

FRAME SHIFTING AND FRAME
BLENDING IN DIGITAL
TRANSFORMATION

FRAME SHIFTING AND FRAME BLENDING IN DIGITAL TRANSFORMATION

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Doctoral Dissertation

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Frame Shifting and Frame Blending in Digital Transformation

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SUMMARY

As organizations embrace digital technologies in new ways, they experience a process known as digital transformation. This process is not just about technological changes – digital transformation also involves organizational changes that enable and result from engagements with digital technologies. Despite the growing knowledge base about this topic, extant digital transformation research is largely inattentive to how meaning-making shapes digital transformation.

In this thesis, I outline an approach to unpack meaning-making in digital transformation with the concepts of frame shifting and frame blending. This conceptual framework approaches meaning-making through discursive interactions, or “talking”, where (1) frame shifting manifests when exploring what could be new in potential futures which involve digital technologies, and (2) frame blending manifests when identifying what might remain of an organization’s past in such potential futures.

This work builds on insights from a longitudinal case study of meaning-making in digital transformation at the incumbent firm Sydved operating in the Swedish forest industry. The empirical research was carried out between 2018 and 2022. At Sydved, I studied the meaning-making associated with “injections” of new digital technologies into Sydved’s existing digital ecosystem. I noticed the temporal character of the meaning-making process and engaged in exploring how to understand theoretically the role of time in this process. This led me to the concepts of frame shifting and frame blending. I also studied changes connected to Sydved’s established digital application “My Forest” between 2013 and 2022 to illustrate how meaning-making shaped Sydved’s digital transformation.

The thesis contributes a different conceptual framework to the digital transformation literature for approaching both meaning-making and temporality - as in the interplay of potential futures and the past - in digital transformation. It also contributes to the framing literature by elaborating on the theoretical understanding of frame shifting and frame blending as well as extending their field of application to digital transformation as an area of concern. Finally, it contributes to practice by outlining insights for arranging and participating in meaning-making during digital transformation.

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Gothenburg, March 2023

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Part 1

**FRAME SHIFTING
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1. INTRODUCTION

Past decades have been characterized by the emergence of many transformative digital technologies. During this time, we have witnessed the emergence of mobile, social, platform, and cloud technologies around the 2000s and that of big data, IoT, blockchain, and AI around the 2010s (Bodrožić & Adler, 2022). These technologies have given rise to new ways of organizing, notably through digital platforms and digital ecosystems (de Reuver et al., 2017; Gawer, 2014). These technologies have also had implications for established organizations that have needed to adapt to new conditions for organizing and doing business, such as in manufacturing (Hylving & Schultze, 2020; Svahn et al., 2017), the public sector (Magnusson et al., 2020), healthcare (Oborn et al., 2021), social movement organizations (Selander & Jarvenpaa, 2020) and religious organizations (Nylén & Holmström, 2019). Such changes – with and by digital technology - are increasingly referred to as digital transformation (Hanelt et al., 2020; Hinings et al., 2018; Markus & Rowe, 2023; Vial, 2019).

While the knowledge base about digital transformation is growing, we need to learn more about meaning-making in digital transformation (Ivarsson, 2022; Nambisan et al., 2017). Practitioners and scholars alike struggle with questions such as “what is new [...] in a world transformed by digital technologies?” (Lanzolla et al., 2018). Meaning-making is a crucial intangible process in organizing (Fayard et al., 2016; Zilber, 2008, p. 152) that is commonly conceptualized as framing (Cornelissen & Werner, 2014). It involves changing or reproducing beliefs, knowledge, expectations, and assumptions that guide interpretation and action (Cornelissen et al., 2014; Orlikowski & Gash, 1994). Understanding meaning-making

in digital transformation is critical because such transformations require work to change meanings so that people can perceive new action possibilities, such as identifying new things to explore (e.g. Gregory et al., 2015), paths to create (e.g. Pentland et al., 2022) and options to develop (e.g. Svahn & Kristensson, 2023).

A well-known challenge of meaning-making in innovation studies more broadly is the balancing between novelty and familiarity in meaning-making (Hargadon & Douglas, 2001; G. Wang et al., 2022). In this way, meaning-making is made up of these two opposing notions. The idea is that if meaning-making is perceived as too provocative, it may trigger responses such as confusion, denial, or protectionism (Magnusson et al., 2021). Conversely, efforts that are too conservative can fail to generate change (Nambisan et al., 2017). This challenge implies a temporal aspect of meaning-making in innovation that is relevant for digital transformation as well. It is centered on balancing a familiar past with novel, uncertain, and potential futures that build on, yet divert, from the past in some ways (Henfridsson & Yoo, 2014; Kaplan & Orlikowski, 2013; Reinecke & Ansari, 2017). However, its role and dynamics are still poorly understood in the context of digital transformation.

1.1. RESEARCH AIM AND MOTIVATION

In light of this knowledge gap, the aim of this thesis is to contribute a new conceptual framework for unpacking meaning-making in digital transformation. I ask:

How can meaning-making in digital transformation be conceptualized?

In this thesis, I introduce frame shifting and frame blending as a conceptual framework for approaching meaning-making in digital transformation (Werner & Cornelissen, 2014). I show that digital transformation is shaped by manifestations of frame shifting and frame blending that take place in “talking” (Weick et al., 2005) i.e. in discursive interactions (Dewulf & Bouwen, 2012; Gray et al., 2015). Frame shifting is about questioning established beliefs that may no more be relevant in light of

ideas of potential futures which in some ways differ from the status quo (Werner & Cornelissen, 2014). In the context of digital transformation, such futures inevitably involve digital technologies in some ways. On the other hand, frame blending is about integrating enduringly applicable understandings of an organizational past into such ideas of potential futures (ibid.). Together, these concepts explain how digital transformation is shaped through “talking” that explores similarities and differences between alternative futures (what may be) and an organizational past (what has been) (Reinecke & Ansari, 2017).

By elaborating on the theoretical understanding of frame shifting and frame blending, this thesis offers a conceptual framework for center staging the role of “talking” that constitutes micro-level meaning-making. It also offers an alternative approach for dealing with temporality in digital transformation, as in the interplay of potential futures and the past (Henfridsson & Yoo, 2014; Kaplan & Orlikowski, 2013). Without frameworks that move between micro-level discursive interactions and organization-level digital transformation, there is a limited understanding of why digital transformation takes different shapes (Berente et al., 2019; Fayard et al., 2016; Selander & Jarvenpaa, 2020), even in similar organizational contexts (Noesgaard et al., 2023).

1.2. LIST OF PAPERS

The thesis extends the four conference papers included in this thesis. To approach meaning-making in digital transformation, I have re-analyzed partial empirical data from three of the conference papers, incorporated additional longitudinal data of the same empirical case, and leveraged the suggestion for theorizing digital transformation proposed in the fourth paper. These papers are:

1. Ivarsson, F., & Svahn, F. (2020). *Digital and Conventional Match-making – Similarities, Differences and Tensions*. Proceedings of the 53rd Hawaii International Conference on System Sciences.
2. Ivarsson, F., & Svahn, F. (2020). *Becoming a Digital Ecosystem Orchestrator - The Sydved Case*. Proceedings of the 28th European Conference on Information Systems.
3. Ivarsson, F., & Selander, L. (2021). *Coordinating Digital Content Generation*. Proceedings of the 54th Hawaii International Conference on System Sciences.
4. Ivarsson, F. (2022). *Applying Framing Theory in Digital Transformation Research: Suggestions for Future Research*. Proceedings of the 55th Hawaii International Conference on System Sciences.

1.3. THESIS STRUCTURE

The thesis is structured as follows. Chapter 2 outlines the view of digital transformation that underlies this thesis. Chapter 3 introduces framing theory, unpacks the concepts of frame shifting and frame blending, and explains how they shape digital transformation. Chapter 4 describes how I studied meaning-making in digital transformation through a longitudinal case study of the incumbent firm Sydved AB (henceforth Sydved). Chapter 5 consists of an overview and summary of the included conference paper contributions to this thesis. The results section in Chapter 6 begins with a demonstration of manifestations and interactions of frame shifting and frame blending in five focus groups referred to as “innovation labs” during Sydved’s digital transformation. Thereafter, I illustrate how meaning-making shaped digital transformation at Sydved. I do this

by detailing the technological and organizational changes connected to Sydved's established digital application "My Forest" between 2013 and 2022. In Chapter 7, I discuss how frame shifting and frame blending differ from extant theoretical perspectives that approach meaning-making or temporality in the digital transformation literature. I also elaborate on the contributions of this thesis as well as their methodological implications. Finally, I acknowledge the limitations of the study, set out directions for future research, and present insights for practitioners.

2. DIGITAL TRANSFORMATION

In this thesis, I view digital transformation as *organizing characterized by ongoing adaptations to dynamic digital ecosystem conditions*. In this view, I approach digital transformation by using the concepts of digital platforms and digital ecosystems. Together, they are useful for concretizing the unique organizing challenges that have arisen with emerging digital technologies since around the 2000s (Bodrožić & Adler, 2022; Constantinides et al., 2018). This view accentuates three aspects that I will go through next: digital transformation as organizational theory, digital ecosystems as organizing context, and digital transformation as process.

2.1. DIGITAL TRANSFORMATION AS ORGANIZATIONAL THEORY

First, this thesis approaches digital transformation as an organization-level phenomenon, in line with a great deal of other research into digital transformation (e.g. Chantias et al., 2018; Hanelt et al., 2020; Wessel et al., 2021). In the literature, the concept is however used to theorize change on different levels such as, for example, ecosystems (Mann et al., 2022; Tan et al., 2020), industries or industry-level practices (Lanamäki et al., 2020) and society (Bodrožić & Adler, 2022). Others propose an institutional perspective where digital transformation broadly entails new actors, constellations of actors, structures, practices, values, and beliefs resulting from innovations with digital technologies and their implications to the institutional order (Hinings et al., 2018). While inquiries on and across different levels of analysis are not, in itself, problematic, the inconsistent

use of the concept has nonetheless contributed to conceptual vagueness (Markus & Rowe, 2021).

All organizations experience some kind of impact of digital technologies on established ways of organizing. Generally, these technologies have afforded boundary-spanning environments that inhabit large scale and diverse sets of people, organizations and multi-layered platforms of hardware, software and data (Baskerville et al., 2019; Yoo et al., 2010). These environments are commonly referred to as digital ecosystems. Many organizations struggle to grasp the implications of digital ecosystems for their established organization and business (Magnusson et al., 2021).

2.2. DIGITAL ECOSYSTEMS AS ORGANIZING CONTEXT

This thesis follows recent views of digital transformation as organizing situated in digital ecosystems (Hanelt et al., 2020; Skog, 2019). A digital ecosystem comprises an organization's surrounding "ecology" of distributed and interdependent actors, including other organizations, people, and nowadays usually digital platforms comprised of hardware, software, and data (Jacobides et al., 2018). In digital ecosystems, digital platforms have fundamental implications for how organizing can take place because they are arrangements that enable interactions and data flows at scale (Alaimo et al., 2020; Constantinides et al., 2018). Partnerships typically span previously conceived industrial boundaries (Furr & Shiplov, 2018), and activities are highly distributed as, potentially, any employee or non-employee with access to digital technologies can be engaged in different activities (Gregory et al., 2018). Thereby, digital transformation blurs the lines between what is considered outside and inside the boundaries of an organization (Tana et al., 2022).

Different types of ecosystems have been delineated in the literature (P. Wang, 2021) such as, for example, business ecosystems (Adner, 2017; Jacobides et al., 2018; Moore, 1993), innovation ecosystems (Adner, 2006; Dattée et al., 2018), platform ecosystems (Parker et al., 2017; Tiwana, 2015) and digital ecosystems (Selander et al., 2013). There have been some attempts to collapse boundaries between concepts, for example, digi-

tal business ecosystems (Hanelt et al., 2020), and to distinguish between organizational and technical views of ecosystems (de Reuver et al., 2017). In my understanding of contemporary digital ecosystems, they typically include heterogeneous arrangements with a broad variety of actors (Baskerville et al., 2019; Zhang et al., 2021), which makes distinctions between different types of ecosystems all the more blurred (Hanelt et al., 2020). Therefore, I use the term digital ecosystem in a way that considers this heterogeneity.

Ecosystem actors differ in terms of their motives, interests, and needs, and no single ecosystem actor can control outcomes because of a digital ecosystem's many connections, interdependencies, and task distributions (Nambisan, 2018; P. Wang, 2021). However, ecosystem actors can achieve some degree of influence over outcomes by exercising implicit control over other ecosystem actors' economic, creative, and social activities (Mann et al., 2022). This is typically referred to as *digital ecosystem orchestration* (Paper 2, Li et al., 2017; Tiwana, 2015). Ideally, it includes facilitating value creation and capture for all ecosystem actors (Ritala et al., 2013), enabling, incentivizing, and discouraging distributed actors' creative processes and outputs (Paper 3, Boudreau & Lakhani, 2009; Nambisan et al., 2017), and enabling social interactions and economic transactions between ecosystem actors (Paper 1, Constantinides et al., 2018).

