increasing innovation speed.

By feeling heard, supported, and gaining the needed resources to be available, it may enhance employees' beliefs of being supported in the future (e.g., delayed reciprocity) (McEvily et al., 2003). Moreover, expectations of support, clarity, and meaning with the new situation may provide a sense of acceptability and uncertainty tolerance (McEvily et al., 2003). As *predictability* was understood to be important for the employees, employees may be guided to trust by expectations of being heard/supported (reasoning to trust). Consequently, trust might enhance the tolerance for the laboratory situation being uncertain, directing attention and loyalty (e.g., acceptance) towards the innovation. *Speeding up* might in this sense involve reduced tension and enhanced sense of connection (dialogue) with management, limiting defensive routines. Moreover, self-criticism is assumed to link to uncertainty towards own and others' performance, and a lack of control (e.g., feeling powerless and frustrated) due to a lack of resources given to perform optimally regarding the innovation. As the employees wished the tasks towards the primary health service were looked upon as important (being given resources), expectations of being supported in this matter seemed to be limited. Being self-critical could therefore be the result of taking responsibility from uncertainty tolerance being low. As being accountable enhanced self-criticism (Schillemans & Smulders, 2015; Tetlock et al., 1989), the fact that employees took responsibility (self-inflicted responsibility) on such a high level when they were not expected to show the value of communicating expectations and needs for innovation speed (facilitating positive attitudes, e.g., selfless reasoning) towards management intentions with the innovation. Managerial action thus frames expectations and willingness to adopt the innovation.

It is important to keep in mind that finding the right balance for trust depends on various factors (e.g., change in organizational structure, management availability, and needs). In this case, the laboratory structure (organizing style) as well as the pressured situation for management (see Table 1) seems to have created distance between managers and employees. Moreover, the fact that the hospital was mentioned to be governed by others (e.g., government level) and various agreements plays an important part in relation to managers' ability to perform acts of trust. As the tension-creating mechanisms are assumed as essential for trust generation in this case, they might vary in importance and change between employees at different points in time. Moreover, as reducing tension-creating mechanisms may make the situation more bearable for the employees, it does not mean that the goal of innovation adoption is reached.

The paper findings indicate that innovation implementation decisions have been made without sufficient consultation and regard of the employees' knowledge and experience.

A more traditional approach to management and change seems in this way to have impacted employees negatively. Consequently, the organization style in this case seems not to be consistent with the traditional Norwegian Work Life Model. Furthermore, we argue that trust is an important factor to enhance innovation speed. However, as trust creation is highly complicated, it is hard to break it down and analyze it. As a result, trust in this case may be understood as a consequence of positive emotions employees may develop based on *organizational characteristics* (e.g., management decisions, atmosphere, communication/dialogue, and participation/involvement). From this view, trust is understood as reflexive, modified from a reactive response to the experienced organization style.

### 4.4 Practical implications for innovation speed

Enhancing technology (medical instruments and equipment) is essential to increase blood analysis efficiency and in this way meet patient needs in better ways. For urgent and critical hospital situations (e.g., the COVID-19 situation), we argue that speed is an important element for innovation implementation success. Moreover, as urgent situations often involve making fast decisions, technical knowledge, achieving common objectives, and professional responsibility place a special emphasis on the importance of the ability to trust management.

Successful innovation implementation in organizations requires managers that take action towards enhancing the connection with their employees. As this case has shown, negative rumors, self-interest-seeking reasoning, and tension are factors which might reduce innovation speed. Creating a social environment by facilitating a space for employee participation where employees feel heard and supported (e.g., empowered) is therefore essential. This involves providing positive responses to employee's needs (tension-creating mechanisms), which may impact innovation understanding and frame employees' positive expectations of the innovation being beneficial.

Reducing the sense of loss and focusing attention on the innovation can be done by providing meaning and protecting employees' professional pride. Therefore, managers should provide enough information for the reasons and consequences for innovation implementation (information regarding resources, competence, being able to use education). Being available for the employees as well as facilitating the needed resources for employees to feel available (e.g., proximity) towards the primary health service may thus produce positive emotions and a sense of predictability. This might impact future expectations of being supported (from positive reasoning to trust), consequently limiting employees from performing defensive routines.

As trustful actions by management are assumed to link to positive expectations from selfless reasoning, facilitating resources (compensating activities, avoiding postponing problems, and taking action) may limit employees' sense of uncertainty and lack of control (towards own competence, the context, and customer needs). This might reduce self-inflicted responsibility and self-criticism, shifting the focus towards the innovation. In the light of this, facilitating transparency and dialogue of expectations and needs towards communicative tasks involving the primary health service might reduce the disconnect between managers and employees. In effect, reducing the sense of having to manage tasks and take responsibility alone (self-inflicted responsibility) may impact positive expectations of managers' decision-making abilities.

### 4.5 Limitations and further research

We are aware that there are other views that may provide different perspectives to the study.

For the purpose of innovation adoption, this could involve alternative approaches to scientific management, e.g., employee-driven innovation or workplace innovation. Moreover, as speed could be a function of a sense of urgency (e.g., COVID-19) (Kotter, 2008), the concept of trust subject to the importance of speed for urgency, and having a shared vision, could be a topic for further research in relation to different organizations facing rapid change. In this sense, a focus could be placed on corporate transformation (facilitated by a shared vision of the intended outcomes of the transformation). Moreover, issues of autonomy, participation, and forms of participatory action research could be explored to take the case forward. Equally important, the ability to trust might change depending on context (e.g., organizational structure or availability of management). In this sense, one might investigate the relevance of time as a dimension for tension-creation and defensive routines in this context.

As the study describes a context-specific description of trust in one specific situation, the implications made to generate trust may vary in other settings. Generalizing trust and tension-creating mechanisms for innovation speed within the health sector thus means that more studies on this issue are needed. In the light of this, we acknowledge that the ability to trust is complex and based on various factors. As we recognize a connection between level of trust and defensive routines, this connection needs further research. For example, degree of defensive reasoning and routines, and the ability to trust may, in addition to management and organization style, vary depending on deeper human characteristics (e.g., psychology, sociology, anthropology) placed outside of the boundary of this paper. Thereupon, by going deeper into each individual employee need, one might reveal new mechanisms, which could be employee specific, to increase innovation speed (individual level). In this case, it could be possible to provide enhanced insight regarding the

mechanisms driving defensive reasoning (e.g., professional pride) on behalf of each individual. This could facilitate learning in relation to motivation measures for selfless reasoning facilitating a linking of individual and organizational levels for innovation speed. Similarly, as we observe a connection between *emotion, defensive routines*, and *trust* (see Fig. 3), a better understanding of the appropriate levels (e.g., amount/balance of variables subject to the three factors) that must be present for innovation adoption to occur (turning point) in this context is needed.

In relation to emotional tension, e.g., *stress* and *burnout*, we acknowledge some of the complexities of using these terms to the context of hospitals, as there exist different understandings of the terms among disciplines. Additionally, 3 months is not considered enough time to fully understand the complexities of the overall situation. Hence, we highlight the importance of stress and burnout as terms having various connotations among disciplines. Therefore, to seek a more accurate explanation of what stress and burnout mean in this case, the facilitating factors for defensive routines/tension-creating mechanisms (see Fig. 3) are a description of what social and environmental factors (that over time) might have contributed to employees' response. Additionally, the amounts of tension-creating mechanisms might impact the level of trust generated between management and employees. However, as only an assumption could be made of the link between level of trust and probability for innovation adoption, investigating this connection in relation to defensive routines could be valuable.

As interviews were performed on behalf of employees, creating a context including management has involved workshop notes and reports. Information, reports, or measures taken place beyond this point in time have thus not been included in the study. As the project report does not state anything more than organizational development being postponed to another project, only an assumption could be made on this part being addressed in the project's part 2 from information at the workshop. Moreover, since this paper has taken the employee perspective in a complex organizational structure, further research could involve defensive routines on behalf of management. This might provide in-depth insight of the "why" of defensive routines developed in this case. Moreover, it would give more input on relational and dynamic connections regarding defensive routines and how they might vary and change between organizational levels. Furthermore, the concept of self-interest-seeking behavior (e.g., professional pride and control) and thus meaning creation from tension may connect to the concept of "sensemaking" (e.g., Weick, Sutcliffe, & Obstfeld, 2005) and could be a form of "negative sensemaking" which may link to trust generation. This connection is worth investigating.

### 4.6 Policy implications

Being able to take part in a politically and regionally governed public innovation system (e.g., regional hospital structure) has made it possible to yield important insights for decision-makers and future policy decisions within the context of innovation and structural change (e.g., innovation centralization). The study results have contributed to lifting the discussion with regard to the regional innovation system by providing a glimpse into the effects of a structural hospital change associated with a lack of employee involvement. We therefore argue for the importance for policy makers to consider employee (e.g., innovation users) voice and participation (starting from the initial stages of the decision-making process) to avoid the development of defensive reasoning and routines as it may slow down the innovation adoption process. Understanding what cues breed a higher level of commitment and trust towards management and the innovation may in this way boost innovation progress. The findings lay forward political guidelines to important incentive systems politicians and hospital division managers can initiate to enhance the pace of innovation adoption in a structural change context. In this way, the study has facilitated a framework with significant factors the authorities may use for innovation understanding. Moreover, understanding the importance of addressing the darker side of innovation is significant for patients and the society (e.g., urgent situations and crisis). Accordingly, it may simplify the process of earning financial support for research, innovation, and sustainable growth (e.g., The Norwegian Research Council or Innovation Norway).

## 5 Conclusion

To help organizations with innovation implementation success, a focus has been placed on important mechanisms driving trust creation for innovation speed towards innovation adoption in the context of the Norwegian Work Life Model. By investigating hospital employees' experiences with implementing new laboratory instruments for blood test analysis, tension-creating mechanisms understood as barriers to innovation speed could be addressed.

The study shows that employee emotional tension within a context of organizational innovation and complex organizational structures facilitates disconnection and defensive routines towards management and the innovation. This involves self-interest seeking reasoning (e.g., professional pride) and defensive acts of self-inflicted responsibility, which may redirect employee's attention away from the innovation efforts and towards what is perceived as meaningful. Consequently, the study provides a new and contextual understanding of defensive reasoning and behavior for trust and innovation speed. To enhance innovation speed from trust, the study discusses relevant types of trust mechanisms applicable for this case, emphasizing the importance of managers' role in creating a space for employee voice and meaning. Timing, availability, communicating expectations, participation, and addressing various emotional tension-creating mechanisms are in this sense understood as essential elements which may impact positive reasoning to trust. Having a human-centered focus throughout the innovation implementation process is thus understood as equally important to enhance trust and the pace of innovation adoption, as the innovation itself.