While previously associated with the governance of digital platforms (Wareham et al., 2014), digital ecosystem orchestration is becoming critical for organizing within digital ecosystems generally (Gregory et al., 2018; Mann et al., 2022; Svahn et al., 2017). That is not the same as saying that all ecosystem actors have equal prerequisites for engaging in digital ecosystem orchestration. For example, previous research has examined the asymmetries between ecosystem actors depending on their influence across architectural layers of a digital platform where, for example, application developers (e.g. Spotify, Netflix) to some extent depend on ecosystem actors that control operating systems (e.g. iOS, Android) and underlying hardware (e.g. phones, cars, game consoles) (Skog et al., 2018b). Nevertheless, peripheral ecosystem actors with limited architectural control may adopt different strategies for exercising some degree of influence (Selander et al., 2013) such as, for example, selectively choosing what to offer to,

and withhold from, particular digital ecosystems (R. D. Wang & Miller, 2020).

The application of digital technologies for digital ecosystem orchestration has made digital ecosystems highly dynamic, as compared to “traditional” ecosystems without reliance on digital technologies. As with turbulent environments in general, changing conditions in digital ecosystems can include changes in people’s needs, wants, and behavior, the injection of novel emerging technologies in ecosystems, and new actions taken by others (Pavlou & El Sawy, 2010). However, digital technologies make digital ecosystems especially dynamic, as they are characterized by a strongly emergent nature and enhance the possibilities for engaging large scale and diverse actors (Paper 2). For this reason, existing research points to that organizing in digital ecosystems is an open-ended process of acquiring, sustaining, or enhancing an influential position within them (ibid., Khanagha et al., 2022; Pagani, 2013).

2.3. DIGITAL TRANSFORMATION AS PROCESS

Given the dynamic conditions associated with digital ecosystems, existing literature suggests a process view on digital transformation (Skog, 2019). It is described as being associated with, for example, an “adaptive capacity” (Liu et al., 2021), “malleable organizational designs” that enable adaptations in response to ecosystem-level changes (Hanelt et al., 2020), and a shift from focusing on targeting predefined goals and maintaining fixed structures to focusing on ongoing adaptations in efforts to cultivate the emergence of networks and ecosystems (Majchrzak et al., 2016).

Viewed as process, digital transformation thereby implies *organizing*, or a process of becoming without a clear endpoint (Tsoukas & Chia, 2002). In this view, “organization” “emerges from the coherent and constrained interactions of several individuals” (Langley & Tsoukas, 2017, p. 3). In the context of digital transformation, it also involves people’s interactions and work together with digital technologies (Baptista et al., 2020). Digital transformation can thereby be characterized by many small changes, or adaptations, in both technology and surrounding organizational arrangements, at various points in time (Weick & Quinn, 1999). In this way, digital transformation requires us to acknowledge the actions of both people

and technology (Zhang et al., 2021), how they shape each other over time (Orlikowski, 1992) as well as the ecosystem and organizational context in which it is situated.

To understand why the process view on digital transformation is necessary, one must acknowledge what makes digital ecosystems dynamic as well as its implications for organizing. In digital ecosystems, conditions *recurrently* change, which means that organizational needs to adapt are recurrent as well. Change in digital ecosystems is recurrent for two reasons. First, digital technologies are self-referential, which means that injecting digital technologies in digital ecosystems enables and accelerates the injection of more digital technologies in the future (Kallinikos et al., 2013; Yoo et al., 2010). Second, the flexible nature of digital technologies is a unique source of recurrent turbulence. As digital technologies are “incomplete by design” (Garud et al., 2008) or “ever-in-the-making” (Lehmann & Recker, 2021), established ones can be reprogrammed and recombined for new or additional purposes over time. Such changes can be initiated by employees as well as distributed innovators located across digital ecosystems (Henfridsson et al., 2018; Yoo et al., 2010). In this way, digital technologies establish potent conditions for generativity (Pentland et al., 2022; Thomas & Tee, 2022), which means that the creative efforts of distributed actors contribute to a digital ecosystem’s development over time (Hukal et al., 2020; Parker et al., 2017).

Change in digital ecosystems can also occur *rapidly*, requiring urgent organizational responses. Since digital technologies have drastically improved in price and performance (Yoo et al., 2010), access to them is nowadays wide-spread and part of many individuals’ every-day lives (Gregory et al., 2018). This means, for example, that people’s expectations can change more quickly and that barriers have been lowered for contributing to their development across contexts. Conditions can also change rapidly because digital technologies enable exponential growth patterns (Katz & Shapiro, 1985; Shapiro & Varian, 1998) where it is possible to scale user-bases much more quickly than before digital technologies were widespread (Huang et al., 2017). This means, for example, that competitors can emerge and compete for user bases more quickly than in the past.

Last, some ecosystem-level changes can be *disruptive* to established organizations, if they have implications for something that is perceived as

essential for an organization's existing operations (Tripsas, 2009). It means that ecosystem-changes may trigger an “acute” need to respond (Skog et al., 2018a). For example, introducing a marketplace based on digital platforms in an established ecosystem that successfully scales users is disruptive for incumbent retailers, because it has direct consequences for how sales can be carried out and how money can be made on it (Li et al., 2017).

Meaning-making is essential for dealing with the dynamics of digital ecosystems in digital transformation. Some research has, for example, emphasized the need for screening to notice ecosystem-level changes (Liu et al., 2021; Tiwana, 2015) and that such screening can be amplified through the use of diverse data sources, big data analytics and AI (Warner & Wäger, 2019). Noticing such changes is not enough, however. Here, existing digital transformation research points to, for example, the struggles of using established knowledge schemes as a guide (Magnusson et al., 2021; Svahn et al., 2017) as well as emphasizes the need for questioning assumptions (Westerman & Bonnet, 2015) and shifting the system of meanings that guide practices (Gawer & Phillips, 2013). Thereby, coping with these dynamics also requires meaning-making through discursive interactions to shape digital transformation (Weick & Quinn, 1999). Meaning-making that in some way challenges existing beliefs, assumptions and knowledge claims enables for seeing otherwise unseen action possibilities (Purdy et al., 2019), thereby influencing *how* it is possible to adapt in response to such changes.

I will now unpack the concepts frame shifting and frame blending that make up this thesis' contribution to conceptualizing meaning-making in digital transformation.

3. THEORETICAL FRAMEWORK

In this thesis, I will demonstrate how the concepts *frame shifting* and *frame blending* are useful for conceptualizing meaning-making in digital transformation. I begin this chapter by briefly introducing framing theory. Thereafter, I unpack the concepts by describing what they are and how they interact, as well as explaining how they shape digital transformation. To illustrate how I understand these concepts, I provide brief examples from the empirical case study of this thesis that I will return to later, namely the firm Sydved.

3.1. FRAMING THEORY

Framing is a process for making and negotiating meaning in context (Benford & Snow, 2000) – for individuals, within or between groups in organizations, between organizations, or across an organizational field (Cornelissen & Werner, 2014). It focuses on the intangible, ideational aspects of organizing (Leonardi, 2011), as meaning refers to “what is signified in institutional structures and practices” (Zilber, 2008, p. 152).

Frames comprise, and are structured by, (socio-)cognitive elements, such as beliefs, knowledge, expectations, and assumptions (Orlikowski & Gash, 1994). They operate as filters for interpreting new experiences where some aspects of experience are accentuated over others (Gilbert, 2006). In this way, frames guide what actors perceive as possible and important to do (Leonardi, 2011; Purdy et al., 2019). Organizations typically inhabit several frames (Fraser & Ansari, 2021) because of differences between individuals’ as well as groups’ shared frames (Young et al., 2016).

Framing is the process of shaping frames, and can either reinforce (Cornelissen et al., 2014; Kellogg, 2009) or change frames (Gray et al., 2015). However, change in frames is necessary for making people see new action possibilities (Raffaelli et al., 2019). In this way, framing can be “a source of agency” (Purdy et al., 2019, p. 409). For example, Raffaelli et al. (2019) pointed to how flexible frames positively affect organizational exploration, as exemplified in the digital platform Netflix’s expansion following the framing of the organizational identity from “a DVD rental company” to “an entertainment subscription service” (Raffaelli et al., 2019).

Framing is resource-intensive work. Established frames can be a source of inertia preventing organizational change (Tripsas & Gavetti, 2000). Organization-level frames that are shared across an organizational context are especially rigid. For example, they have been shown to counteract change in individual-level frames (Klos & Spieth, 2021). Previous research has also demonstrated that there are contextual contingencies that influence the strength of the inertial force of established frames, such as prior industry affiliation (Benner & Tripsas, 2012; Kaplan & Tripsas, 2008), prevailing epistemic stances (Fayard et al., 2016), established power structures (Azad & Faraj, 2008; Yeow & Sia, 2008) and whether a particular emerging technology threatens the identity of an established organization (Tripsas, 2009).

Time is embedded into the framing notion because all “processes occur in and over time” (Reinecke & Ansari, 2017, p. 403). Established frames are shaped by and encode past experiences (Kaplan & Tripsas, 2008; Orlikowski & Gash, 1994) that work like a springboard in rendering new experiences as well as potential futures meaningful. Benner and Tripsas (2012) demonstrated this relationship by showing that firms from three distinct prior industries, namely photography, consumer electronics, and computing, respectively framed digital cameras as “an analogue camera substitute”, “a video system component” and, “a PC peripheral” in their initial framing efforts (Benner & Tripsas, 2012).

In retrospect, it becomes clear that neither of these nascent “framings” expected the then future emergence and integration of digital cameras in smartphones. Such incapacity to break away from established frames can have detrimental consequences on an organization’s long-term prosperity (Kaplan & Tripsas, 2008), as illustrated by cases such as Kodak (Lucas

Jr & Goh, 2009). As I will show next, the concepts frame shifting and frame blending are especially useful for bringing this temporal dimension of framing to the forefront.

3.2. FRAME SHIFTING AND FRAME BLENDING

To theorize meaning-making in digital transformation, I build on the concepts frame shifting and frame blending from the framing literature (Coulson, 2001; Werner & Cornelissen, 2014). Frame shifting and frame blending highlight a particularly salient temporal dimension of meaning-making, namely that of temporal orientations (Oborn & Barrett, 2021). More closely, they represent the interplay of potential futures and the past (Henfridsson & Yoo, 2014; Kaplan & Orlikowski, 2013).

A basic assumption of these concepts is that framing takes place through comparison between alternative discourses and established frames. In other words, framing “depend[s] on a background of firmly anchored and mastered mental structures” (Fauconnier & Turner, 2002, p. 382). Discourse is a concept closely related to framing. In framing, discourse is used as symbolic expressions of frames in the form of written and spoken language (Orlikowski & Gash, 1994; Werner & Cornelissen, 2014). In this way, it is shared resources that are shaped within particular social, cultural, and historical contexts (Loewenstein et al., 2012; Willig, 2013) that are used to mediate between different frames.

Frame shifting manifests when elements of frames are reconstructed, either by explicitly negating or questioning established frames, or implicitly doing so (Werner & Cornelissen, 2014). This means challenging existing assumptions, beliefs, and knowledge claims when talking of new possibilities. At Sydved, frame shifting manifested when talking about how new ways of applying digital technologies for engaging in digital ecosystem orchestration could be different as compared to Sydved’s established practices (Papers 1 and 2). Such ideas questioned Sydved’s established frames in some ways, sometimes explicitly and other times implicitly.

Frame shifting can manifest when actors proactively search for, and inject, an alternative discourse for constructing semantic differences against established frames (Pratt, 2000). It can also manifest reactively, if ambiguous experiences stimulate a search for alternative discourses to

make meaning of such experiences (Rao et al., 2003; Werner & Cornelissen, 2014). Framing in Sydved's digital transformation was a response to ecosystem-level changes. Sydved employees faced ambiguities especially following the injection of a digital platform for wood matchmaking in their ecosystem which created confusion. It motivated some employees to seek out new perspectives about digital platforms and digital ecosystems from academia and new partners.

Frame blending manifests when elements of established frames are integrated or iterated in framing by constructing similarities between alternative discourses and established frames (Werner & Cornelissen, 2014). This means recognizing the continued relevance of past experiences and using them to inform more talking of ideas for the future. At Sydved, frame blending manifested when talking about how new ideas for applying digital technologies for digital ecosystem orchestration in the future resembled how Sydved, in some ways, already engaged in it (Paper 2), for example, by enabling wood transactions between forest owners and mills (Paper 1).

In this way, frame blending manifests when talking of new ideas enhances elements that are already established and thereby positions new ideas as somewhat familiar (Ansari et al., 2016; Raffaelli et al., 2019). For example, Ansari et al. (2016) noted that framing during digital transformation in the context of the U.S. television ecosystem involved "a change in emphasis from the "disruptive" aspect of [digital video recording] that upstages established incumbents, to the beneficial aspect of the innovation that can enhance the value generated for and by various incumbents within the ecosystem" (p. 1848). Another example of frame blending is analogy, where new experiences acquire meaning by recognizing similar elements between new ideas or situations and past experiences (Gavetti et al., 2005). Other examples of frame blending are conjunctions ("and"), conceptual integrations, and discursive combinations (Werner & Cornelissen, 2014).

Together, frame shifting and frame blending provide conceptual tools for thinking more carefully about time in meaning-making. They capture the intangible work of juxtaposing understandings of an organization's past as well as ideas of what its future might entail (Kaplan & Orlikowski, 2013; Schultz & Hernes, 2013). As people talk about what might be new in potential futures (Reinecke & Ansari, 2017, pp. 405-406), it manifests as frame shifting because it explicitly or implicitly questions the status quo. As people recall a similarity between a potential future and what is already in place in the organizational context, it manifests as frame blending.

3.3. FRAME SHIFTING AND FRAME BLENDING IN DIGITAL TRANSFORMATION

I will now clarify how I have elaborated on the theoretical understanding of the concepts to theorize meaning-making in digital transformation. As a foundation, I have built on Werner and Cornelissen's (2014) theoretical understanding of the concepts (Table 1).

In this elaboration, I draw on the literature of framing as an *interactional process*. In this view, framing is a dynamic social process that manifests in discursive interactions between individuals (Dewulf & Bouwen, 2012; Gray et al., 2015), that is in "talking" (Weick et al., 2005). For example, Sydved arranged focus groups that were specifically designed for talking about how Sydved could explore new ways of organizing in digital ecosystems in the future. Although framing takes place in "every-day" interactions when employees engage in their usual activities (Purdy et al., 2019), Sydved's focus groups were spaces where frame shifting and frame blending were especially salient. In contrast, Werner and Cornelissen's (2014) focus on the process of strategic framing, as they apply "a cognitive linguistic focus on how [individuals] deliberately use language to influence the creation or maintenance of cognitive schemas" (p. 1454).

An interactional view of framing thereby concentrates on *group-level interactions* in framing, where individuals *change and negotiate frames together* (Gray et al., 2015). In this view, framing thrives on boundary-spanning interactions between people with different frames that are formed in different contexts (Levina & Vaast, 2005), because such diversity provides resources for accessing and combining diverse discourses in framing (Lane & Maxfield, 1996). For example, Sydved's focus groups included Sydved employees from different professions, but also researchers in digital innovation/transformation and partners from software development and digital marketing, who all brought different inputs. In contrast, Werner and Cornelissen (2014) focus on individuals' efforts to *persuade others*. In their view, frame shifting and frame blending are discursive tactics that individuals employ when constructing and communicating convincing messages so others will support or adopt an alternative frame.

Table 1. Foundations and elaborations of the concepts frame shifting and frame blending.

	Werner & Cornelissen (2014)	This thesis
Type of process	Strategic framing	Interactional framing
Level of analysis	Individual	Group
Function	Framing messages to persuade others	Changing and negotiating frames with others
Technology	Macro-level trigger of discursive opportunity	Micro-level resource for meaning-making in interaction
Ontological position	Dualism	Duality

In interactional framing, interactions with technology also stimulate meaning-making (G. Wang et al., 2022). In this view, applications of technology are *resources for meaning-making in micro-level interactions* because they carry discourses that are instantiated in their design (Azad & Faraj, 2011; Bernardi et al., 2017; Gawer & Phillips, 2013). At the same time, what meanings people make in interaction is not determined by discourses inscribed in technology (Pinch & Bijker, 1984), although different technologies pose constraints on what meanings are possible (Doherty et al., 2006; Hoppmann et al., 2020). This view differs from Werner and Cornelissen (2014) by focusing on a different level of analysis of technology in meaning-making. In their view, technological change is a *macro-level trigger of a new discursive opportunity* that “unsettle previous assumptions in society and thus present an opportunity for change” (p. 1462). A discursive opportunity can provide force to a frame shifting tactic (Werner & Cornelissen, 2014).

Within digital transformation, digital technologies play an increasingly common role as such resources, including, for example, data visualizations, mockups, and prototypes (Flyverbom & Garsten, 2021; Pershina et al., 2019). Traditional examples of such resources that remain useful in the context of digital transformation include, for example, timelines, narratives, and drawings (Garud et al., 2013; Pershina et al., 2019). For example, the focus groups at Sydved included different resources that were designed for stimulating talk of potential futures of digital ecosystem orchestration such as fictitious narratives of Sydved’s digital transforma-

tion, a visualization of Sydved's ecosystem, and, eventually, mockups and prototypes of new digital applications.

Finally, I elaborate on frame shifting and frame blending as a *duality* in framing. It means that frame shifting and frame blending are interdependent and enable one another, although they are conceptually distinct (Farjoun, 2010). This synergetic relationship makes new meaning emergent from a dynamic process of identifying both similarities and differences between alternative discourses and established frames (Cornelissen, 2005). This view resonates with El Sawy and Pauchant's (1988) early view on frame shifting. They embedded two concepts in frame shifting: accommodation, where established frames are modified because new information is incompatible with established frames, and assimilation, where new information is integrated in established frames (El Sawy & Pauchant, 1988). Here, frame blending is similar to assimilation as both emphasize integration.

In contrast, Werner and Cornelissen (2014) imply a *dualism* view of frame shifting and frame blending (Farjoun, 2010), by treating them as separate tactics that individuals choose between in different situations. They propose that the success of either frame shifting or frame blending, defined as their persuasiveness, depends on the nature of a particular discursive opportunity and its degree of resemblance to established frames.

As frame shifting and frame blending work together in framing, it is sometimes possible to distinguish interactions between them. Frame shifting can trigger frame blending when ideas of alternative futures activate the identification of similarities between such futures and an organization's past. Such identifications depend on the participants' contributions because "different visions of the future will lead to the mobilization of the past in different ways" (Garud et al., 2010, p. 768). For example, it was specifically ideas of Sydved as a future digital matchmaker, that enables transactions between other ecosystem actors through digital applications, that opened up for comparisons to Sydved's existing position as an intermediary of ecosystem actors such as mills, forest owners, and various forestry service suppliers (Paper 1).

In turn, frame blending can trigger frame shifting by making visible otherwise unseen differences between alternative futures and an organization's past (Coulson, 2001, p. 200). For example, seeing examples of

matchmaking in how Sydved's had organized in the past also made visible many more granular potential differences. Especially, it enabled talk of more detailed differences of what could be different for, for example, established professions that were important for conventional matchmaking in the scenario where Sydved engaged in new forms of digital matchmaking (Paper 1).

Taken together, frame shifting and frame blending connect micro-level meaning-making with organizational-level digital transformation. Meaning-making is what directly shapes organization-level digital transformation because it is in this process that new ideas for the future are brought into being and integrated with the organizational past (Kouamé & Langley, 2018). See Figure 1 below for a simplified illustration. On the micro-level, meaning-making is constituted by manifestations and interactions of frame shifting and frame blending through talking. Manifestations refer to events when some element of established frames, such as a belief, assumption, or expectation, is shifted and/or blended. It is in such events that new ideas for potential futures or integrations of such ideas with the past are made. Interactions refer to their dynamics, that is when either of them manifests as a response to the other. Shifts are enacted if or when actions are taken that are guided by the shifts to redirect digital transformation (ibid., Gray et al., 2015). It is the shifts that represent the emergence of new meaning. In this way, the thesis moves between the micro-level analysis of meaning-making and its organization-level implications, that is digital transformation.

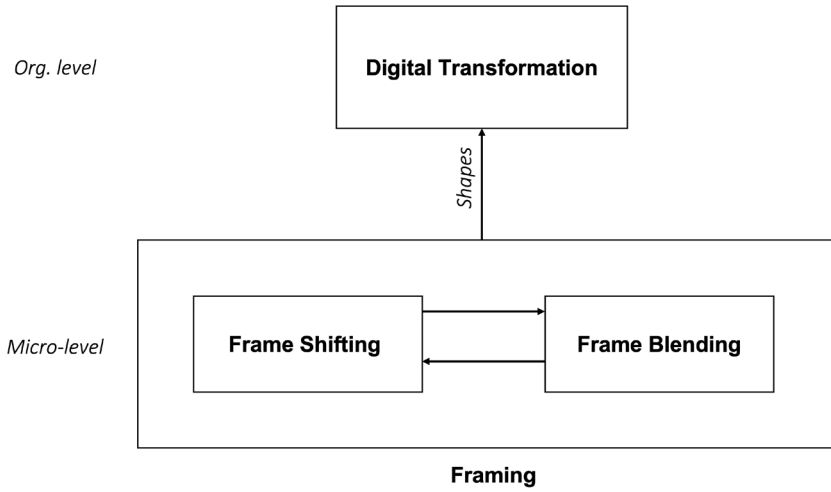


Figure 1. Simplified illustration of conceptual framework for approaching meaning-making in digital transformation.

I will now introduce the case that I have analyzed and the method I have used for studying meaning-making in digital transformation.

4. METHODOLOGY

In this chapter, I provide a background into the Sydved case, its established ecosystem context, and its ongoing digital transformation. I also describe and justify methodological choices of data collection and analysis for studying meaning-making in digital transformation.

4.1. CASE STUDY

To study meaning-making in digital transformation, I undertook a longitudinal qualitative case study of the incumbent firm Sydved between 2018 and mid-2022. This approach was chosen because this research topic requires access to micro-level processes situated in employees' and groups' every-day activities (Purdy et al., 2019), deep insights into the organizational context (Klein & Myers, 1999), as well as the option to make comparisons and trace changes across time (Dyer Jr & Wilkins, 1991). Over these years, I both observed and engaged in meaning-making in Sydved's digital transformation with varying degrees of activity. The case study was thereby carried out with an engaged scholarship approach, that included researcher interventions in the meaning-making process (Van de Ven, 2007, p. 28).

4.1.1. CASE SELECTION

Sydved was a suitable case for studying meaning-making in digital transformation for three main reasons. The first reason was that Sydved is an incumbent organization, that is an organization that predates discontinui-

ties such as the injection of new technologies in an organization's ecosystem (Anderson & Tushman, 1990). Incumbent organizations are well-suited for the study of meaning-making generally because they commonly struggle to overcome inertial forces that prevent change (Benner, 2007; Gilbert, 2005; Tripsas, 2009), such as established frames (Kaplan & Tripsas, 2008).

Second, Sydved is an incumbent matchmaker. Matchmakers include organizations that play an intermediating role by connecting different ecosystem actors through brokering (Majchrzak et al., 2016). This can be achieved by brokering and/or orchestrating interactions and transactions between them (Paper 1). In brokering, a matchmaker intermediates by intentionally keeping actors separate and forcing them to interact through the intermediary. In contrast, a matchmaker encourages direct interaction between actors by taking an indirect role in orchestration, which can be enabled by digital platforms (Furr & Shiplov, 2018; Holzmann et al., 2014). Matchmakers are especially interesting for studying meaning-making in digital transformation. On the one hand, some stress that incumbent matchmakers and digital platforms are fundamentally different, as they are "the businesses that [digital] platforms are actually disrupting" (Evans & Schmalensee, 2016a). At the same time, incumbent matchmakers and digital platforms share similarities (Paper 1). These prerequisites made Sydved an especially useful case for exploring the role of temporality in meaning-making in digital transformation.

The third reason was timeliness. The Sydved case offered a rare opportunity for being immersed in meaning-making during digital transformation as it happened (Harding et al., 2002; Monteiro et al., 2022). Meaning-making in digital transformation is, if not impossible then at least highly difficult, to study as an outsider retrospectively because it occurs in employees' every-day activities (Schultze, 2017) and is temporally bounded to when digital transformation unfolds (Howard-Grenville et al., 2021). At Sydved, I encountered the opportunity to follow and participate in employees' activities during a period of turbulence in Sydved's digital ecosystem that created ambiguities of the future, as triggered by, for example, the launch of a new digital platform for matchmaking wood. I will now describe the case background in more depth.

4.1.2. CASE BACKGROUND

Sydved is an incumbent matchmaker in the Swedish forest industry, founded in 1979. Its core mission is to supply wood to its two owners' mills, namely Stora Enso Skog AB and Ahlström Munksjö AB. In 2018 when this study was initiated, Sydved was structured as seven geographically distributed forest buyer districts to cover the wood market of southern Sweden. It also had a central head office in which were located functional units, namely marketing, logistics, IT, human resources, forestry development, finance/wood administration, and management. About 50 % of the workforce (approximately 140 people in the total workforce) were forest buyers, responsible for brokering transactions between actors in the wood market. Over the years, brokering had come to include a wide palette of forestry services between forest owners and independent forestry service suppliers, including wood harvesting, wood transportation, forest plantation, forest road construction, silviculture¹ consultancy, and environmental certifications. A critical shift towards more diverse match-making occurred in the early 2000s. At this point, Sydved reorganized by making previously employed forestry service providers into independent partners who ran their own businesses. As such, Sydved became a matchmaker within a fairly diverse ecosystem.