### Abbreviations

ARA model: Actors-Resources-Activities model; NVivo: Qualitative data analysis software; VR: Virtual reality; AR: Augmented reality; COVID-19: Coronavirus disease 2019.

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### Author's contributions

This case study has been performed by CMM. The author read and approved the final manuscript.

**Authors' information**

This study is part of my Ph.D. project on behalf of the Norwegian University of Science and Technology and the Department of Mechanical and Industrial Engineering. The data collection has been performed through a 3-month Ph.D. placement at a hospital. On behalf of the hospital and my own research, my work consisted of performing interviews and preparing a report in which I gave an account of employees' experiences with an ongoing innovation implementation to facilitate innovation success. The data in this article builds on the interviews that were conducted. All employees were informed of the purpose of the study (on behalf of the hospital and my own Ph.D.) and confidentiality prior to the interviews. Considering this, there have been no conflicts of interest to disclose.

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**Availability of data and materials**

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Competing interests**

The author declares that there are no competing interests.

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### 6.3 Paper III

# Towards a sense of urgency for innovation realization:
# -A case study on complacency asymmetries in interorganizational relations

Christina Marie Mitcheltree

Paper III

**Abstract**

This paper seeks to explore the concept of complacency as a barrier to the sense of urgency within product innovation by investigating the concept on behalf of interfirm project partners. More specifically, the study aims to understand complacency within the context of an industrial research project in Norway subject to material substitution of an energy transmission tower. As such, the study seeks to give a contextual understanding of complacency for innovation realization (e.g. innovation speed) from a single case study. The study identified different complacency mechanism asymmetries on behalf of the actors, as well as the varying reasons (drivers) to why urgency gaps may occur among actors. The urgency gaps were found to impact a sense of urgency and thus innovation speed negatively. The asymmetries are presented from the drivers: Role understanding, competence, project intent, risk and trust. Moreover, the urgency gaps´ implications for interorganizational project collaboration, and how it contributes to theory on industrial product innovation, are explained.

The findings contribute with new insights on important mechanisms for how a sense of urgency may be enhanced in research projects subject to interorganizational innovation. Theoretical contributions thus relate to enhanced understanding of complacency asymmetry in product innovation collaboration, and how trust is an important dimension for urgency creation.

Keywords: *Urgency; product innovation; innovation speed; aluminum; complacency asymmetries; case study*

## 1 Introduction

In a fast-paced world, creating a sense of urgency among individuals is argued to be an important part of leadership for successful organizational change (Kotter, 2008). From Kotter's view, as great suffering is associated with not managing urgency challenges well (e.g. producing failure, disappointment and pain), one should distinguish *false* from a *true* sense of urgency. Having a false sense of urgency involves being proactive and alert, but from feelings of anxiety, contentment, frustration or anger (e.g. facilitating burnout). Complacency is thus a thought about own behavior (e.g. problems do not require changes in own behavior) and "a feeling of contentment or self-satisfaction, especially when coupled with an unawareness of danger and trouble" (Kotter, 2008).

Establishing a sense of true urgency is "the first step in a series of actions needed to succeed in a changing world" (Kotter 2008). It is the first stage in Kotter's (1996) eight stage process of creating a major change (e.g. organizational transformation) (Mento, Jones et al., 2002). Leaders should in this way connect emotionally to the heart of others, awakening emotions from experiences individuals can relate to (Kautt, 2009). Hence, "the change process goes through a series of phases that, in total, usually require a considerable length of time. Skipping steps creates only the illusion of speed and never produces satisfying results" (Kotter, 1995). In this sense, false urgency and complacency are oppositions to true urgency.

A main emphasis in this paper is complacency in relation to the urgency of realizing innovation. The concept of complacency and establishing a sense of urgency has mainly been studied in related to the context of hierarchical organizational change (e.g. Kotter, 1996, 2008; Campbell 2008; Golden-Biddle 2013; Kuhnert 2014; Pollack and Pollack 2015; Hackman 2017; MacQueen 2019). Other areas urgency and complacency has been examined for change and progress are in relation to technology integration (Swenty and Titzer, 2014), disease concern (e.g. mobilization and public interest) (Newman and Persson, 2009), strategic manager roles in corporate entrepreneurial processes (Ren and Guo, 2011), performance's pressure on product quality (Rodríguez-Escudero et al. 2010), and urgent action to combat climate change (e.g. risk communication or climate change adaption) (Mbeva, Makomere et al. 2019; Poortvliet, Niles et al., 2020).

Relevant for this paper, is complacency in studies on interorganizational product innovation. Product or process innovation is important for organizational success, survival, and renewal (Shona and Kathleen, 1995). Scholars have studied complacency subject to the context of product and service projects (Ligthart, Oerlemans et al., 2016; Vichara, Nathalie et al., 2018; Yström, Ollila et al., 2019), product development teams (Menon, Chowdhury et al., 2002; Shikhar and Colarelli, 2009; Huang and Huang, 2020; Lei, Fang et al., 2020) and networks (Cravens, D. W., et al., 1994; Kim, Oh et al., 2006; Jean, R.-J. B., et al., 2014). However, as these

studies provide some insights of the importance of interfirm complacent attitudes and behavior, they do not investigate complacency directly for innovation progress, nor are they related to a material substitution project. Hence, acquiring a sense of urgency seems to have received little attention with regards to interorganizational research projects within the industry.

Within the industry, innovation speed is essential to keep up with industry needs and reduce costs (Higson, Patrick et al., 2002). Industry innovation speed is stated as the rate of innovation activities in an industry (Yao, Zeng et al., 2019). However, innovation speed may not always be beneficial for organizational performance (e.g. brand equity) (Yao, Zeng et al., 2019). Applicable to product innovation projects, enhanced innovation quality and speed requires managers that gather actors with varying functional specialties and expertise (Shikhar and Vijay, 2001). In this way, product innovation success is achieved from learning by challenging ideas and opinions of others (Sarin and McDermott, 2003). A higher level of collaborative exchanges and understanding of a partners capability enhances access to external resources and information relevant to innovation performance (Squire, Cousins et al., 2009). However, too much collaboration (e.g. from trust) might lead to complacency within the value chain (Rossetti and Choi, 2005) in terms of reduced manufacturing responsiveness (e.g. action) (Squire, Cousins et al., 2009). Encouraging a conflict averse and harmonious collaborative climate may in this way place barriers to innovation performance (Sarin and McDermott, 2003). Finding the optimal level of project collaboration is therefore relevant for innovation performance in this context (Squire, Cousins et al., 2009).

Kotter's (1996) process for change has been criticized for lacking details as to how it should be applied to guide management (Pfeifer, Schmitt et al., 2005), and for not being general enough (Pollack and Pollack, 2015). Moreover, the model is argued to not address organizational culture (e.g. organizational narrative) as an integral part of the change process and the organization (MacQueen, 2019). Furthermore, as Kotter stresses, previous successes as a main precondition to complacency, it is hard to grasp the depth of *reasons* for developing complacency, as well as *dividing* between preconditions for complacency and complacent response. As changing complacency in an organization is stated as a cultural intervention, one should thus gain an understanding by asking *how* and *why* questions (MacQueen, 2019). A more general outline of what constitutes complacency is thus valuable for recognizing types of complacent behavior. Assessing the organic reality of the organization rather than stereotypical descriptions is therefore important as the latter may lead to neglect of essential details for understanding and evaluating the organization (MacQueen, 2019).

In terms of implementing interorganizational change, network inertia (Kim, Oh et al., 2006) as well as overcoming collaborative friction (Le Ber and Branzei, 2010) are stressed as important challenges that needs more attention. In this regard, there is a call for socioemotional ways to stimulate learning and capability transfer among actors (e.g. ability to recognize and adjust other partners cues) towards shared goals (Le Ber and Branzei, 2010).

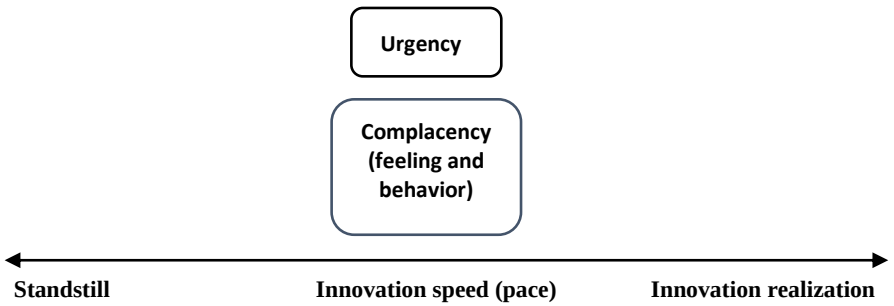
As complacency seems to provide important consequences for innovation performance, and speed is essential to keep up with needs within the industry, it is a bit surprising that complacent attitudes and behavior in innovation projects has received so little attention with regards to industrial innovation processes. Drawing on Kotter's (1996, 2008) view, a theoretical contribution in this paper is thus the exploration of complacency asymmetry (described in this paper as a prerequisite for urgency gaps) of participating actors in relation to the dimension of industrial material substitution research projects. For this reason, the concept of urgency is applied to the *progress* and thus *pace* of product innovation (e.g. innovation speed) in this paper. An emphasis is placed on understanding complacency mechanisms, and thus barriers and opportunities for urgency in an interorganizational project context.
As a co-operative innovative component seems to be missing within the literature on organizational hierarchical urgency, and the concept of true urgency is lacking within the industrial material substitution domain, this paper seek to provide a context-based understanding of urgency drivers from a level of actor *commitment* and *co-operation* (e.g. true urgency). To be able to contribute with new insight on important mechanisms for urgency in innovations, the goal is to understand the following questions: *What is complacency within product innovation? What factors (barriers/enablers) should a project leader be aware of, and how does this vary across actors in a research project (e.g. complacency asymmetry)? Why does this matter for acquiring a sense of urgency?* The results seek to provide some guidelines as to how a true urgency strategy may be achieved for product innovation in this context. The study begins with addressing a theoretical framework of complacency from studies chosen as relevant to answer the research questions. Following the literature review, comes a description of the case and the participating organizations, a methods section and a combined results and discussion section. Finally, a conclusion is made involving suggestions for further research.

## 2 Literature review

This section provides a theoretical framework to gain insight on the concept of complacency, its applicability to product innovation, and its impact on innovation speed and realization. Figure 1 shows a *speed line* measuring *innovation speed*

(pace). A high level of innovation speed leads to *innovation realization*, whereas a low level results in a state of *standstill*. Hence, a high pace of innovation speed towards realization relies on two factors: *Complacency* and *a sense of urgency*. In this study a main emphasis is placed on complacency which in this case is understood as detrimental to innovation realization. As such it will only be directed one way (towards standstill) on the speed line. Urgency may be directed both ways, as it is dependent on, and understood to be an opposition to complacency. Enhanced complacency has a negative impact on a sense of urgency and the opposite. Hence, for innovation realization to occur, a sense of urgency needs to be present. For an elaborated version of figure 1 showing contributing variables (e.g. findings) to innovation realization as well as the connection between complacency and urgency, see figure 2.

*Figure 1. Innovation speed line with contributing factors for innovation realization*




## 2.1 Theoretical framework

### *2.1.1 Complacency as a concept*

Complacency is a type of resistance to change, impacting inertial thinking which is integrated in organizational culture (Kotter and Cohen, 2002).

Organizational change is argued to be top-led (Pollack and Pollack, 2015). One way of handling complacency in organizations is by manufacturing an organizational crisis (a disruption of the workflow) (MacQueen, 2019). However, change only occurs when modifying individuals' perception (Kotter and Cohen, 2002; Bolisani and Bratianu, 2018). A sense of urgency thus limits individuals to cling to the status quo and resist change. It consists of helping actors see and feel the reason to change (Campbell, 2008). Relevant sources of complacency are from Kotter (1996) view: The absence of crisis, too many visible resources, low overall performance standards, organizational structures focusing on narrow functional goals, denial, and low confrontation culture. However, as Kotter (1996) stresses trust as a missing factor in many organizations, and that this is one reason why individuals do not

commit to *the overall excellence*, he continues to suggest dishonest actions which potentially could break trust (Hughes, 2016). Nevertheless, as enhancing rivalry and urgency speeds up innovative activities, it does not breed co-operation and trust (Lang, 2009).

For chosen and relevant signs of complacency for this study see table 2.

The concept of complacency is argued to derive from incidents and accidents related to the aviation community (pilots or air traffic controllers assuming all is well) (Parasuraman and Manzey, 2010). It has also been associated with cruise ship crises (Parasuraman and Riley, 1997). Three features common to accident and empirical human studies may provide a description of complacency: Human operator monitoring (e.g. automated system), low monitoring frequency (Moray & Inagaki, 2000), and low system performance/reaction (e.g. malfunction or a failure is missed) (Parasuraman, Molloy et al., 1993). As time is important for a fast reaction, a delayed reaction thus equals *a miss* (Parasuraman and Manzey, 2010).

There is no common agreement on the definition of complacency, hence, describing complacency characteristics through empirical research is stated as useful (Parasuraman and Manzey, 2010)**.**

The next section will describe complacency within actor collaborations subject to actor role, knowledge asymmetry and risk.

### *2.1.2 Actor role, knowledge asymmetry and risk*

Investments in old ways of working are culturally integrated in organizations, impacting organizations and operations (Mezias et al., 2001). Hence, past actions and successes enhance rejection of contradictory information of existing beliefs. Complacency thus involves unlearning (Akgün, Byrne et al., 2007). As cultures emphasizing order and stability tend to have a status quo and complacency environment, risk is discouraged. This is negative for innovation (Menon, Chowdhury et al., 2002). Furthermore, vertically integrated and hierarchically organized organizations may find it hard to form collaborative relationships with other organizations (Cravens, D. W., et al., 1994). A sense of urgency for change thus relies on *risk* and *environmental complexity* as well as *resource gaps* between companies. In this sense, some have found a *healthy dose of constraint* positive for innovation as complacency derived when constraint was non existent (Drejer and Jørgensen, 2005). Although this may be true, shared goals has been stated to be resilient to partner friction in cross-sector partnership. Hence, it requires a recalibration of roles to enhance the connection between social value creation and risk (preventing premature failure, speeding up success rates) (Le Ber and Branzei, 2010). Reducing relational risk enablers and enhancing relational attachment thus facilitates a turnaround from innovation failure to success as it enhances the effect of role (re) calibrations. Despite this, complacency in terms of lacking ongoing investment of time and energy into renewing social partnership value, and partner

disillusionment, had a negative impact on relational attachment and role recalibration (Le Ber and Branzei, 2010).

Furthermore, inertia is stated as a result of complacency. Hence, it facilitates an inattention to change (e.g. in technology or customer needs). Enhancing partner relationships is in this way essential to avoid competitors from entering (Lieberman and Montgomery, 1988). Managing innovation thus involves protecting against late entrant *free-riding* or imitation (e.g. patents) (Lieberman and Montgomery, 1988). In some projects, individuals may perceive processes as *unrelated commodities*, failing to analyze them as one. The *silo* approach in contrast to a cross-functional approach to collaboration may thus result in project failure (Pinedo-Cuenca et al., 2012). Wandering along from one project to another without securing improvements (e.g. connecting projects) and making sure they are sustainable in the future, will also make a project suffer (Pinedo-Cuenca et al., 2012; McLean, Antony et al., 2017). Project failure is thus stated to derive from an absence of involvement from e.g. a sponsor working towards progress and success, or an owner/leader not providing enough urgency throughout the project. Committing full-time resources to lead the project is therefore needed without involving key project participants, as this may result in operational pressure (McLean, Antony et al., 2017).
Like resource gaps, moderate levels of role conflict and ambiguity may have positive impacts on product quality (Rodríguez-Escudero et al., 2010). In the same way, task uncertainty (R&D co-operation) is stated to lead to decentralization of coordination and control practices. Equivocality thus facilitates group co-ordination, as it limits the need for informal ongoing monitoring (Sherratt, Sherratt et al., 2020). Although this may be true, it is suggested that project or group planning activities should be done in the initial stages to create a seamless view, avoiding misunderstandings and misalignment of low committed partners. Partner differences thus require communication and negotiation to reach a common objective (Drejer and Jørgensen, 2005). Planning is especially important when partners cultural basis (e.g. systems, identity and mission) are different as it impacts askew perceptions of partners work (Siegel, Waldman et al., 2003). Additionally, differing goals may impact changes of direction, slowing down research activities (Lacetera, 2009). Moreover, differing perspectives can impact actors focus (e.g. micro vs. macro). Having a narrow focus may thus lead to critical myopia (Sherratt, Sherratt et al., 2020).
Comparatively, tacit knowledge (relating to experience and cognition of the individual) frames role visions and process adaptiveness (Dawson, Watson et al., 2014). As participants in a co-operation may have various levels of information about other partners, asymmetric information is detrimental to high quality gods and services (Dawson, Watson et al., 2014). In this sense, complacency may link to project information asymmetry (e.g. type of knowledge) which might lead to opportunistic behavior (Dawson, Watson et al., 2014). Where information

asymmetry occurs, moral hazard may thus be present, as the partner knowing the most (e.g. own intentions) might take on more risk than a partner knowing less. In this way, one partner might have higher risk connected to e.g. industrial secret transfer and opportunistic behavior within the co-operation. However, this is usually bound by confidentiality contracts (Morandi, 2011). Nevertheless, perceiving a relationship as an unbalanced dependency may lead to uncertainty and feelings of *imprisonment*. This means that if one actor invests in specialized goods, it makes it harder for e.g. a supplier to change the supply (Ryals and Humphries, 2010). Accordingly, performance is motivated by high mutual expectations and accountability. This require that organizational capability and commitments are compatible (assess execution gaps). Avoiding partner disengagement may therefore be possible from assessing collaboration capacity by understanding partnership commitment/connection, clarity of purpose, congruency of mission, creation of value, communication and continual learning (Austin, 2000).
Having searched for complacency and reasons for complacency within the literature on actor collaboration, trust recurred as a relevant factor. Trust will therefore be described in relation to complacency in the next section.

### *2.1.3 Complacency and trust*

In relation to complacent attitudes and behavior, trust may reduce efforts of monitoring and control, leaving a partner exposed to being taken advantage of (Wuyts and Geyskens, 2005; Granovetter, 2005; Gargiulo and Ertug, 2006; Villena, Revilla et al., 2011). Being given relation-specific knowledge thus drives complacent role behavior (not providing a full effort). On the contrary, trust may from previous positive experiences impact actor's selflessness and flexibility positively. Familiarity from trust thus enhances collaborative routines (project performance) (Gulati, 1995; Elfenbein and Zenger, 2014; Ligthart, Oerlemans et al., 2016). In effect, as trust reduces uncertainty, it enhances dialogue, fast decision making and transfer of tacit knowledge (Almeida and Kogut, 1999). Knowing (from trust) that a partner will not misuse the knowledge at a partner's expense, thus makes it more likely that important knowledge is shared (enhance innovation) (Jean, Sinkovics et al., 2014). However, trust may trap actors in unnecessary obligation exchanges (using resources without providing benefits) (Gargiulo and Ertug, 2006). Nevertheless, complacent behavior breeds partner stability (trapping actors in initial routines) and reduces competitive intensity (Hurmelinna-Laukkanen, Olander et al., 2012; Jois and Chakrabarti, 2020). Complacency in this way facilitate actors to choose the most intuitive idea instead of investing in better idea generation (Dujuan, Song et al., 2018).
Equally important, strong intra-cluster relationships involves norm conformity, a type of complacency that reduce innovation (narrow focus) (Lang, 2009). Isolation and own *worldviews* might thus (similar to the silo approach) result in strategic

inertia and insular competitive practices, limiting the search for external resources (Lang, 2009). Trust is thus viewed as a filter for external information (actors being isolated) (Uzzi, 1997), as there is a lower investment with familiar partners. In this way, it may breed *overconfidence* where an actor overlook potential opportunities leading to product innovation (Jean, Sinkovics et al., 2014). Complacency may in this way be associated with trusting relationships as they are less likely to address problems (performance decline) (Villena, Revilla et al., 2011). Hence, network inertia is "a persistent organizational resistance to changing interorganizational dyadic ties or difficulties that an organization faces when it attempts to dissolve old relationships and form new network ties" (Kim, Oh et al., 2006). Mechanisms consistent with inertia and network change constraints are related to an organization's internal context (intraorganizational networks), network tie specific context (interorganizational dyadic ties), network position (interorganizational network position), and external environment (interorganizational field) constrain network change, and how internal and network tie specific constraints jointly affect network change (Kim, Oh et al., 2006).