1 “Silviculture is the practice of controlling the growth, composition/structure, and quality of forests to meet values and needs, specifically timber production”. ([Wikipedia](#), n.d.), cf. agriculture.

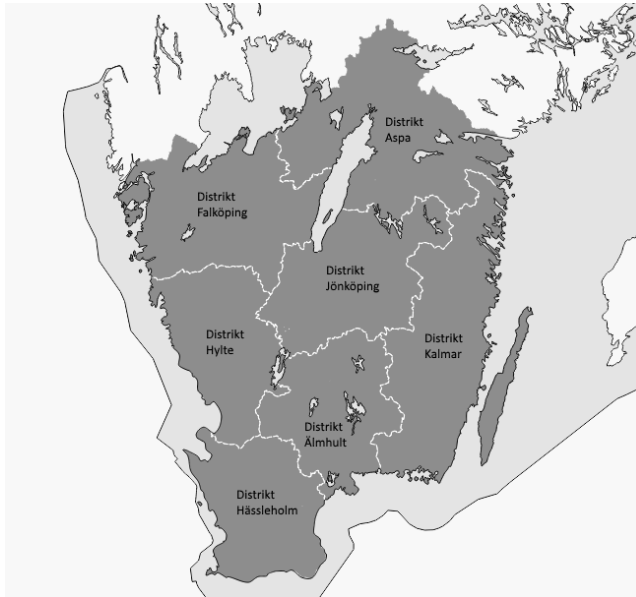


Figure 2. Map of Sydved's geographical area of operations and districts between approx. 2000-2022.²

In this way, Sydved has always been an intermediary actor within an established ecosystem, as in a collective of interdependent actors that to a large extent did not rely on digital technologies for organizing (Paper 2). Figure 3 displays an image of Sydved's established ecosystem, as perceived around 2016-2017. At this time, some Sydved employees mapped and illustrated their established ecosystem together with my supervisor Fredrik Svahn. The mapping was carried out in three steps. First, they identified external actors, activities, and resources that Sydved had established relationships with. Next, they identified actors, activities, and resources that were part of the forest industry but that Sydved had no direct established relationships with. Finally, they identified actors, activities, and resources that could become relevant for the ecosystem in the future, but that were not perceived as already part of it. When visualized in a network graph, the two innermost circles of Figure 3 revealed that Sydved's established ecosystem largely centered on actors, activities, and resources directly associated with wood supply, such as wood purchasing, production, and transport.

² Sydved – Kontakta oss (n.d.)

marked by long geographical distances between actors. Individual forest owners are diverse, as some enjoy rural living close to their properties while some live in urban areas a great distance from their properties. Some have a forestry background with strong emotional connections to their properties while others have financial incentives of forest ownership, seeing their forest properties as investments.

Since Sydved was founded, forest buyers have been critical for match-making wood (Paper 1). When I studied the firm, forest buyer salaries were based on performance, as measured in wood volumes, precision of supply, production precision, and compliance with nature care criteria. The forest buyer role was characterized by autonomy in managing relationships with forest owners and forestry service suppliers, so there existed individual preferences and variety amongst forest buyers on how to manage such relationships. At the same time, the forest buyer role typically required skills for sensing and adapting to forest owners' diverse needs and requirements. Forest buyers typically visited forest owners at their properties for negotiating types of felling (final felling/thinning) and prices. Contract variants included setting the price per cubic meter of wood where real costs for forestry services were reduced in retrospect when wood volumes were measured, setting a net-price per assortment where an estimated cost of forestry service was calculated and reduced in advance, or setting a price for a designated forest area where a purchaser could fell and sell wood as they like within a given time interval. As such, there was flexibility to use different wood business models, with no official price list in place.

Forest buyers also coordinated local teams of small independent businesses that managed harvesting and forwarding. In practice, it often meant that forest buyers directed the wood production, although it varied across production teams as to what extent forest buyers distributed responsibilities to forestry service suppliers (e.g. marking trees and communicating with forest owners). Additionally, some forest buyers actively brokered between forest owners and more diverse forestry service suppliers, such as plant, gravel, and grounding service suppliers, which in some cases rendered an additional source of revenue in terms of profit from transactions between these ecosystem actors. However, Sydved's main source of revenue was profit from wood transactions.

Regional, district, and, to some extent, logistics managers were responsible for mill relationships. Although unforeseen events could affect mill needs in the short-term, these relationships were typically characterized by stability given that supply contracts typically were long-term. Managing these relationships nonetheless involved regular meetings throughout the financial year (typically six-month contracts) to investigate the wood supply the mills need and negotiate wood prices. These negotiations set the limits for what prices forest buyers could offer forest owners.

While Sydved's owners were in particular need of pulp, Sydved also had established relationships with other mills, such as sawmills in need of timber. In this way, they had the capacity for matchmaking all wood assortments that wood purchasing entails, including the ones that their owners did not need. Further, transactions with sawmills were bidirectional, because Sydved also purchased the sawmills' "left over" pulp from their operations, to ensure Sydved's owners' access to pulp. Negotiations with sawmills therefore involved both the price of timber for Sydved to sell, and the price of pulp for Sydved to buy. Sydved also bartered with competing firms that purchased wood but did not share Sydved's owners' interest in pulp. Production and delivery planning were therefore also made part of the regional and district managers' tasks, thereby intermediating between mill needs and forest buyers' access to different wood assortments.

The logistics unit had the main responsibility of relationships with transportation providers. It supported the planning of supply as well as the coordination of transport services with smaller transport firms or independent truck drivers. They were in regular contact with forest buyers, district managers, and truckers to coordinate the matchmaking of wood and logistics resources. The headquarters also housed other supporting units for the districts, such as the IT unit that developed supporting digital tools and managed data flows, the forestry development unit that supported knowledge building on forestry and nature care, marketing that ensured frequent and attractive communication with forest owners and wood administration that managed financial flows and accounting. Over the years, some members of these traditional supporting units became increasingly involved in efforts to develop new digital services for various ecosystem actors.

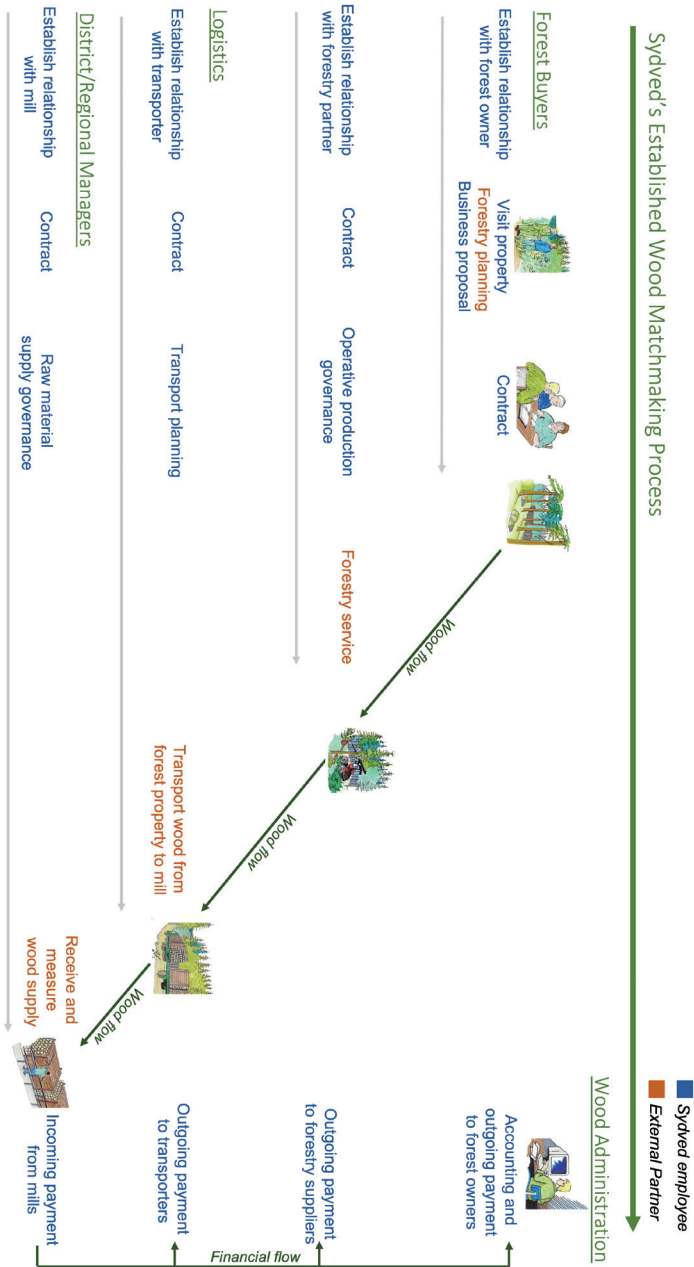


Figure 4. Illustration of Sydved's established wood matchmaking process⁵.

5 The illustration is an adapted version of an article from the Sydved magazine "Aktivt Skogsbruk" (2017) and process maps made by Sydved and Stora Enso Skog that has a similar business for wood matchmaking. The images are from a Sydved PowerPoint presentation from 2002. The forestry developer verified that it is representative of Sydved's established matchmaking process (2021).

Sydved's initial steps towards digital transformation can be traced to the early 2000s (Paper 2). At this time, Sydved developed web-based applications for forest owners and forestry service suppliers. At the beginning of the 2010s, mobile applications were developed for the same actors as well, following the emergence of the widespread use of smartphones. These services did not compete with established practice for wood matchmaking, but rather gave ecosystem actors access to partial information about the wood transaction/production after the point of purchase/contract.

Around 2013, Sydved made changes in organizing as a response to the emergence and growing use of social media applications (Paper 3). The marketing unit began exploring digital content generation as a new way of attracting and scaling user bases beyond their established base of forest owners and forestry service suppliers, via their webpage sydved.se and various social media accounts (Instagram, Facebook, YouTube). To enable this, the newly formed "Sydved Online" team, which comprised members from marketing, IT, forestry development, and forest buyer representatives from the districts, distributed digital content generation to forest buyers. This way of organizing was characterized as an on-going process, that required new forms of coordination for the marketing unit.

Around 2016, Sydved experienced turbulence again. This time, frontiers were pushed in the ecosystem for digital service development for ecosystem actors. New entrants as well as incumbent ecosystem actors explored innovation with new data sources, such as drone data, satellite data, updated laser scanned data provided by the government, forest owner generated data, as well as existing data sources, such as production data from machines. Notably, a digital platform for wood transactions was launched. This platform was a particular source of ambiguity for Sydved, as it represented the injection of a new form of digital matchmaking into the ecosystem. As articulated by one system developer: "*The uncertainty is big in terms of what [digital platforms] imply for the industry and for us - will there, for example, appear an "AirBnb" in the forest industry?*" (System developer 6⁶, meeting notes 2016-08-31).

In response, management decided to give the responsibility for "digitalization", with an emphasis on "digital wood business", to the marketing unit in 2018. This was motivated by the close interdependence between

6 I have used individual IDs for each individual who took part in data collection.

the marketing and IT units that had emerged in the Sydved Online team, as well as the IT unit's ongoing resource-intensive work upgrading and maintaining the systems for industry-shared wood measurement data. The same year, the CMO received funding from the board of 1 million SEK for developing digital applications, in addition to investments for implementing a new CRM system, developing an application for digital wood contracts and a new forest buyer application connected to these. These events coincided with the start phase of this study.

4.2. DATA COLLECTION

To study meaning-making as a process, I needed to use multiple methods for collecting data as well as collect data at various points in time (Langley et al., 2013). Between 2018 and 2022, I therefore collected data through participatory observations, meeting participation, unstructured and semi-structured interviews, correspondence over e-mail and social media, and collection of various archival data (see summary in Table 2 below).

Table 2. Overview of total data-set (table adapted from Paper 2).

Data Collection Method		No.	Σ
Participatory Observation	Days spent on-site		86
	Field notes		111
	Meetings		92
	Number of focus groups in the total number of meetings		16
Interviews	Management	50	106
	IT	8	
	Marketing	9	
	Forestry development	13	
	Forest buyers	15	
	Partners	2	
	Group interviews	9	
E-mails and social media chats			168
Archival Documents			314

The focus of data collection shifted throughout the study, as studying digital transformation as it unfolds is like following “a moving target” (Klein & Myers, 1999, p. 73). Retrospectively, I distinguish three slightly overlapping phases in the study that were characterized by different methods for data collection: *understanding the organization*, *engaging in meaning-making* and *observing digital transformation*. I will now provide more details on what data collection methods I used in these phases and why.

4.2.1. UNDERSTANDING THE ORGANIZATION

To acquire a deep understanding of Sydved’s established organization, its context, and ongoing digital transformation (Klein & Myers, 1999), I took guidance from ethnographic approaches to data collection in organizations (Schultze, 2017). This data collection especially permeated the initial phase of the study, as I spent 52 days on-site during 2018 and 27 days during 2019 observing daily operations as well as talking to a broad set of employees. I consistently made field notes of these experiences. I mostly spent time at the headquarters, but also made visits to some forest buyer districts, one mill, felling/forwarding suppliers, meetings/events organized for forest owners, and visits to firms within the company group (Stora Enso Skog and Stora Enso Metsä).