### 2.2 Case description

This case was a three-year energy transmission tower project (involving a Norwegian state-owned customer) subject to aluminum substitution. Energy transmission towers in Norway have traditionally been made using concrete, glass fiber reinforced polymer (GFRP) composite, steel, and aluminum (Hillestad, 1984). Steel pylons are the most widely used in the main grid in Norway (NVE, 2009). Aluminum has been used in energy transmission towers in Norway and dates to 1968 (Øvre Årdal line). Furthermore, there are aluminum pylons from 1971 (Øvre Årdal-Fortun III) and 1991 (Frøystul-Såheim). Similarly, as the design of these pylons were a substitute idea of the steel design, it resulted in costly and less robust solutions as less load could be achieved with this type of aluminum (6082 alloy). Aluminum has thus been argued to not be able to compete with steel mostly due to economic reasons (Hillestad, 1984). In this way, aluminum pylons have been perceived as significantly more expensive, if not exceptionally large savings in transport and assembly could be reached due to reduced weight (Hillestad, 1984). Nevertheless, aluminum manufacturers have previously not been able to successfully develop the pylons further.

In the recent years' aluminum pylons has been found to have significantly lower CO2 emissions than standard steel pylons (EFLA, 2018). This involves the fact that it is a lighter material than steel, is easier to transport (e.g. reduced helicopter lifts) and safer to assemble (fewer manual operations, shorter assembly time, fewer components and modular structures). However, a report from the Norwegian Water Resources and Energy Administration (NVE), stated that upgrading the regional grid

to hold larger volt levels involves substantial costs which are not seen by the authorities as socio-economically profitable (NVE, 2015). Moreover, as the existing power grid development in Norway was mainly done in the 1950s and 1970s, the standard of the time involved a lack of redundancy which has made modernizations and changes difficult (Elnet, 2019).

As the current energy transmission towers in steel had been part of the larger electricity grid, they were now approaching the end of their life span. Hence, one of the main drivers for the customers´ need to change the grid as well as the energy transmission tower supporting it, was the need to maintain a satisfactory operational reliability (e.g. robustness) as well as meeting sustainability measures and future electricity consumption demands. The customer had initiated various recent research and development projects, each emphasizing different sustainable factors in relation to energy transmission towers in Norway (e.g. geometry, choice of alloy, material durability and condition resistance and recyclability). However, these projects had been directed at developing pylons for low and medium voltage distribution grids (<132 kV). As the highest voltage used in the power grid in Norway is 420kV, galvanized steel has mainly been used due to the high stresses a pylon must withstand at this voltage level (NVE, 2009).

The case project for this paper is related to research and development of a tower construction based on extruded aluminum profiles created to withstand a 420 kV transmission grid. The co-operation thus involved an energy transmission tower prototype in aluminum that could substitute the 50-year-old technology and geometry of todays´ pylons in steel, and which could be adapted to the highest voltage levels, the Nordic climate and topography. The project had a basis in the customers need. The aim of the project was to make the product construction process safer, and find the best solution from different inputs in terms of cost, material selection, weight, efficient production and assembly solution.

The project was an innovation co-operation supported by the Norwegian Research Council (user driven innovation) between eight actors related to the aluminum industry (table 1). The customer had contacted the researcher to see if the pylon substitution idea was possible. As the researcher was a member of the network association whose intent was to strengthen the opportunities for the local aluminum actors, the research project was applied for and finally supported. Participating actors therefore represented a broad range of expertise applicable to the entire product value chain. The actors are presented as *Network association* (organization A) *Researcher* (organization B) *University* (organization C) *Regional manufacturers* (organization D, E, F) *Material and process manufacturer* (organization G) and *Customer* (organization H). The goal was to contribute to sustainable value creation for Norwegian businesses and industry, through research-based innovation in companies and their collaborative research and development environments (R&D). The project was funded through the partners' own efforts and a grant from the

Research Council. In addition, the customer and Innovation Norway had contributed with financial investments. Innovation Norway is a state-owned organization with the aim of supporting innovation in industry.

The project involved a co-operation/consortium agreement stating the various actors' roles, investments and rights within the project. The project was stated by organization F to follow a milestone plan (main and sub-goals) according to the Research Councils requirements. Creating a new pylon solution would thus give knowledge of the possibilities for future aluminum pylon production in Norway. Based on project role and intent, the actors had different financial investments and risks of being involved in the project. Part of the reason for this was the later decision during the project to build the prototype with the research findings. The material and process manufacturer and organization F had thus contributed with investments. The customer was optimistic to include the building of a prototype as part of the project and not another project due to keeping the same actors. However, there was some unclarity regarding the financing of the prototype, and whether it should be part of the project. The project resulted in a prototype and pilot that underwent a full-scale impact test and passed the requirements. Benefits involved low maintenance cost, low weight, high corrosion resistance and recyclability.
Along with the new pylon development insights, various uncertainty elements became present, and impacted the co-operation dynamics. This seemed to challenge the actor's own role and the perceived role and intent of others. For this reason, this paper is an investigation of the pylon co-operation (a significant international innovation) from in-depth interviews performed with the participating actors.

*Table 1. The project actors*

| **Organization category** | ***Organization description*** | ***Project role*** |
|---|---|---|
| **Network association** | *Organization A*<br>Regional industrial network organization (association) whose mission is to contribute to development and growth on behalf of their member organizations in the region. Aim to develop competitive advantage through the ability and willingness of product delivery co-operation (close interaction between companies and R&D environments). Activity involves mechanical production, enhancement and use of light weight metallic materials within product development. Company B, D, E and F are members of this organization. | Project initiator (commercialization.) Gathered relevant actors after communication with the customer and researcher. |
| **Researcher** | *Organization B* | Understood to be project leader. |

| | | |
|---|---|---|
| | National competence center for goods production that delivers cutting-edge expertise in automated production, technology management, value chain management and materials technology. | Contributed with pylon engineering (calculations) and design. Brought forward solutions for business and the market. Got the pylon idea from the customer (the customer asked if the concept was interesting.) |
| **University** | *Organization C*<br>Research partner. | Generated generic research and articles from the project. Contributed with the building engineer part of the pylon design. |
| **Regional manufacturers** | *Organization D*<br>Manufactures and sells metal products. Offer forming and machining of different types of metals. | Contributed with processing of small units (details) and profile design. Withdrew from the project due to a change in focus e.g. less focus on pylon details. |
| | *Organization E*<br>Specializes in the production of light weight metal structures. | Welding, machining of larger profiles and assembling the pylon. |
| | *Organization F*<br>Delivers component and system solutions based on extruded, surface-treated and processed light weight metal profiles to industries. | Contributed with material technology and new alloying possibilities. |
| **Material and process manufacturer** | *Organization G*<br>Aluminum supplier. | Material supplier participating as aluminum and alloying experts. |
| **Customer** | *Organization H*<br>Builds, owns, and operates the central power grid in Norway. | Understood to be project owner. Expressed a need to use aluminum for energy transmission towers in Norway and contribute to the green shift in Europe. |

## 3 Methods

To answer the research questions, a qualitative single case study was chosen to acquire a contextual understanding and in-depth knowledge of the participating

actors and the research project to which they were part (Eisenhardt, 1989; Yin, 2009).

The study is a result of a broader research goal (connected to my PhD) to enhance the understanding of how the speed of aluminum project co-operations may be enhanced. Hence, it is a continuation of previously having undertaken the first stage of acquiring actor and project specific data. In this sense, the concept of urgency and complacency was not pre-decided at the time of the interviews, but occurred as a relevant topic from the data as to new ways of triggering innovation speed and efficiency within industrial projects.

As this is an explorative single case study, the method seeks to create a descriptive framework. As such the *number of cases, data collection techniques, unit of analysis, role of prior theory* and *analysis methods* has been emphasized (Eisenhardt, 1989). The *data collection* consisted of open questions and a semi-structured interview guide, to give as much information as possible regarding the project co-operation (e.g. relevant activities and resources), background and goals. The interviews were conducted face-to-face with key individuals (chosen from convenience and relevance to the project) within the participating companies. Snowball sampling was used to get access to the most central individuals (Naderifar, Goli et al., 2017). As this was a finished project, an exploration was performed from the actors told experience with the project, on behalf of their own (perceived) project role and intent based on the project in question. The interviews had a duration of approximately 1 hour each. There was no relationship between researcher and participant prior to the interviews that could impact the study. The *unit of analysis* was subject to one participant from each of the three reginal manufacturing companies as well as the university, two participants on behalf of the material and process manufacturer, the researcher and the network association, and four participants on behalf of the customer. The interviews were recorded and transcribed. Hence, important ethical considerations consisted of communicating confidentiality obligations, sharing information as for the reasons for the interview participation, as well as requesting informed consent on behalf of the actors. Due to the project being finished, the actors answered in retrospect. However, as some actors had been involved in previous pylon substitution projects (pre-studies) leading up to this one, limitations may have involved answers being affected by the overall pylon substitution project timeline.

On behalf of the *data analysis and interpretation,* to acquire a deeper understanding of the case, Kotter (1996, 2008) view on urgency and complacency was used as a primary source to develop questions for data analysis (see table 3). However, relevant theories have been applied within the literature review to supplement Kotter's view, and gain a wider insight (e.g. for discussion) of the concept of complacency.

According to Kotter (2008), accomplishing a true sense of urgency is about a *pressing importance* and a *gut-level determination* of achieving something important and winning today. It is driven by a belief that there exist both great hazards and opportunities (Kotter, 2008). As it facilitates motivation and initiative, critical levels of stress are avoided, as these individuals only prioritize tasks valuable to their goal. However, complacency and false urgency are barriers to organizational change, as they cultivate an inward focus, leading individuals away from acknowledging opportunities to prosper (Kotter, 2008). Enhancing urgency in this way, require removing complacency sources (Kotter, 1996). Obtaining low complacency levels is thus essential for change and to avoid product failure (Kotter, 2008).
Kotter's work is subject to establishing a true sense of urgency and addressing complacency signs within hierarchical organizations. Moreover, Kotter's theory is understood to be directed towards products or services having a higher technology readiness level (TRL). However, in this paper, the concept has been applied to cover an interorganizational research project context, having a lower TRL (e.g. product innovation). A true sense of urgency is therefore relevant in terms of *time* and *innovation speed* being valuable elements distinguishing successful from unsuccessful projects.

From this view, the goal has been to understand what the drivers are for complacent behavior among the actors. Motivational cues and cues understood to drive responsibility and commitment has therefore been emphasized (see table 3). No questions were directly related to complacency or urgency within the interviews. However, by using Kotter's signs of complacency, it was possible to recognize what could facilitate true urgency and complacent behavior within the project.
To make sense of the data, the analysis process was performed manually through color coding (Baralt, 2011) in Word. Thereupon, an understanding could be attained from sorting relevant data according to similar colored themes, writing the themes and their surrounding context in the margin of the document. Five themes stood out from the analysis and differed among the actors: *actor roles (understanding of roles)*, *competence*, *project intent*, *risk* and *trust*. These dimensions were found to be important actor preconditions impacting complacency in different ways (see figure 2), and provided a basis for comparison within the discussion. To understand and make sense of the data, the analysis process took an iterative path (Saldaña, 2016). Hence, the focus was shifted several times between the raw data, the colored themes emerging from the data, and the theory related to complacency.

A detailed description of signs subject to complacency (Kotter, 1996, 2008) used for this case is stated in table 2. Kotter's framework made it possible to create a case specific (descriptive) framework (Rowley, 2002) for important preconditions for complacent attitudes and behavior as well as complacent mechanisms found in the

study (see figure 2). However, as the starting point for data analysis has been Kotter's description of complacency for urgency, the paper does not go in-depth on urgency theory. Moreover, of importance to this study, is the value creation from an interorganizational project co-operation. Issues related to how benefits may be created on behalf of the different individual companies (organizational level) has thus been placed outside of the scope for this paper. Furthermore, a combination of an inductive and deductive approach was applied (Strauss and Corbin, 1990). This is because the chosen theories (urgency and complacency) derived from structures and information within the data, and was discussed in light of previous literature to develop implications (Thomas, 2006). The case study in this way has contributed to enhancing existing theory (Yin, 2009), as well as contributing to theory testing (Eisenhardt, 1989). The *role of prior theory* has thus been relevant for the purpose of data analysis, and to reveal the complexity of industrial research projects in this context.

The following result and discussion section seek to highlight this complexity in the light of the theoretical framework (figure 1). Important findings (variables) relevant for innovation speed are shown in figure 2.

*Table 2. Signs of complacency (a thought and a feeling of own behavior) (Kotter, 1996, 2008)*

| ***Signs of complacency (Kotter, 1996, 2008)*** |
|---|
| Previous successful projects. |
| Blaming and arrogance "problems are over there" (lack of responsibility). |
| Postponement of critical issues. |
| Cyclical jokes undermining important discussions. |
| Problems does not require changes in own actions (thinks one knows best). |
| Contentment/self-satisfaction (Content with the status quo). |
| Playing it safe: Continue with the norms of the past/what one is used to. |
| Afraid of personal consequences of change. |
| Internal focus: Looking inward and not outward (e.g. willingness to cooperate, miss what is essential for prosperity). |
| Lack of competitive instincts (not seeing problems/opportunities outside as a result of turning competition inward (e.g. bureaucratic politics). |
| Laid back/slow pace: Lack of co-operation/action. |
| Not acknowledging threats/opportunities ("you worry too much"). |
| Justifying own point of view. |
| Complacency is not recognized by the complacent individual/ sees oneself as rational. |
| Lack of competence. |

*Table 3. Questions inspired by Kotter (2008) signs of complacency used for data analysis*

| **Questions to find/understand preconditions for complacent attitudes/behavior (mechanisms impacting innovation progress (e.g. commitment)** ***Why*** **and** ***How*** | **Question to find complacency mechanisms** ***What*** |
|---|---|
| How committed are the actors?<br>What was perceived as important/relevant and critical issues? Why?<br>What has been important/meaningful topics and focus/activities among the actors (inward/outward focus)?<br>How responsible are the actors?<br>What in this case portray responsible vs. irresponsible attitudes?<br>In what way do they feel ownership? | What are the signs of contentment/complacency? |

## 4 Results and discussion

The aim of this paper has been to investigate complacency's impact on the sense of urgency and thus innovation speed, an important factor for product innovation realization. Earlier studies related to acquiring a sense of urgency by addressing complacency have mainly been linked to the context of leadership within hierarchical organizations. Moreover, research on urgency within interorganizational project collaborations seems not to involve actors' complacency cues as a stand-alone research objective. In contrast, this study looks at complacency mechanisms within industry from a collaborative (interorganizational) perspective. Consequently, it offers a more complex understanding of complacency, by looking at possible *reasons* (preconditions) as well as *responses* to complacent feelings/behavior within an interfirm context. Hence, it captures various *urgency gaps* described in this paper as variations of what constitute complacency (complacency asymmetry) among the project actors, which may impact the sense of urgency in different ways.

Kotter's model has received some critique as to lacking emphasis on the organizational narrative of organizations, *how* and *why* complacency develops (MacQueen, 2019), and trust as a source to organizational commitment (Hughes, 2016). In addition, there is a need to enhance the understanding of inertia, and overcoming collaborative friction for knowledge transfer between actors (Kim, Oh et al., 2006; Le Ber and Branzei, 2010). The paper considers these arguments in the light of actor collaboration (e.g. level of project commitment) (Rossetti and Choi, 2005; Squire, Cousins et al., 2009) and innovation speed for innovation performance within the material (e.g. metal) industry (Higson, Patrick et al., 2002). The following precondition dimensions were found and understood to have an impact on innovation

speed and the process of innovation realization: *Role understanding*, *competence*, *project intent* and *risk.*
To be able to understand the context and where the different actors are coming from in terms of resulting complacency mechanisms, an introduction of the actor's preconditions are presented in the following section. Further, the preconditions are discussed considering its perceived connection to various complacency mechanisms as well as relevant literature on complacency. Here, trust was found to be an interorganizational characteristic of importance to innovation speed. Finally, *urgency enablers* are discussed on behalf of the actors, bringing the discussion together, instigating important insights for urgency development. The discussion seeks to enhance the theory on complacency and urgency applicable to interorganizational product innovation research projects by giving a deeper understanding of the implications of urgency gaps in product innovation collaboration.

### 4.1 Actor preconditions (asymmetries)

Similar to Kotter's view on complacency and organizational change, the literature related to complacency in interorganizational collaborations relies on some sort of *friction* and *risk taking* for innovation success. Moreover, the importance of organizational environment and culture was stated as significant in terms of complacent attitudes. However, there were different arguments as to the right amount and balance of risk and friction, as opposed to collaboration and commitment for innovation progress. The findings show a significant link between project role understanding, actor capabilities (e.g. knowledge), project intent and risk taking within the project. These dimensions seem to represent the organizational environment from where the actors base their arguments. Friction thus arise from the various preconditions and differences between the actors impacting complacent behavior in different ways (resulting in various urgency gaps). The precondition differences are explained as follows.

The customer organization is in this case is state-owned. This meant that precautions had to be made regarding risk and the new pylon investments (e.g. the Norwegian climate and terrain, pylon cost, size, material weight, safety requirements, various approvals, licenses, durability, and risk calculations). Moreover, due to the public context, there had to be considerations with regards to open competition. Considering this, the customer was restricted to follow the law of public procurement (e.g. tenders). This meant that the choice to collaborate with a partner was based on value creation for society, and ensuring the most efficient use of resources from equal treatment in public procurement.
Due to the project being a research project, the customer had two roles: customer and cooperative contributor to knowledge about pylons (preconditions), as well as

acquiring theoretical competence regarding aluminum. The customer viewed itself as conservative regarding new product ideas. In this way, there had been difficulty internally within the company to realize the project. Hence, there was a gap between wanting to innovate and an openness to change.
To find the right price level, the customer needed to ask at least three suppliers (due to the rules on public procurement). In retrospect the customer felt that they had failed with the choice of supplier (organization E), due to them not being able to automate the production of e.g. 100 pylons. They wished this was discussed earlier to get an overview of the costs.

*"Would be nice to have someone that told you what to do and not do, but we did not get to have that discussion."*

The customer realized that they should have worked more closely with the manufacturers, and been part of their process environment. Distance was thus mentioned as a problem. Correspondingly, the customer did not seem to know what the research work (PhD) of the university was all about. They thus wished they had generally more dialogue within the project to gain a common understanding of project expectations and needs. Therefore, the research from the university was not seen as beneficial for the customer. Additionally, there was no concern of the other actor's project intent for this actor, as long as the job got done, even if that was solely to earn money.

*"The architect is concerned about the facade. Everything else is secondary."*

There thus existed an indifference to other actors' project intent and needs.
The university had a PhD role and research responsibility within the project regarding aluminum constructions and how to model such pylons. The decision to have a PhD student on the team was a request from the researcher. The university was working with separate research tasks (e.g. publishing generic research).

*"I felt that my role involved being alone with my work. And then the others sat on the design of the pylon. I felt that my work was related to my own things."*

Challenges were stated to relate to the confidentiality of research information (either having to be hidden or open to the public). Of importance to this challenge was the customers answer of the actor's freedom to sketch alone with ideas.

*"The freedom to play with ideas and solutions is exciting and educational. But when you go into a creative box with a notepad, it's fun but challenging."*

The room for experimentation with ideas may in this way have provided barriers to communication regarding capturing possible problems.
There seemed to be different motivations regarding a common understanding of the timeline and project vision among the actors (long term vs. short term). Moreover, there had been some disagreement regarding expected project result of the pylon testing at the end of the project. One individual (researcher) was mentioned to have difficulties with admitting mistakes or weaknesses, in this sense portraying superior attitudes, which had been annoying. Equally important, there were some misunderstandings in the start of the project regarding product ownership and intellectual property rights (e.g. patents) especially between the researcher and customer, as this was stated to not be written anywhere. The network association stated that the project had stopped at a later point, due to the customer wanting to change the pylon construction and make it applicable to their system. On behalf of the customer, this involved minor changes to the geometry in the aftermath of the project (due to disagreements in relation to pylon design as organization E wanted more welding in the pylon). Many engineering companies were mentioned to think aluminum could be used for steel pylon design. However, the material and process manufacturer had mentioned many times within the project that this was not possible (backed up by the regional manufacturers), due to aluminum having more design criteria. As such, the customer and the researcher were stated by organization E to think differently; the customer was more occupied with the construction being solid and safe, while the researcher was more interested in using a specific program to optimize and calculate. The customer wished they were told by the university and the researcher that their concept did not fit the big pylon profiles. At the same time, they did not believe that the other actors were aware of the forces to which the pylon was exposed.