For this purpose, I also carried out interviews and participated in meetings. The interviews were either semi-structured or unstructured. In the former, I used an interview guide to steer the questions towards understanding employees’ roles, responsibilities, tasks and specific digital transformation initiatives that they had knowledge about (Roulston & Choi, 2018). The unstructured interviews resembled “friendly conversations” (Spradley, 2016, pp. 55–68) and were carried out without an interview guide to learn more about topics that respondents spontaneously brought up (Roulston & Choi, 2018). I sought to audio record as many interviews and meetings as possible, and most were transcribed with a few exceptions. However, some meetings and long conversations that spontaneously shifted into an interview were recorded in field notes, so as not to interrupt

the conversation flow by introducing an audio recorder. In some cases, I complemented field notes with photos and/or print screens, such as when asking employees to do “walkthroughs” of digital applications with me (Light et al., 2018).

Additionally, I accessed many different archival documents for triangulating findings as well as collecting additional data such as dates, purposes, and “talk” of past events. I collected 314 documents in total, which included strategy documents, PowerPoint presentations, meeting notes, and Sydved’s monthly newsletter. I also took part of digital contents on sydved.se and @Sydved on Instagram that were relevant to this study. These documents thereby provided a way to collect historical data and thus establish an understanding of both Sydved’s historical context as well as ongoing digital transformation initiatives that were initiated prior to this study. These data collection methods were significant for writing Papers 1, 2, and 3 that are included in this thesis.

4.2.2. ENGAGING IN MEANING-MAKING

To study meaning-making in Sydved’s digital transformation, me and my supervisor Fredrik Svahn engaged with employees in the firm and invited partners in focus group (Morgan & Hoffman, 2017) with the purpose of facilitating discussions about and injecting new ideas about digital platforms, digital ecosystems, and digital options thinking (Mårtensson & Lee, 2004). In the following, I refer to both of us as “the research team” and to Fredrik only as the “digital innovation researcher”. Between 2018 and 2020, we held 16 such focus group meetings, where participants’ experiences, perspectives, and ideas could be voiced on these areas. These 16 focus groups were audio recorded and transcribed, with the exception of some shorter sub-group discussions. In total, the data acquired consist of 2 days 21 hours 33 minutes and 17 seconds of audio recording, and 1902 pages of transcribed data.

The different focus groups consisted of a diverse group of people, and the set of participants changed over time. I refer to seven of these meetings as the “innovation labs”, in line with what they were called at Sydved. The

purpose of the innovation labs was to learn about digital platforms and digital ecosystems as well as to identify, develop and realize new digital applications. These included the CMO, CIO, employees from the marketing unit, the forestry development unit, a few forest buyers, different invited partners from software and digital marketing firms on some occasions, the CEO on one occasion, the district managers on one occasion, and the research team. The remaining nine of the focus groups included management-level employees (some for top-level management only, and some including district managers as well) and the board on one occasion. The purpose of these meetings was to learn about digital platforms and digital ecosystems, discuss potential implications for Sydved's organization and business, and learn of the innovation labs' exploration of new digital applications.

Our role as engaged scholars permeated all interactions with Sydved employees throughout the study, but it was especially salient in the focus groups. In several of these, we intervened by, for example, providing a mini-lecture or presenting scenario-like narratives. We used these forms of intervention to facilitate discursive interactions of new ideas and implications for Sydved. To do this, we contextualized inputs while drawing on theoretical perspectives from the digital platform, digital ecosystem, and digital options literatures, similar to how focal theory "provides the intellectual basis" in canonical action research (Davidson et al., 2012). In some of the innovation labs, I also engaged in initiating and designing the agenda in collaboration with the CMO and CIO. Taken together, the discursive interactions between us and practitioners were part of collecting data about meaning-making in digital transformation (Klein & Myers, 1999).

Gaining access to empirical settings when meaning-making takes place required effort to create a trustful environment together with Sydved employees throughout the research project. By "trustful environment", I mean that the study depended on mutual commitment, curiosity, and respect for each other's interests when engaging in and learning more about meaning-making in digital transformation (Amabile et al., 2001; Mathiassen, 2017). Understanding the organization through many informal

interactions was crucial for creating the necessary trust for collecting data on meaning-making (Schultze, 2000). It was critical for ensuring access to some settings where meaning-making was particularly intense, such as the innovation labs, which sometimes lasted entire workdays (Walsham, 2006). Likewise, trust was critical for ensuring long-lasting access for observing Sydved's digital transformation over a period that spanned years (ibid.).

4.2.3. OBSERVING DIGITAL TRANSFORMATION

To study enactments of new meanings in Sydved's digital transformation, I observed actions outside of the innovation labs between 2018 and 2022 of those employees who were engaged in the innovation labs, including how they interacted and worked with digital technologies in new ways. Here, I used similar methods for collecting data as in the initial phase of data collection, meaning that I collected data through meeting participation, unstructured and semi-structured interviews, archival documents (e.g. PowerPoint-slides from meetings), e-mail correspondence, and various sources of digital content (i.e. the webpage sydved.se, Sydved's e-mail based newsletter, and the @Sydved Instagram account).

As several employees played a more prominent role in Sydved's digital transformation (e.g. the CMO, CIO, a forestry developer, and members of the marketing unit), they were interviewed on several occasions, and sometimes in groups, to understand what actions were taken for shaping digital transformation and why. This explains the larger number of interviews at the managerial level, as especially the CMO was interviewed frequently to allow me to stay updated on the course of events and learn who else to interview and what meetings to attend to acquire perspectives from several employees on the same events (Klein & Myers, 1999). I also continued undertaking field visits to the headquarters to take part in informal chats to learn of potentially diverging perspectives amongst employees. During the later stage of the study, interactions mostly took place remotely and less frequently compared to the initial stage of the project, partly because of the covid-19 pandemic. These data collection activities revealed that

digital transformation became especially salient in the renewal of Sydved's established web-based application *sydved.se* that included the log-in accessible pages "My Forest". This renewal also came to include the developments of the new digital application "Skogen Live".

4.3. DATA ANALYSIS

In this subchapter, the data analysis of meaning-making in digital transformation is presented as three distinct phases in which I used different analytical approaches, namely *analyzing manifestations of frame shifting and frame blending*, *analyzing interactions between frame shifting and frame blending*, and *analyzing digital transformation*.

4.3.1. ANALYZING MANIFESTATIONS OF FRAME SHIFTING AND FRAME BLENDING

The first phase of the analysis focused on analyzing manifestations of frame shifting and frame blending. To carry out this analysis, I chose five focus groups for in-depth analysis. Importantly, all focus groups should be understood as "dives" into an ongoing meaning-making process. Meaning-making did not only occur in these focus groups but also occurred to varying degrees outside of these meetings (Purdy et al., 2019). I sampled by choosing the most "extreme" focus groups of the total which were the first five innovation labs (Eisenhardt, 1989, p. 537), thereby choosing data in which meaning-making was the most "transparently observable" (Petigrew, 1990, p. 275). In total, these five focus groups produced 25 hours 31 minutes and 3 seconds of audio recording and 838 pages of transcribed data. I provide details of who participated, what interventions we made as a research team, and what resources we and others used in these innovation labs in Figure 6 below.

This phase of the analysis consisted of five coding rounds (see Figure 5). The analysis began with a first round of open coding using Atlas.TI coding software (Charmaz, 2006). Temporality stood out as an absolutely central theme from the start in codes such as "relating to past experiences",

“making analogies”, “ideas of [something new] raising ambiguities about [something established]” and “questioning [something established] by comparing with [some example of what another digital platform does]”.

In the second coding round, I searched for theoretical concepts for abstracting these codes (Klein & Myers, 1999). I began the search with theory on technological frames (Orlikowski & Gash, 1994) and technological framing (Davidson, 2006), as reflected in Paper 4. Eventually, the data and initial analysis motivated a broader search in the literature. I struggled to find theoretical support for the temporal dimension in my material (Gal & Berente, 2008) as well as conceptual tools for focusing in on the discursive interactions of the innovation labs. Therefore, I broadened the search to concepts from framing theory in organizational studies (Cornelissen & Werner, 2014). This search led me to the concepts of frame shifting and frame blending (Werner & Cornelissen, 2014). I tested the concepts at a few innovation labs to evaluate if they were useful for abstracting the initial open codes. I learned that they were useful as a foundation, but that I needed to expand the theoretical understanding of them to move from “concrete surface observations to more abstract process theory” (Langley et al., 2013, p. 9). To do so, I engaged in further reading of additional literature as reflected in Chapter 3.3. *Frame Shifting and Frame Blending in Digital Transformation*.

I thereafter proceeded with a third round of coding with the aim of identifying manifestations of frame shifting and frame blending in the selected innovation labs. At first, I tried to identify discrete manifestations of frame shifting and frame blending in the transcripts but such manifestations proved difficult to contextualize and disentangle in the data. Rather, I noticed that they needed to be interpreted in the context of what was talked about and what we did through talking (Woodilla, 1998). For this reason, I shifted the initial analytical approach to starting with dividing the innovation lab discussions into events (Langley, 1999), as in what activities we engaged in through talking in the innovation labs, such as generating, negotiating, and evaluating new ideas. I used a lexicon of activities as a guide for delineating events, that is an analytical vocabulary (Gaskin et al., 2014). As this lexicon was originally developed for research on organiza-

tional routines from a sociomaterial perspective (ibid.), I adapted it slightly for this analysis⁷.

After having delineated an event, I interpreted whether frame shifting and/or frame blending manifested in it. Therefore, I added the codes “frame shifting” and/or “frame blending” or “neither frame shifting nor frame blending”, as I interpreted whether or not they manifested in the event. Sometimes, a similarity or difference to Sydved’s established organizing was explicated in the discussion. Other times, it was implied so I needed to interpret manifestations by drawing on my established understanding of Sydved.

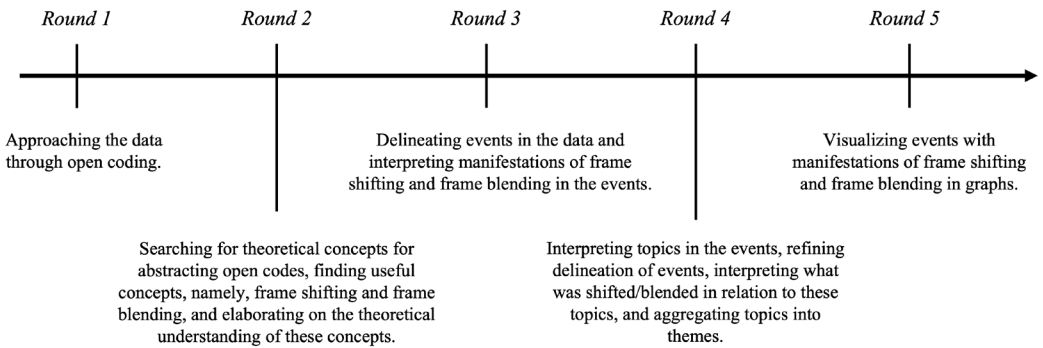


Figure 5. Simplified illustration of the process of analyzing manifestations of frame shifting and frame blending.

7 Training refers to “teaching and/or learning a new skill or knowledge set”, such as when learning new concepts and perspectives e.g. “digital platform”; generating refers to “action-oriented planning and creativity driven tasks”, which here includes ideating new digital applications or future actions; evaluating refers here to examining the potential value of an idea for a future action or digital application; choosing refers here to deciding to pursue an idea; negotiating refers to “resolving conflicts, making compromises” such as when discussing incompatibilities between new ideas and established practices; transferring refers here to the exchange of information, such as e.g., describing past experiences and examples of such without an ideating component as in “generating”, and; executing, refers to “carrying out a plan” which here includes instrumental activities such as moderating the focus group according to the planned agenda (Gaskin et al., 2014). I modified the activity “validate” to “evaluate”, as there was no agreed upon template for validating ideas in Sydved’s focus groups, but such discussions could also involve frame shifting/blending.

In the fourth round of coding, the aim was to interpret *what* of established frames was shifted and/or blended in the events. I approached this analysis through open coding (Charmaz, 2006) where I interpreted “topics” that surfaced in the events (Schreier, 2013), as in *what* was talked about. On some occasions, a change of topic led me to refine how I had delineated events, when, for example, switching from generating ideas on one topic to another signaled that these were two separate events (ibid.). I also added the code relationship “is associated with” between each of these open codes and frame shifting and/or frame blending. In this way, I interpreted what was shifted and/or blended in relation to specific topics. For example, the code “distributing tasks” was assigned the relationship “is associated with” the code “frame blending” in events when there was talk about how new ideas for distributing tasks resembled Sydved’s established distributed digital content generation efforts on Instagram and sydved.se. While coding for topics, I wrote memos on several occasions to assist and document my interpretation of what was shifted and/or blended (Urquhart, 2013, pp. 110-114). These memos provided a basis for presenting the data in Table 4 and Table 5 (see Chapter 6.1.).