*"There were probably shortcomings on both sides, that the project as a whole did not capture that this was not the most optimal design."*

The customer was not familiar with aluminum as a material for the new geometry (contributed to design uncertainty). Hence, they wished the challenges with e.g. bending analysis would be communicated from the researcher earlier (to save time), as it was not possible to understand this issue.

*"It is something that is frustrating when you look back on it because we have discussed the pylon concept here with the group (…) the researcher (…) and this has not been portrayed as a big challenge."*

In this sense, the customer felt that the researcher had been too occupied with the details and theoretic part of the project task.

The researcher viewed the project as a research project. An intention of building a whole electricity grid with this pylon was thus not a focus. As the supplier stage was stated not to be decided, the researchers project intent was to prove that aluminum pylons could handle the load they were calculated for. The researcher felt that the customer could have been more open to advice and blamed their carefulness on a lack of competence. However, this behavior seemed to be perceived as arrogant on behalf of the customer. In the light of this, the researcher had experienced previous successful projects. Having superior attitudes or show a lack of humility could therefore involve a fear of not upholding a trusting and successful reputation (avoid failure by taking the matter in own hands). Furthermore, agreeing on how to go about the project was important in terms of translating ideas for the researcher. In this regard, actors were mentioned to have different views of the design process which made it hard to communicate ideas. The tacit knowledge on behalf of the actors thus made the room for misunderstanding greater. Consequently, the lack of *a common conceptual apparatus* (stated to gain a higher level of accuracy and efficient co-operation) and different understanding of the details that was necessary in the creation of the pylon seemed to have contributed to turning the focus inward (separation).

The regional manufacturer's project intent was to generate local production to be able to enhance business, as well as contribute to sustainability goals by using aluminum. Organization F stated to have been financially invested in the project to learn and to be able to sell pylon profiles. In this sense, the customer not using the pylon would be critical for aluminums reputation in the industry. Hence, it existed a sense of dependence on the customer (unbalanced dependency) (Ryals and Humphries, 2010) to continue with the pylon idea. The regional manufacturers in this way (due to e.g. size and financial capability) seemed to be in a more vulnerable position to take risks. As the customer followed regulations of public procurement, it could involve competitors in the next co-operation round and thus ideas being shared. Consequently, it would involve uncertainty and risk with others copying ideas, and with investing in automated instruments. An example was organization D experience with previous co-operating actors *fishing* for information about their customer to offer their services. For this reason, they had been a bit distant and cautious.

*"There is competition, you can benefit from a network, but you should be aware that other actors take out information as someone comes to you to "fishing out" who your customer is, and then they go there to offer their services. People are not honest. We've had two or three episodes where people have not been honest, so we've been a little reticent."*

Organization D decided to withdraw from the project, due to not feeling that their welding competence was taken seriously (e.g. looked upon as something unnecessary for aluminum). Accordingly, the researcher and network association were stated by this actor to not always be aware of the competitive factor when gathering actors to cooperate.
Furthermore, there had been some unclarity for organization E regarding contribution within the agreement, due to the way their contribution to the project was formulated. As this actor thought they would just make some profiles, the contract was written in a way that the customer thought they would make the whole pylon prototype for free. Therefore, this actor felt a bit tricked into producing something else. As the contribution formulation unclarity was addressed in this case, it shows the importance of being aware and alert of potential threats due to misunderstanding project contributions, as it may impact the affected actor's commitment to the project. Moreover, the feeling of not being taken seriously or not being an important part of the group (unneeded competence) could indicate a lack of communication and understanding for needs within the project, as welding was stated by the customer to make the process more expensive. On the contrary, the network association had an impression of the regional manufacturers not being able to automate the aluminum production, due to not being willing to take lead and the risk with the large investments needed.

"*We are doing well here in [area]. Why expose oneself to risk? There exists risk aversion here in [area] in many circumstances."*

The regional manufacturers were stated to have an unbelievable competence. However, due to private and family-owned companies, they were mentioned to not have the drive or money to take the risk. Hence, they were perceived to value safety and traditions.

*"After the pastry and coffee, it stops."*

The material and process manufacturer had a wish to contribute to product innovation, and learn the potential aluminum had in certain applications (e.g. what to do to be able to use their resources effectively). The involvement among actors was stated by the material and process manufacturer to be dependent on production phase. Therefore, this actor's problem with several projects was that of roles.

*"What role should we have*?"

This was in terms of either building a manufacturing plant or develop the technology (this was stated to take too much time). An optimal production infrastructure

focusing on cost efficient alloys was thus needed and stated to be greater worldwide. When the project started, the material and process manufacturer was solely a material supplier having extrusion activities sold out to another company. However, due to organizational changes, the material and process manufacturer had (during the project) started to perform the extrusion activities themselves, placing them in a competitive situation with organization F.

Due to the project having societal significance, a lot of money could be involved. Hence, eight months were used for lawyers to secure the project (consortium agreement) in case someone would take advantage of future possibilities. This was stated by the researcher as boring and unnecessary for an engineer, the project was therefore argued to be better without it. The agreement was stated to not be used due to no *unfaithful servants* in the system. Even though the researcher understood the importance of following the law, the agreement was looked upon as unnecessary as engineers trust each other. As the customer and the material and process manufacturer was stated as the only ones wanting lawyers, it indicated a more laid-back attitude on behalf of the researcher and regional manufacturers. Complacency may in this way connect to familiarity with previous co-operation, similarity in culture, closeness, and amount of co-operation between actors. Additionally, complacency deriving from a sense of familiarity and similarity may create more distance and, in this way, slow down progress in a co-operative product development setting with unfamiliar actors. Being overconfident and trusting in that the project would go smoothly (e.g. information asymmetry) may thus provide dangers for the other actors who have more invested in the co-operation, and are more at risk for potential competitors (facilitate moral hazard) (Dawson, Watson et al., 2014).

### 4.2 How actor preconditions impact complacency

The actor responses in this case indicated asymmetries regarding the project vision, intent, roles, ownership, risk, and trust. These insights have provided some important information on preconditions for project commitment, and may in this sense be looked upon as *the why* and thus mechanisms for actors' complacent attitudes and behavior in this case. However, placing actor preconditions (reasons) in relation to complacency mechanisms (response) as well as urgency enablers, may enhance understanding of complacency reduction towards a true sense of urgency (facilitate an urgency strategy) (see figure 2). Communicating these variables within the project thus play an important role for innovation realization. This is because urgency gaps and separation places actors in a vulnerable position which enhances risk and reluctance with moving forward in a project. Hence, innovation speed from a higher sense of innovation urgency may be reached by a more seamless understanding of what facilitates complacent attitudes and behavior on behalf of each actor. The next section explores the precondition properties and their perceived connection to

complacency. Further, various urgency enablers on behalf of the actors are presented.

### *4.2.1 Separation and indifference*

Similar to Kotter's signs of *internal focus* and not acknowledging organizational *threats* or *opportunities*, being separate from the other actors and lack of co-operation may make it harder to understand what (and why) some decisions are made in a project (e.g. confidential information). However, having an inward focus may for some actors be the result of pre-decided and given project roles. Hence, complacent attitudes may not always be self-inflicted, but may create a sense of project alienation due to a lack of group involvement. This type of complacency may be critical as it might make the actor unaware of what is going on (not acknowledging threats), shaping the actor's impression of the project (driving behavior). An unawareness of actors' role, project intent and risk may thus make actors more vulnerable and reluctant to share information or commit fully to the project co-operation. Similarly, obligations to follow rules of e.g. public procurement might trigger reluctance to take risk on behalf of more vulnerable actors. Placing time and resources into a project with an unclear production future may thus impact hesitance to go forward in a project. Equally important, the network association portrayed complacent attitudes through what may resemble a *cyclical joke* (Kotter, 2008) in that other regional manufacturers were not as interested or motivated in these kinds of projects (involving solely traditions, conservatism, and safety). However, based on the other actors' responses in this case, assuming other actors' lack of interest may portray a lack of understanding of the other actor's needs (e.g. the regional manufacturing companies' dependence on the customer in the future, tenders, cost and the risks it involved). Information asymmetry (Dawson, Watson et al., 2014) in this matter may impact biased decisions on behalf of the network association in terms of underestimating actors' ability and thus opportunities to prosper (Kotter, 2008).

Actors' understanding of what was perceived as valuable seemed to differ within the project based on perceived role, intent, competence and what was looked upon as necessary (e.g. tacit understanding). This created separation and a narrow vision within the co-operation. Needs in this way, seemed to derive from tacit knowledge and interest. Similarly, having a short-term vision, not being more open to external input or being uninterested in engaging with others in the project, could impact innovation progress negatively. A lack of involvement or interest (complacency) may thus provide barriers to the co-operation in terms of meeting other actor's needs. As shared goals was stated to be resilient to partner friction (Le Ber and Branzei, 2010), actor separation and unclear visions and goals may in this case have enhanced actors' sense of risk within the project. Furthermore, as the researcher was portrayed as a skilled actor, the customer felt this actor was arrogant in terms of how things

should be done. The friction was stated to involve *a misinterpretation of results* and *a lack of humbleness* which had provided unprocessed results. Hence, instead of the researcher being a support, the co-operation was experienced more as a competition. Based on the researcher being a nonprofit research institution, and not a competitor in this case, the finding was surprising. As different perceptions and project intent could be a prerequisite for some actors' complacent *inward* attitude (Sherratt, Sherratt et al., 2020), complacent behavior may by some be interpreted as competitive. The fact that the researcher was not aware of this issue may resemble Kotter's sign of not seeing problems that require changes in one's own actions, /seeing oneself as rational. This is detrimental to innovation. The actor's freedom to sketch alone with ideas, might in this case provide barriers to innovation speed.

As the researcher was portrayed as detail focused, it had given the customer an impression of the researcher not considering the whole *project picture*. An active leadership and passionate individuals were thus mentioned to be missing. From the interviews, a general understanding was that the customer was the project owner, while the researcher was the project leader. However, there were different answers as to who the project owner and project leader were among the actors. In this sense, the customer stated to have *taken ownership* of the project due to unclarity in the start of the project. Overall, it seemed that the project group did not have a common ownership feeling (e.g. commitment) of the product idea. Given this was a research project having a low technology readiness level (e.g. technology maturity) (TRL) (Vlăduţ, Tănase et al., 2018), one would think the research project *context* would be the factor developing a seamless vision. As critical issues were left undiscussed, the project had been lacking clear project roles and a neutral leader that could consider the overall project vision (McLean, Antony et al., 2017). Unclear project leader/owner roles may thus impact some actors to take ownership responsibility. However, the gap between project competence, focus and interest had separated the actors, making the end goal vision harder to reach. Being provided or taking the role as project leader and participant (having several roles), may therefore limit the actor's vision to the overall project, making interfirm innovation more difficult. Hence, myopia (Sherratt, Sherratt et al., 2020) can be associated with unawareness of the long-term project perspective as a result of diving into one's own preferences and tasks independently of others. This justifies the need for a neutral leader within research projects. Correspondingly, emphasizing details may make an actor becoming blind to the overall situation (e.g. inattention to change/needs) (Lieberman and Montgomery, 1988) or *silo* thinking (Pinedo-Cuenca et al., 2012), creating distance to other participating actors.

The customer stressed a significant need to meet pylon safety requirements (urgency enabler). As important needs were not communicated within the project, the *time*

and *freedom* given to complete the project may have facilitated the group separation. Hence, a lack of exchanging ideas and true opinions/requirements might impact actors to go about their own usual procedures (dividing work). Consequently, it had provided barriers for knowledge transfer and a seamless understanding between the actors. In this sense, one partner being detailed focused may, in combination with a lack of dialogue, be perceived by another partner as *indifference*, giving signals of threat. Hence, the belief of keeping uninterested actors within a project, not addressing motivation, may result in the other actors withholding information (act of self-protection). Complacency in relation to this issue may thus be a barrier to product innovation as it reduces trust towards the other actors. In this way, trust involves an understanding of the other actors' project intensions. Therefore, trust is viewed as a valuable dimension impacting complacent behavior.

Indifference is perceived as a critical complacent mechanism in this case, as it can hinder understanding of needs within the group. On behalf of organization E, this related to admitting that they were not as good at establishing big goals and visions, and thinking it was nice to participate with their own welding competence. Hence, they were seldom engaged in the reason for taking something into account as long as they followed a list of materials and a drawing. This actor therefore seemed to only focus on producing the product, and not on factors regarding the design or material properties coming before the finished drawing. In this way, some of the regional manufacturers seemed slightly passive and waiting for someone to take the production leap (playing it safe/fear of personal consequences) (Kotter, 2008). In like matter, to acquire a cost-efficient solution, a closer co-operation and meetings was stated by the material and process manufacturer to be postponed to the end of the project. In this case, postponing (Kotter, 2008) close co-operation seems to have contributed to a lack of understanding. This type of complacency asymmetry may be critical for innovation realization, as it disregards and shows a lack of understanding of other actors' needs (e.g. to feel safe). As this was a very small project compared to other projects this actor was involved in (projects with global potential), it was viewed as irrelevant and not as important. Unclear roles and long-term perspectives (unclear vision), and the limited long-term production possibilities (profitability), may thus facilitate a more passive stance, and developing an attitude of the project being irrelevant (separating the group). Hence, complacent behavior may be not seeing opportunities of e.g. starting with a smaller market, and a lack of interest in the project due to e.g. fear of the consequences of investing (e.g. afraid of personal consequences of change) (Kotter, 2008). However, as two of the actors had become competitors during the project in this case, changes in roles and competition may trigger indifferent behavior or passiveness. Project withdrawal may therefore derive from not feeling valuable or needed within the project.

### *4.2.2 Unawareness, uncertainty, and trust*

As uncertainty facilitated autonomy and closer co-operation (Sherratt, Sherratt et al., 2020), it seems to have provided more distance and separated focus within the project. To gain a sense of urgency, one needs to know what to look for, based on knowledge and customer needs. However, the lack of dialogue had led to complacency in terms of not seeing possibilities and addressing each other's project expectations. Moreover, the uncertainty with this being a research project (project intent on behalf of the researcher) and a perceived lack of competence, may have impacted the researcher to take responsibility (sticking to own ways). However, a gap in project intent and knowledge/competence (the customer's lack of knowledge on aluminum and the researcher on pylon needs) provided misunderstandings that separated the group (impact innovation speed negatively). A lack of knowledge, and thus uncertainty in relation to how the pylon would handle the environmental loads, may thus impact reluctance and uncertainty to go forward with an idea (e.g. afraid of consequences, sticking with the safe) (Kotter, 2008). Additionally, the researcher in this case had positive experiences with pushing others forward. Hence, this actor did not seem to be too aware of the customers perception of them (inward focus/not acknowledging threats) (Kotter, 2008). Not having the customer *on board* is in this way, is looked upon as a barrier to innovation realization.

Similarly, uncertainty was connected to misunderstandings regarding intellectual property rights which had made the customer reluctant to be involved with the project. From the customers side, this involved not being able to produce the product elsewhere, not being able to be involved in a *living industry* and feeling stuck (living under a *catch 22* indicating a locked situation due to rules and regulations). Moreover, it involved the manufacturers not being able to deliver according to their needs (e.g. feelings of imprisonment) (Ryals and Humphries, 2010). Risk and uncertainty with the new material had therefore led the company to be more confident and trusting towards the status quo (Kotter, 2008) (sticking to steel). As such, having a backup plan (steel material) was found to be significant for complacent behavior.

For the researcher, taking patents was not a concern and was stated to have nothing to do with research, as it could ruin researcher credibility.

*"A researcher can never be a commercial actor in the market because then you ruin your own credibility."*

Being clear about having a role as a researcher in the project was stated to facilitate *trust* and would open opportunities to see interesting possibilities and new connections. In this case it seems that the researcher felt confident and safe, based on the specific project role *researcher.* This was something this respondent had

experienced before (previous successful projects) (Kotter, 2008), hence it might have impacted the perception about this project as well. As this may be true in some situations, having self-righteous attitudes can be a type of complacency as it may impact an actor to become unaware of what is going on. One might not be portrayed by others as one would like to believe (as this case shows regarding the customers view of the researcher). In this way trust was linked to own perception of project role. Due to not having as high risk/investments in the project, and in terms of earlier successful projects with other co-operating trusted engineers, the researcher seemed to portray a general trusting (laid-back) attitude on behalf of the project. In this matter, a sense of *I told you so* when the project was finished was present on behalf of the researcher, due to the project/consortium agreement (involving lawyers) not being used. Moreover, a *us* versus *them* (e.g. cultural) attitude (tacit knowledge) was present, and seemed to associate delays and problems with other actors' needs (blaming) (Kotter, 2008). In one way, this confidence could reflect the researcher's previous successful experiences with project co-operations. However, the laid-back attitude might indicate a lack of insight of the different actor roles and investments in the project (long term goals). Nevertheless, the researchers' complacent attitude may reflect their position and thus project intent (experimental/research work). As a result, complacent attitudes may be a type of trust that derives from a cultural assumption of similarity and familiarity, as well as not being financially invested (or less personally invested). In this regard, enhanced trust from previous positive experiences seems to make actors unaware of other actor's needs, facilitating a continuation of complacent behavior (e.g. an inward innovation focus). As familiarity from trust is argued to enhance collaborative routines (Gulati, 1995; Elfenbein & Zenger, 2014; Ligthart, Oerlemans et al., 2016), it can be detrimental to interorganizational innovation realization. This is because it facilitates a false confidence of success, when in fact the project is missing essential information on behalf of the other actors (Parasuraman and Manzey, 2010). As a result, it can postpone problems (Pinedo-Cuenca et al., 2012; McLean, Antony et al., 2017) and make future e.g. follow up projects harder to realize. Correspondingly, a laid-back attitude may be experienced by other actors as a lack of project contribution, impacting the sense of trust, commitment, and urgency within the project negatively. Visualization of goals (e.g. using 3D technology) was suggested in this matter, to avoid misunderstandings and feelings of alienation with regards to the concept.

"*If there are actors that do not want to contribute to the project, it is important to find out the reason for this as this actor may become like a rotten apple in the box as people will not be comfortable in sharing information."*

As preconditions e.g. rules, regulations and actor roles (intent and product ownership) were not clear from the start of the project, it had created different

understandings of individual roles. In this sense, as trust is seen as an important dimension in this case for interorganizational understanding, trust from familiarity among some of the actors might create distance towards other actors (e.g. norm conformity and own worldviews) (Lang, 2009). Hence, it is portrayed as negative for innovation speed in interfirm collaborations, as it can separate the actors within a project (inward focus). Consequently, as trust is positive for innovation speed to gain a seamless focus within e.g. an organization, or as in this case a familiar cluster of actors, trust is negative when it is asymmetric between actors within a project. This is because it may enhance complacent behavior (separate focus and filter external information) (Uzzi, 1997), making it harder to form new project relationships (Kim, Oh et al., 2006).
This thus differs from (Ligthart, Oerlemans et al., 2016) view in that trust from familiarity enhances collaboration. As trust reduces knowledge asymmetry (Almeida & Kogut, 1999) in product innovation, the trust gap between the project contestants seems to have facilitated complacent behavior, dividing the group and resulting in an urgency gap. As such, complacency in this case may be understood as unintentional, and a response based on an unawareness of actor preconditions (e.g. project participant disconnection).

### 4.3 Towards a true sense of urgency

True urgency (Kotter, 2008) was about sensing and feeling (e.g. being part of an experience). As the actors seemed not to be physically part of each other's processes, nor take enough time to address needs, important needs were lost. As a result, distance and separation appeared to have impacted actors' perception of other actors e.g. *partner disillusionment* (Le Ber and Branzei, 2010) or *askew perceptions* (Siegel, Waldman et al., 2003) and their contribution to the project negatively, further dividing the project group. Of importance for true urgency, was finding cues facilitating actor drive, responsibility, and commitment. This section thus addresses cues found as relevant for developing a true sense of urgency. As such, it is seen as a relevant dimension in addition to preconditions and complacency mechanisms towards innovation realization.

Urgency enablers related to *project/topic interest, production certainty* and the project having a *high importance/priority rate*. From this view, the network association was not an active part of the project. However, it was important for them to have the actor's best interest at heart (enhance business and product portfolio). For the customer, urgency enablers related to using more sustainable, lighter (e.g. helicopter transportation and security) and cost-efficient materials in a pilot pylon that could substitute their steel pylon for Norwegian terrain. Hence, a crucial factor was meeting security requirements. Consequently, they were curious and eager to learn about aluminums properties. Similarly, on behalf of the university the project

(as a research project) had to meet a certain level of research that could be published. As this actor did not have industrial project experience, there existed an eagerness to learn. However, this actor was familiar with, and attaining a special interest for aluminum as a material.
Urgency enablers on behalf of the material and process manufacturer related to the physical prototype to see the future production potential and opportunities to expand production. Hence, having a concrete actor (e.g. future vision) to manufacture the product would give more inner drive to innovate.