Thereafter, I wanted to create an overview of what was talked about in the innovation labs, as well as what was shifted and/or blended when talking about these topics. I did this by organizing topics into themes (Braun & Clarke, 2006). Here, I outlined the codes “frame shifting” and “frame blending” in a coding network in Atlas.TI, as well as all open codes that were associated with these codes. The code relationships revealed which of the topics were associated to “frame shifting” and/or “frame blending”. Mostly, it was both but some only had frame shifting manifestations. In this coding network, I organized the “topic” codes into overarching themes (Braun & Clarke, 2006). I identified two themes, namely *framing digital matchmaking* and *framing digital innovation* - a distinction that also aligns well with the division of innovation and market platforms in the digital platform literature (Cusumano et al., 2019).

In the final round, I visualized all events coded as frame shifting and/or frame blending for each innovation lab using graphs⁸ (see Figure 6). I added all events from the innovation lab to Excel spreadsheets, one for each innovation lab. In these, I added one column each for frame shifting and frame blending respectively. In the cells of these columns, “1” represented a manifestation of frame shifting or frame blending and “0” represented the absence of any such manifestation. Thereafter, I added two additional columns with aggregated manifestations for both frame shifting and frame blending. To display how the balance between frame shifting and frame blending moved in the innovation labs, I visualized the latter columns using two-dimensional blue graphs, with frame shifting on the y-axis and frame blending on the x-axis. These graphs made visible that frame shifting dominated all innovation labs for most of the time, although the emphasis shifted over time throughout and across the innovation labs.

The analysis of the innovation labs rendered a total of 606 events, including 316 manifestations of frame shifting and 108 manifestations of frame blending. As the analytical process was iteratively developed, I carried out round 3 and 4 two times to ensure consistency in the coding of the innovation labs (Schreier, 2013).

8 The data had some limitations for making these graphs that I needed to manage. First, I needed to handle how three focus groups involved shorter segments with smaller group discussions. These were also inconsistently recorded. In one of the five focus groups, they were recorded individually. In two of them, I “walked around” with the recorder. As the activity was the same in all smaller group discussions, I assumed that there were no significant differences in how frame shifting and blending manifested in these. Therefore, I let one small group discussion or the “walk around” recording be representative for all. Second, interruptions such as lunch or coffee breaks were typically not audio recorded, as they commonly represented a break in the group discussions. However, there were some exceptions, so I removed these events to maintain consistency across the innovation labs. Last, the audio recorder was accidentally shut off for approximately 20 minutes during the innovation lab on the 2019-03-07 where I recall a strong emphasis on frame shifting. As such, there is a segment in the analysis in innovation lab four that underestimates the manifestations of especially frame shifting, but possibly also frame blending. For these reasons, the total number of accumulated events in Figure 6 is slightly less than the overall total of 606 events.

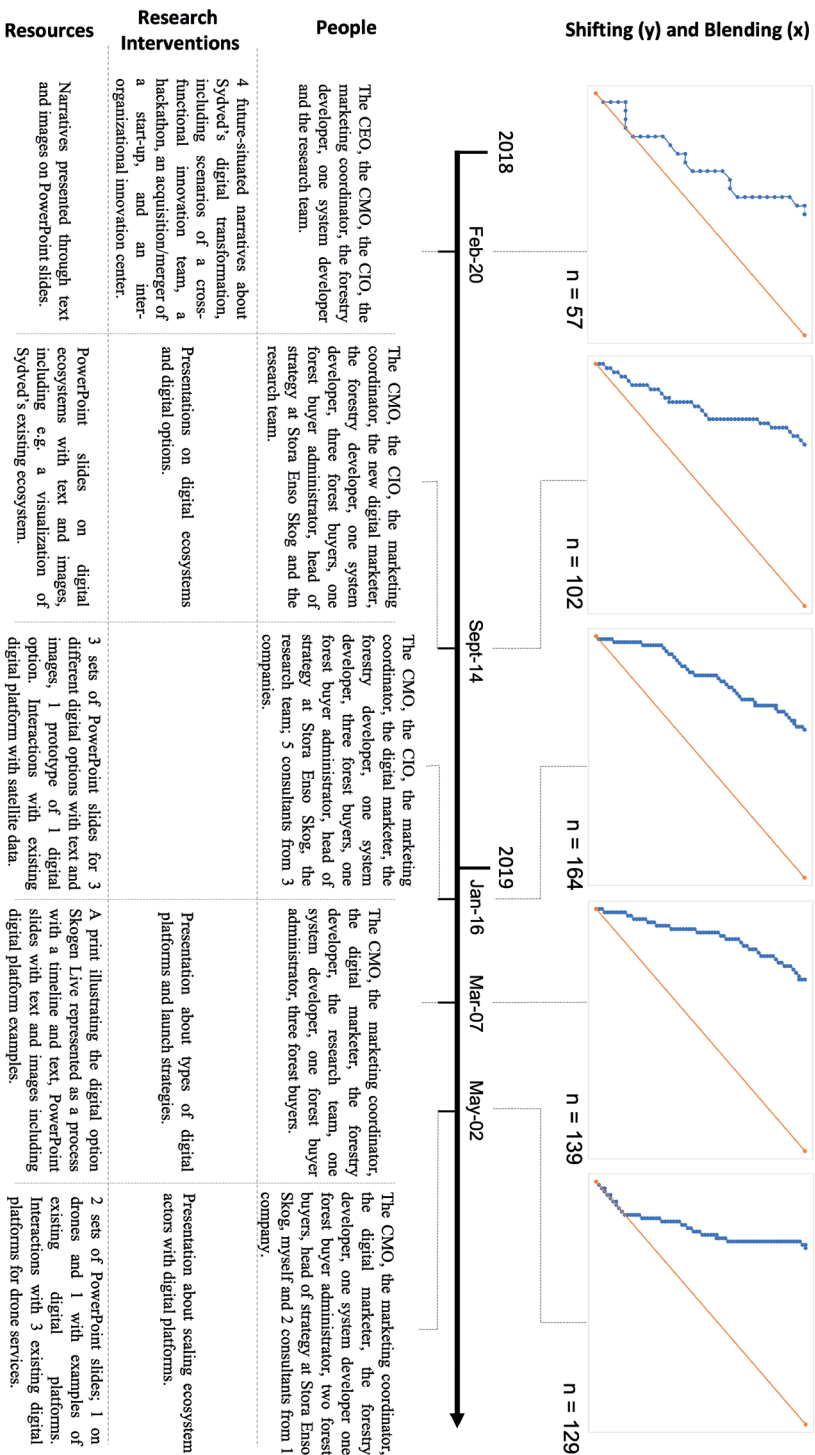


Figure 6. Overview of the innovation labs selected for analysis. The blue graphs represent manifestations of frame shifting and frame blending. The orange lines represent the hypothetical equilibrium of frame shifting and frame blending. The closer the blue graph is to the y-axis, the more emphasis there was on frame shifting. The closer the blue graph is to the orange line, the closer to equilibrium.

4.3.2. ANALYZING INTERACTIONS BETWEEN FRAME SHIFTING AND FRAME BLENDING

When analyzing manifestations, it became clear that there were dependencies between frame shifting and frame blending, such that a manifestation of one triggered a manifestation of the other. For this reason, I returned to the transcripts of the innovation labs once more, with the aim of interpreting and illustrating micro-level interactions of frame shifting and frame blending. In this coding phase, I paid specific attention to events where frame shifting and/or frame blending manifested. For these events, I took a sentence-by-sentence approach for interpreting when, how and why frame shifting and frame blending manifested in these events (Willig, 2013, p. 346).

I identified two interaction patterns, frame shifting triggering frame blending, and vice versa. I selected a few events for illustrating these patterns where either (1) manifestations of both occurred in the same event, or (2) manifestation of either in an event was a salient response to a manifestation of the other in a previous event (see Chapter 6.2). Thereafter, I interpreted possible reasons as to why the interaction patterns occurred sometimes but not every time (Reichertz, 2013, p. 127). This was important in order to understand the emphasis on frame shifting in all innovation labs (Figure 6).

4.3.3. ANALYZING DIGITAL TRANSFORMATION

The final phase of the analysis centered on analyzing how frame shifting and frame blending prefigured as well as constituted Sydved's digital transformation. To do this, I analyzed actions taken to change technology or organizational arrangements surrounding the digital application "My Forest" between 2013-2022. I focused on "My Forest" as a salient example of one digital application where shifts to redirect digital transformation were enacted outside of the innovation labs. It also included the new digital application "Skogen Live" that was eventually integrated into "My Forest". I selected all data from the total data-set that I had categorized as "Sydved Online", "My Forest" and "Skogen Live". Consequently, this analysis covers changes both before the innovation labs as well as actions to change it during and after the series of innovation labs. I considered its history prior to the innovation labs because it provided a richer picture of how later

actions represented enactments of new meanings as compared to its past developments (Monteiro et al., 2022).

To make this analysis, I adopted a narrative strategy to create a descriptive story of the developments of “My Forest” (Langley, 1999). In the analysis, I began again by delineating events, which here included data on when something about “My Forest” changed, what actions were taken to change it, who was involved, and why these actions were taken. I organized these events in chronological order and constructed a descriptive vignette for each event (ibid.). Based on these vignettes, I constructed a coherent narrative of Sydved’s digital transformation (see Chapter 6.3.). I complemented the narrative by drawing a visual timeline (ibid.), to which I added codes that represented my interpretation of when and what new meanings were enacted that shaped Sydved’s digital transformation. Here, I could reuse the codes for “topics” which I had developed in the analysis of manifestations of frame shifting and frame blending.

4.4. ETHICAL CONSIDERATIONS

My approach to ethics when carrying out this study has been to view ethics as enacted in the practice of doing research (Markham, 2018). Such a view recognizes that ethical dilemmas can and will likely emerge throughout the research process (Mertens, 2013), “whereby one must make a choice among options with no clear outcome” (Markham, 2018, p. 2). This means that researchers who study digital transformation through longitudinal case studies with an engaged approach must practice caution and care, despite an intention of doing no harm, as it is impossible to know or control how the study unfolds in context (Markham, 2018). When such situations emerge, regulations (e.g. GDPR as this research is situated in Sweden), guidelines (e.g. IRE 3.0 (franzke et al., 2020)), core values stressed in these (e.g. human dignity and integrity⁹) and colleagues (Markham et al., 2018) can be critically assessed as guidance when making situational methodological choices during the study that involve making judgments.

9 The Norwegian National Research Ethics Committees (2019)

4.4.1. ETHICAL CONSIDERATIONS IN DATA MANAGEMENT

During this study, I have, at times, engaged closely with Sydved employees, which has led to me encountering ethical dilemmas regarding how to record, store, and save data. Over time, the interactions with some Sydved employees became quite “friendly” in nature, or at least colleague-like, where I had little control over how “everyday” conversations would unfold (Spradley, 2016). In some of these situations, I unexpectedly encountered special categories of personal data. As such data were unnecessary for answering the research questions as well as violated GDPR, I decided that they should be removed (Markham et al., 2018), which also aligned with a data minimization strategy for avoiding risks of doing harm (Ess & Hård af Segerstad, 2020).

One situation particularly exemplifies these situations. In one group meeting that I audio recorded, where we were designing an upcoming focus group, the conversation shifted towards gossip about an employee who was not present in the meeting. This led to one participant revealing the religious beliefs of this individual. I judged that I both needed to make sure that my research complied with GDPR as well as protected this individual’s integrity. I therefore decided to edit the recording after the meeting, by splitting the audio file into several components and removing the segment that included sensitive data, as well as deleting the original file.

4.4.2. ETHICAL CONSIDERATIONS OF INFORMED CONSENT

Given the longitudinal design of this study, I have faced challenges in obtaining informed consent from Sydved employees, as research participants have the right to know, decide to and withdraw from participating in a study (Ryen, 2016). In organizational studies, obtaining informed consent has in-built practical as well as political challenges, especially where observations are part of data collection (Buchanan & Bryman, 2007). As a researcher enters a work site, s/he becomes situated in a crowd of employed professionals, who have limited influence over granting researchers access to the site. Likely, such decisions are made by individual(s) in power that may expect employees to participate. For researchers, it means that

informed consent of employees cannot be taken for granted as employees' opportunities for opting out may be restricted by organizational politics (Davison et al., 2022).

Given this challenging context of research, I developed an ongoing approach to obtaining or navigating ethical questions of informed consent across research stages (e.g. data collection, dissemination) (Franzke et al., 2020, p. 9). Thus, I was extra careful when encountering employees who had no direct influence over my access to Sydved as a case company. Nonetheless, ethically sensitive situations emerged which the following examples illustrate.