*"What role should [company] have, this is where things take too long. When I worked in [company] we had our own products, and then a factory at [location] for example could decide to get a large project and then you had an internal drive and applied to be allowed to invest. Then 100s of millions were spent on innovation, but then you had a specific factory that was behind it."*

As the material and process manufacturer could produce the pylon themselves, they did not have any engineering competence related to pylons. Hence, it was important for this actor to learn from the others. Furthermore, the motivation for this actor was new possibilities for aluminum use, and to see the long-term industrialization potential from the pilot pylon, not only in Norway but globally. In this sense, there was a need for a larger engineering company to industrialize the pylons, as the costs of producing them with the regional manufacturers were too costly.

*"We need to find a usage where it is profitable to invest."*

Similarly, for the reginal manufacturers, urgency enablers involved the certainty of producing the pylon in the future, and being able to have more than one customer.
The researcher was motivated by the possibility to be able to use mathematics in new ways. The motivation had thus been to develop a new calculation method to reduce weight of the pylon. There was an extensive interest in the research topic and research in general, as well as a motivation to push other actors forward.

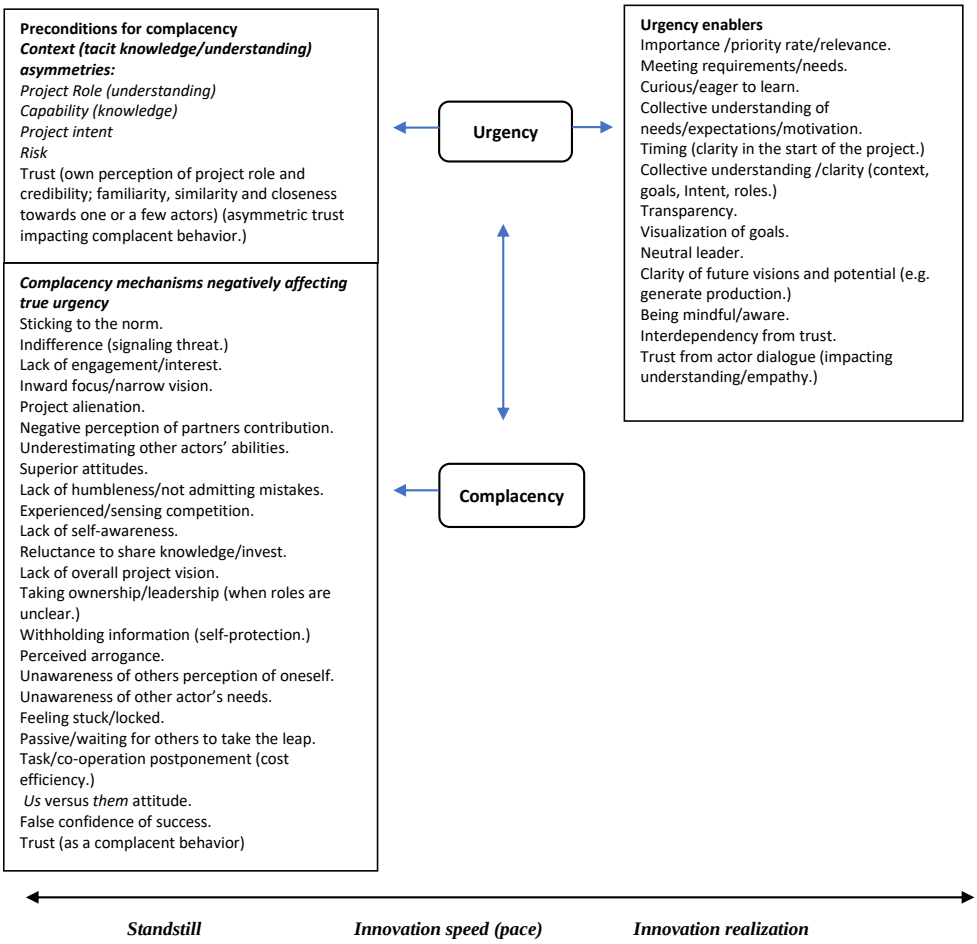
*"I was focused on something happening, some engineers are very concerned about details and are never satisfied. They calculate four dots after a comma, and it has no value at all. To say that enough is enough now we are building, that was important to me. However, it can have consequences."*

In retrospect, if the researcher had known some of the customers´ pylon challenges (e.g. wind and ice), they could have been able to contact relevant people to calculate this issue. However, this was not communicated. Further, as some of the actors were mentioned to be competitors, acquiring a balance between competition and co-

operation was stressed as important. Hence, knowledge about other actors and stability (not jumping in and out of the project) was stressed as essential.
Being unaware was a repetitive element hindering understanding, and thus the sense of urgency, from arising in this case. As such, there existed a gap in tacit understanding of what was perceived as important (e.g. tacit knowledge) (Dawson, Watson et al., 2014). Reducing this gap in interorganizational understanding (e.g. asymmetric information) is therefore understood as a step in the right direction for true urgency and collective innovation realization. A co-operative innovative component therefore seemed to be missing within the project; the urgency to understand the larger project picture.
As performance equals mutual expectations and accountability, and compatible organizational capability and commitment (Austin, 2000), enhanced understanding may in this case involve clarity of roles, project capability, intent and level of investment. Hence, with new ideas (e.g. building a prototype) and needs arising in research projects, comes a responsibility of enhancing all actors´ awareness of preconditions at the beginning of the project (Drejer and Jørgensen, 2005). Moreover, as some (e.g. organizational) changes may happen during the project, actor relations may become competitive. This can facilitate uninterested or hesitant behavior. Therefore, an enhanced clarity by investing less resources in e.g. a pre-project, could provide better chances of project success. This is because involvement and acquiring an understanding of the project context and actor differences (goals, intent and roles) may reduce relational risk enablers. As risk reluctance was linked to organizational culture (e.g. stability and order) (Mezias et al., 2001; Menon, Chowdhury et al., 2002; Siegel, Waldman et al., 2003) and *a healthy dose of constraint* was positive for innovation, enhanced transparency and understanding of differences (Drejer and Jørgensen, 2005) may enhance relational attachment. Consequently, innovation speed might be increased from enhancing (traditional) actors motivation of forming collaborative relationships (Le Ber and Branzei, 2010).

From the insights in this paper, complacency is understood as *an unmindful characteristic of interorganizational relations from a basis of asymmetrical preconditions. As such, it is a disconnection among actors due to a tacit understanding (e.g. individual perception) of other actors in the light of self-interest and vulnerability.*
As the different asymmetries impact trust generation negatively in this case (e.g. facilitating a gap in what is portrayed as familiar and safe), addressing complacent attitudes are understood to provide important insights for trust generation measures in projects. This makes trust an important dimension to the concept of urgency for innovation progress in interorganizational projects. Commitment and innovation speed are therefore understood to increase when trust is *combined* with a seamless interfirm understanding of actors' roles, capability, and purpose with the project.

*Figure 2. Innovation speed line with contributing factors and variables for innovation realization*




## 5 Conclusion

This paper has explored the concept of complacency as a barrier to achieving a true sense urgency towards innovation realization subject to an interorganizational material substitution project. As changing complacency in an organization was stated as a cultural intervention (MacQueen, 2019), the study has acquired a context specific understanding of complacent behavior on behalf of the participating actors. Previous research has not addressed complacency directly to enhance innovation speed in this context. Nor has the sense of urgency been applied to industrial research projects in relation to innovation pace. As such the study has placed Kotter's (1996, 2008) framework applicable to hierarchical organizational change within a different

context (co-operative industrial research) subject to enhancing the speed of product innovation. Additionally, the study has provided important insights and given rise to a new dimension, *complacency asymmetries*, and how this influences the efficiency and value of interfirm research projects (e.g. the sense of true urgency). Trust was in this sense found to be significant for complacent behavior. For this reason, the study has brought important insights into barriers and enablers of significance to acquire a true sense of urgency from a level of commitment and co-operation in industrial research projects. Accordingly, the findings have contributed with some advice for project leaders (urgency strategy) and participating actors within the industry, by highlighting important actor preconditions that may negatively impact actor behavior and innovation progress. The insights from the study may thus provide valuable implications for organizations such as The Norwegian Research Council when supporting industrial research projects in Norway. Furthermore, an enhanced insight into the complexity of industrial research projects might challenge traditional beliefs of e.g. aluminum projects pursuing formal and structural forms of co-operation (e.g. quality regimes). In this way, being aware of interorganizational actor complacency as an *unmindful characteristic of asymmetrical preconditions*, and linked to *vulnerability*, might help to gather the best collection of project participants. Consequently, it may limit complacent behavior from developing, reducing actor disconnection, and enhance innovation speed from a place of true interorganizational urgency for product innovation success.

As the findings from this study derives from a single case study, it is context specific, the possibilities of generalizing the results are therefore limited. Moreover, there may be other reasons as to the type and level of preconditions/complacent behavior found in this study, as well as different reasons for actors' perceptions on behalf of other actors (e.g. superior attitudes or a lack of humility). For example, behavior and perceptions might involve defensive behavior (e.g. defensive action) hiding underlying issues. Going deeper into possible individual reasons for complacent attitudes as well as the perceptions of such attitudes, could therefore be valuable to enhance the understanding of the process of complacency development. Correspondingly, as commitment and innovation speed were understood to increase by combining trust with a seamless interfirm understanding of preconditions, further research could investigate trust mechanisms between actors and how it may confine interorganizational complacency asymmetries. Nevertheless, finding an optimal level of project collaboration was stated as relevant for innovation performance (Squire, Cousins et al., 2009). As a connection between complacency and urgency was observed (figure 2), future studies may be subject to finding the best balance of the variables and how different amounts of complacent behavior may impact the sense of interfirm urgency towards innovation realization.

**Abbreviations**
TRL: Technology Readiness Level; GFRP: Glass Fiber Reinforced Polymer; R&D: Research and Development; NVE: Water Resources and Energy Administration; kV: Kilovolt; CO2: Carbon Dioxide

**Availability of data and materials**
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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**Authors' contributions**
This case study has been performed by CMM.

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# Overcoming the limits of language in innovation project

## Exploring Design Thinking as an approach to worldview inconsistencies and innovatio speed

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