Throughout the study at Sydved, I noticed that my role, at times, became unclear to some employees when I was attending the site for collecting data. For example, it happened that some employees whom I did not interact with frequently mistook me for an employed colleague. I was reminded of this when they asked me: "do you still work for us?". Such questions signaled that I needed to remind people of my research role, explain my purpose for being there and describe what activities I was currently engaged in. Further, new employees joined Sydved from time to time, so I also developed a routine of introducing myself in meetings and around the coffee table.

Over time as I became more aware of the issues of informed consent, I fine-tuned my practice of being more careful when collecting data, such that some employees would not know, forget, or misunderstand why I was there, or covertly not want me to be there. Here, I took guidance from handling ethical issues of informed consent in "found data" such as digital trace data, even though it here concerned ethical issues in "made data", such as participatory observations, field notes and interviews (af Segerstad, 2021). For example, I tried to reduce risks of harm by not exposing employees' identities in field notes, to protect their integrity if they would voice views that could be interpreted as critical by other employees and managers. The field notes only disclosed overarching details, but not details of individuals such as "who said or did what". If I still thought that a particular individual's perspective was relevant to learn more about, I asked for a separate interview where I could more closely inform them of the purpose and method of collecting data. Then, the employee could choose whether they wanted to participate or not.

I also considered ethical issues of informed consent in the dissemination stage. In one conference paper that is included in this thesis, one employee problematized aspects of gender imbalance amongst Instagram followers. In this situation, I judged that these data were relevant for the study I was doing on Sydved's process for generating digital content, although I did not foresee that this discussion would occur when I started the investigation. Given the discussion's political nature, I decided that the situation motivated a "member check" (Mertens, 2013) as I did not know whether the consent this employee had given included these politically-laden data. Therefore, I gave this employee the opportunity to read through the text before I submitted it so they could read and request the removal of data if it would be perceived as too personal or political for public exposure in the way that I had written about it (ibid.).

4.4.3. ETHICAL CONSIDERATIONS OF RESEARCH ENGAGEMENT

Engaged scholarship is always entangled with ethics, politics, and values (Van de Ven, 2007), but few information systems (IS) researchers describe their experiences of doing such research (Davison et al., 2022). My research engagement in Sydved revealed ethical dilemmas that became discernable only in retrospect. I did not foresee risks of harm beforehand (Markham, 2018) and I experienced a growing awareness of the political nature of this research whilst doing it. This awareness grew from reading into framing theory alongside the empirical data collection, experiencing situations where different values and interests became visible in data collection as well as the Swedish forest industry more broadly, and reading into gender research alongside this study. As such, my research into organizational becoming (Tsoukas & Chia, 2002) has also been entangled with my own researcher/personal becoming (Klevan et al., 2019).

To illustrate these considerations, I will describe three political "critical junctures" during this study (Markham, 2006) in a confessional account (Schultze, 2000), referring to moments or situations that involved deeply self-reflecting decision points in the research process with implications for what paths to (not) open up and why. I also present learning based on these experiences, which, for me, has crystalized as guidance when select-

ing what organizations to do engaged scholarship with in future digital transformation studies. While outcomes cannot be controlled when carrying out engaged scholarship, researchers nevertheless have agency in selecting which organizations to do – or continue to do - engaged research with.

LABOR POLITICS

In this research, I have encountered tensions in manager-employee relations as digital transformation shifts competence demand in organizations. In the focus groups, I engaged in talking about new ideas for digital applications for ecosystem actors such as forest owners and forestry service suppliers. In these discussions, it became clear to me that digital transformation would inevitably bring consequences for the forest buyer role (see also discussion in Paper 2). Forest buyers, making up about 50 % of the workforce, had the main responsibility for managing external relationships in established work practices.

To exemplify, discussions revealed that it was initially difficult even to imagine that forest owner data (e.g. names, telephone numbers) would be stored digitally, because some forest buyers deemed that they “own” forest owner relationships, so telephone numbers are thereby better stored on post-it notes in their cars’ glovebox. Realizing there were potential consequences for forest buyers posed an ethical dilemma for me. While the digital platform perspective I played part in injecting indicated that relationship management in the future wood market would require different, or at least, complementary practices and competences, individuals with the forest buyer role nonetheless had an interest in having a job and relevant competences in a future job market. While I wanted to respect the forest buyers’ interests and safeguard them from harm¹⁰, that is considering the risk that digitalization poses to their jobs, I did not know at the outset whether this ambition of mitigating potential risk of job loss or competence subversion was shared with influential Sydved practitioners.

Early on however, I received indications that I was in a context where these concerns were shared by others, especially the influential CMO that I engaged closely with. For the CMO, it was prioritized that forest

10 [The Norwegian National Research Ethics Committees](#) (2019)

buyers were included in the focus groups, so they would also acquire an understanding of digital platforms and potential implications for Sydved's organization and business, as well as participate in envisioning innovative services. I also noted that the focus group discussions did not come to focus on replacing forest buyers, but on how to make use of and develop their competences in future scenarios (e.g. knowledge of ecosystem actors' needs, wants and local cultures, silviculture and nature care in forestry). For example, one focus group with the management team had a dedicated section for envisioning future scenarios of a changed forest buyer role. In this focus group, I primed discussions by presenting fictitious scenarios of alternative ways forest buyers could contribute to delivering services to ecosystem actors in a digital platform-based context, starting from how to make new use of forest buyers' established competence base (a community manager, a sustainability forestry consultant, a digital forestry specialist).

I learned two lessons from this experience. First is the importance of doing research with organizations that intend to include individuals whose roles are subject to change in shaping digital transformation. I also learned of the importance of having the mandate to push discussions towards envisioning future ways for employed individuals to create value in the organization's digital transformation, for example, with competence development and making use of established competence bases in new ways.

SOCIAL INEQUALITY

In this research, I have faced question about giving voice to marginalized groups, particularly women (Buzzanell, 1994). The context of the Sydved research is, as with many industries and sectors, inherently gender imbalanced¹¹. In the study, I encountered a situation where gender inequality was brought up as an issue by another woman organizational member (Paper 3) in the context of their digital transformation. Distributing content generation on Instagram to a male-dominated group of forest buyers had resulted in a stark gender imbalance amongst Instagram followers.

On the one hand, the situation represented an important empirical observation on inadvertently risking reproducing unequal structures

¹¹ [Swedish Forest Agency \(2019\)](#)

through lack of diversified representation in digital content generation (Benschop, 2021). On the other hand, I had not raised expectations with the firm or funders that gender would be included in the analysis or that political struggles of gender would be a focus of my study. Discussing gender in the analysis represented an opportunity to advance knowledge on a problem that I felt was morally important and empirically motivated. I felt worried that expressing an interest in making this observation part of my study would harm my relationship with the organization, for example, through reduced access to the site, freedom of interpreting data, and difficulty in distributing findings due to loss of trust. Added to this, I am also a woman researcher. Although I had not experienced my gender negatively impacting the research process up until this point, I was worried that it could amplify relational issues *if* they surfaced in this situation. Thereby, this situation presented a dilemma on how to handle this observation, as it blurred the boundary between my “research self” and “personal self”.

When the organizational member brought up the issue with influential stakeholders without problems, it turned out they also perceived as an issue because of their interest in attracting forest owners of all genders, including women who make up about 38 % of private forest owners in Sweden. I reasoned that it indicated that it was “safe” for me to “test the ground”, and thereafter presented the way I interpreted the observation in my analysis to the CMO as well. I received no remarks on this finding or my interpretation of it. Based on this experience, I learned the importance of doing research with organizations where it is “safe” to bring up and discuss issues of gender inequality, as well as inequalities of other marginalized groups, that may surface during digital transformation. I learned of the importance for engaged researchers to establish a position for problematizing homogeneity in envisioning ideas of, as well as in generating digital content, services, and products.

CLIMATE CHANGE

Having undertaken this research, I struggled with how to practice ethics when carrying out engaged scholarship in a temporal context that intersects with the climate crisis. One of the ideas that surfaced in the focus groups was to generate a service for environmentally interested forest

owners that could help them boost carbon dioxide storage in forestry, an idea I was active in generating within a smaller group of three. Following larger group discussions, the envisioned solution was to create a metric for carbon balance optimization in forestry, “Climatify”, which could also provide a basis for offering complementary services to forest owners who wished to improve carbon balance in forestry. When generating the idea, I felt enthusiastic about the shared ambitions of combining new app development with an initiative towards improved environmental sustainability. To develop this solution, Sydved employees decided to collaborate with scholars in computer science and forest technology at a different university, a phase in which I was no longer engaged.

Since then, if and how to engage in forestry has become an increasingly politically sensitive topic in Swedish society. My awareness of the sensitivities and diverse perspectives of different groups on this topic has grown since. This discussion is, however, not a direct effect of Sydved’s innovation efforts. The societal discussions reflected different values and claims both between and within different groups, such as the industry, government, environmental activists/communities, indigenous people, and academics from various academic disciplines and institutions.

While I did not analyze the discussions in detail, I sensed that there was an overarching shared interest in improving environmental sustainability in forestry, but that there were conflicting views regarding how to progress with this ambition, especially given the urgency of combatting the climate crisis. The long growth cycle of trees, in relation to the short time frame set in current frameworks for sustainability goals, such as the Paris agreement, amplified tensions. In other words, change must happen quickly while tree growth is a relatively slow process and views differed on how to address it. Further, there appeared to be agreement that forests are useful means for storing carbon dioxide, but some questioned whether current forestry practices reflect this view and whether focusing on carbon balance as an isolated issue is sufficient for combatting climate change. Here, some pushed for center-staging of not only carbon dioxide storage but also other issues in initiatives for combatting climate change in forestry, such as biodiversity and indigenous peoples’ rights, to name a few.

The diverse perspectives that were voiced in these discussions made it clear that I had engaged in ideating a digital technology despite lacking

the domain-specific knowledge to evaluate its potential environmental and social impact. I became aware of and reflected on potential environmental and social side effects in more depth in retrospect (Markham, 2018). From this experience, I learned that when research engagement in digital transformation studies becomes entangled with intentions of combatting the climate crisis, it enhances and broadens the researcher's responsibility to acquire and/or engage competence of the social, historical, and political context of the research beyond the immediate context of a particular organization (Davison et al., 2022). At the same time, doing so is highly resource-intensive work that requires significant investments of time. In the context of the urgency required for acting towards improved environmental sustainability, this situation remains an unresolved dilemma of this kind of research to me.

5. THESIS CONTRIBUTIONS OF INCLUDED PAPERS

This thesis extends the research of four peer-reviewed and published conference papers (Table 3). Three of the papers are empirical, where the Sydved case study makes up the empirical context.

Table 3. Overview of papers included in the thesis.

Paper No	1	2	3	4
Paper title	Digital and Conventional Matchmaking – Similarities, Differences and Tensions	Becoming a Digital Ecosystem Orchestrator – The Sydved Case	Coordinating Digital Content Generation	Applying Framing Theory in Digital Transformation Research – Suggestions for Future Research
Author(s)	Ivarsson, Frida and Svahn, Fredrik	Ivarsson, Frida and Svahn, Fredrik	Ivarsson, Frida and Selander, Lisea	Ivarsson, Frida
Outlet	53 rd Hawaii International Conference on System Sciences	28 th European Conference on Information Systems	54 th Hawaii International Conference on System Sciences	55 th Hawaii International Conference on System Sciences
Theoretical Concepts	Matchmaking, Institutional Logics	Systems Digital Ecosystem Orchestration, Reorganizing (reconfiguring, restrengthening)	Digital Content Generation, Coordination	Digital Transformation, Framing Theory
Research Aim/ Question	“A better theoretical understanding of (1) similarities between conventional and digital matchmaking, (2) how conventional matchmaking differs from digital, and (3) what tensions that are likely to unfold during digitalization of matchmaking.”	How do incumbent ecosystem intermediaries reorganize for becoming a digital orchestrator?	How is digital content generation on digital platforms coordinated?	How can framing theory be useful for digital transformation research?

5.1. PAPER 1: DIGITAL AND CONVENTIONAL MATCHMAKING – SIMILARITIES, DIFFERENCES AND TENSIONS

This research investigated matchmaking, which refers to organizational processes of resource allocation in an ecosystem through mediating interactions and transactions between different actors. The paper outlines similarities and differences between digital and conventional matchmaking by comparing extant literature on digital platforms with Sydved's matchmaking practice. It was found that digital and conventional matchmaking is built on shared principles for matchmaking, namely relationship building, mobilizing innovation, governing transactions, and curating matches. It was also found that these principles are enacted differently in digital and conventional matchmaking. Based on these findings, the paper discusses how these differences may become sources of tension as incumbent matchmakers experience digital transformation.

This paper contributes to the digital transformation literature with an improved understanding of matchmaking, which is an integral part of digital ecosystem orchestration. For this thesis specifically, it contributes an in-depth understanding of Sydved's established matchmaking practice. It unpacks similarities and differences of this practice as compared to existing literature on digital platforms.

5.2. PAPER 2: BECOMING A DIGITAL ECOSYSTEM ORCHESTRATOR – THE SYDVED CASE

This research approached digital transformation by studying how incumbent organizations reorganize for becoming digital ecosystem orchestrators. Ecosystem orchestration refers to how intermediary organizations enable interactions and transactions between ecosystem actors, engage ecosystem actors in economic, social, and creative activities, and rely on implicit governance mechanisms for influencing how ecosystems evolve.

The paper presents a framework grounded in literature on digital platforms and digital ecosystems that outlines three distinct characteristics of digital ecosystem orchestration, i.e. the application of digital technologies for ecosystem orchestration. These are (1) *guided emergence*, referring to

how digital orchestration involves developing generative architectures and motivating external actors to engage in the ecosystem's development, (2) *unlimited diversity* referring to how digital orchestration involves increased scope of participating ecosystem actors as well as of products and services, and (3) *exponential scaling*, referring to how digital orchestration involves possibilities for rapidly growing the number of participating ecosystem actors by exploiting network effects. Next, the paper presents a case study of Sydved's process of reorganizing for becoming a digital orchestrator during the period between about 2003 and 2020.

The paper contributes to the ecosystem literature by outlining three characteristics of digital orchestration, as well as contributes to the digital transformation literature by adding digital ecosystem orchestration as a perspective for approaching digital transformation. This perspective on digital transformation also forms the paper's main contribution to this thesis, as outlined in Chapter 2 on digital transformation, as well as empirical insights into Sydved's past experiences of digital transformation.

5.3. PAPER 3: COORDINATING DIGITAL CONTENT GENERATION

This research studied coordination of distributed digital content generation on digital platforms in the context of incumbent organizations. Digital content generation is the generation of data in the form of digital text, audio, images and/or video that are either generated originally or by recombining existing digital content elements, such as GIFs and memes. The paper makes an empirical dive into Sydved's marketing unit's emerging coordination efforts as they distributed digital content generation for a collective Instagram account to employees in the firm, mainly forest buyers. To engage and guide their creative efforts, we found that the marketing unit explored coordination mechanisms for both encouraging digital content generation and discouraging certain forms of digital content. We noted that these coordination efforts involved ongoing struggles of political and cultural character, including negotiations about what values should be made and kept visible on the Instagram account, such as digital contents reflecting hunting practices and alcohol consumption.

The paper contributes to the digital platform literature by highlighting the resource-intensive contextual coordination efforts of organizations that generate digital content on digital platforms and demonstrating its emergent character. Such coordination complements the context-agnostic coordination efforts by digital platform owners. For this thesis, the paper contributes insights into Sydved's past experience of digital transformation in response to the injection and growing adoption of social media in its digital ecosystem. As with Paper 2, these insights was part of establishing a deep understanding of Sydved's ongoing digital transformation.

5.4. PAPER 4: APPLYING FRAMING THEORY IN DIGITAL TRANSFORMATION RESEARCH – SUGGESTIONS FOR FUTURE RESEARCH

This study investigated how an existing theory on meaning-making, namely framing theory, has contributed to the understanding of it in the context of digital transformation. Its aim was to offer research questions for studying meaning-making in digital transformation in future research that extant research had paid insufficient attention to. To do this, the study reviewed extant literature in the information systems field that has applied framing theory in studies related to digital transformation as an area of concern. Based on this review, the study synthesized this research into themes to guide a discussion of future research opportunities. The study found six themes of existing research, namely relational framing, political framing, tactical framing, technological framing, temporal conditions, and contextual conditions.

The paper contributes a synthesis of the contributions of framing research in the context of digital transformation as well as directions for future research to the digital transformation literature. This study was useful for this thesis in two main ways. First, it revealed the lack of useful conceptual tools for exploring the discursive interactions and the temporality of meaning-making that I observed in the Sydved case. In this way, it motivated the search for other concepts from framing theory outside of the information systems discipline. Second, it provided a backdrop to how digital transformation research has used framing theory in the past to which I could connect when outlining the contributions of frame shifting and frame blending.

6. MEANING-MAKING IN SYDVED'S DIGITAL TRANSFORMATION

In this chapter, I present the empirical results of the Sydved study. The first two subchapters include the empirical results of the five innovation labs selected for analysis. Thereby, these two subchapters comprise the micro-level analysis of meaning-making. In Chapter 6.1., I present manifestations of frame shifting and frame blending categorized across two broad themes: *framing digital matchmaking* and *framing digital innovation*. In Chapter 6.2., I demonstrate interactions between frame shifting and frame blending in the innovation labs. Some quotes are reduced in these subchapters with segments removed marked with [...]. Chapter 6.3. illustrates organizational-level digital transformation at Sydved. I do this through a narrative of the changes connected to “My Forest”, which was Sydved’s established web-based digital application for forest owners. For narrative purposes, it is told from the perspective of the digital application. The narrative is complemented with a timeline where I visualize with codes when and what new meanings were enacted in Sydved’s digital transformation.

6.1. MANIFESTATIONS OF FRAME SHIFTING AND FRAME BLENDING

6.1.1. FRAMING DIGITAL MATCHMAKING

The first theme talked about in the innovation labs was digital matchmaking (see Table 4 below). Broadly, it centered on new ideas of applying digital technologies for enabling interactions and transactions between ecosystem actors alike digital platforms (Evans & Schmalensee, 2016b). This broad theme covered ten topics.

Orchestrating transactions. Talk about digital matchmaking involved shifting to seeing digital technologies as a means of matchmaking in the ecosystem through orchestration. For Sydved, it included ideas on how, for example, forest owners could interact and transact directly with other ecosystem actors through digital applications such as by ordering complementary services directly from forestry service suppliers.

This idea implicitly questioned Sydved's past reliance on forest buyer brokering to accomplish matchmaking. In one event, brokering was somewhat ironically questioned when talking about a possible digital application for directly connecting forest owners with road service suppliers. "*[Imagine that] I am a forest owner. My road is damaged [...] and I am angry about it. [...] Right now, the solution is to call [my forest buyer] and say "Yes, you know, after the second rock on the right side of the church in [small village], that is where you should go [to help me out]."*" (Consultant 11, 2019-01-16). Orchestrating transactions could thereby avoid such past "inconveniences" of being dependent on a forest buyer, such as for exchanging location data and finding an available supplier.

In some ways, orchestrating transactions blended with Sydved's established position as an intermediary in the ecosystem. The capacity of digital platforms to cultivate networks of users through digital applications as interfaces was compared to Sydved forest buyers as an established "interface" for networking in the ecosystem. In both, matchmaking depends on networking with mills, forest owners and various forestry service suppliers.

Distributing tasks. Additionally, talk about digital matchmaking involved shifting to seeing digital technologies as a means to distribute new tasks to ecosystem actors. New ideas emerged, both on what kind of tasks to distribute and which ecosystem actors to distribute tasks to. Often, such ideas involved pushing the autonomy of forestry service suppliers and forest owners further. Thereby, this topic challenged established views of organizational boundaries, such as when talking about new ideas for handling bark beetle attacks: “*If we would shift perspective, [imagine that] we have a service in a month or so for uploading images and get answers on what trees are attacked or not [by bark beetles]. Then the question is, how will we use it? Should we use it ourselves where we ask the forest owners to send in images by e-mail [...] where we upload [images] and manage the results, or should we have it open so that forest owners can do that themselves?*” (Forestry developer, 2019-05-02).

These discussions blended with past examples of distributing tasks to Sydved’s ecosystem actors. Sydved’s established marketing concept “Active Forestry” was one source for comparison, where the aim had been to encourage forest owners to take care of their forestry proactively to avoid decline of wood value or negative environmental effects of mismanagement. Also, tasks such as wood production had been outsourced for many years to teams of independent forestry service suppliers, following a reorganization around the turn of the millennium. There were also plans underway for outsourcing more tasks, such as production planning, to forestry service suppliers. Traditionally, it had been a task mainly carried out by forest buyers. This initiative was called “Wood by the roadside”:

Digital innovation researcher: “*And Frida has had this reflection before that “I think I see that this shift towards a digital ecosystem is [similar to] a fairly long history of shifting towards ecosystem thinking more generally. [It] began when Sydved decided that service suppliers would no longer be employed, but they should run independent firms.” [...] “Do you agree with this description?”*

[...]

CMO: “Yes, in our case it is [similar]. It is our way of competing. X years ago, we chose to focus on “the winning team”, [an initiative] to develop the different parties in a network. And that meant that there would be a slightly different composition of roles. And the next step [is] “Wood by the roadside”, which is a new business interface where we choose to “let loose” the service suppliers one more level, but still within the boundaries of trust and [sense of being part of] a network. [...]”

CIO: “And in my prior job [as CIO at a competing firm in the Swedish forest industry], we discussed this a lot. We saw the threat of “forestry-Uber”. That is what we [i.e. Sydved] are [too], a focal hub that distributes services here and there. Well, yeah, a transaction engine in the middle. Just like Uber actually.”

(Extract from innovation lab, 2018-02-20)

Building relationships. Framing digital matchmaking involved shifting to seeing digital technologies as offering new ways of building ecosystem relationship. In such ideas, relationship building could involve new automated ways of interactions with ecosystem actors, such as by communicating wood production data more frequently. In this way, ecosystem relationships could be less dependent on a single individual and thereby also independent of geographical location. Such ideas questioned established ways of building relationships, where each forest buyer managed relationship of unique forest owners and typically visited them in their homes or on their forest properties. Each forest owner was assigned a personal forest buyer – “Your Sydved representative”. In the past, this practice was believed necessary to establish the necessary trust to purchase wood.

On several occasions, this talk brought up the idea of establishing a central “back office” or “district 8” with responsibilities for managing interactions with forest owners that were initiated online. This idea blended with the forest buyer administrator role that some forest buyer districts had employed for supporting forest buyers remotely while in the field: “Maybe we should have a “district 8” in Sydved, that is always open, by offering [digital] services. [...] An alternative could be to establish a “back office” unit on every district that operatively works with wood transactions [from a distance]. [Name of forest buyer administrator], you are an established example of that, working more like a back office to support forest buyers at your district that goes to the field for doing forest owner visits.” (CMO, 2018-09-14).

Table 4. Manifestations of frame shifting and frame blending in framing digital match-making.

Theme	Topic	Frame Shifting	Frame Blending
Framing Digital Matchmaking	<i>Orchestrating transactions</i>	Shifting to seeing digital technologies as a means of matchmaking through orchestration	Blending with the importance of networking in brokering
	<i>Distributing tasks</i>	Shifting to seeing digital technologies as a means of distributing new tasks to ecosystem actors	Blending with outsourcing of tasks to ecosystem actors
	<i>Building relationships</i>	Shifting to seeing digital technologies as a means of building relationships in new ways	Blending with relationship building carried out by some forest buyer administrators
	<i>Scaling relationships</i>	Shifting to seeing digital technologies as a means of scaling by attracting anyone	
	<i>Diversifying actors</i>	Shifting to seeing digital technologies as a means of diversifying the range of ecosystem actors in new ways	Blending with established package of forestry services offered as complement to wood purchasing
	<i>Diversifying offerings</i>	Shifting to seeing digital technologies as a means of diversifying offerings	Blending with the practice of manually updating forestry management plan
	<i>Personalizing offerings</i>	Shifting to seeing digital technologies as means for personalizing offerings to each individual's needs and wants	Blending with the establishment of a daughter company for adapting offerings for a niche group of forest owners
	<i>Creating experiences</i>	Shifting to seeing digital technologies as a means of creating new kinds of experiences	Blending with established practice for digital content generation for sydvad.se and social media
	<i>Monetizing transactions</i>	Shifting to seeing digital technologies as a means of monetizing transactions in new ways	Blending with past efforts for generating revenue from forestry services
	<i>Monetizing access</i>	Shifting to seeing digital technologies as a means of monetizing access to digital services in new ways	Blending with past efforts for generating revenue from updated forestry management plans

Framing digital matchmaking included discussions about new ways of applying digital technologies for attracting and increasing the number of actors in the ecosystem (Huang et al., 2017), as well as increasing the number and variety of transactions between them (Evans & Schmalensee, 2016b).

Scaling relationships. Framing digital matchmaking involved shifting to viewing digital technologies as a means of scaling by attracting anyone that would like to take part of what Sydved could offer in the ecosystem. This shift implicitly questioned many assumptions. For example, it questioned the belief that forest owners should be the main target group amongst ecosystem actors. One alternative idea that was raised was that scaling forestry service suppliers should be the focus in the future because it could be a strong stimulator of indirect network effects. In other words, attracting more service suppliers would serve as an indirect means of scaling forest owners too:

Digital marketer: *“I’m thinking that we maybe have started at the wrong end. [...] Take gravel supply for example, it should be the different gravel suppliers that in some way should take action, or something. So we work backwards, in a way, where they are the ones who should fight about who gets to supply gravel to a particular forest owner.”*

[...]

CIO: *“We started by thinking that it should be the forest owner we should develop a service for, or in the gravel case perhaps the local road association or road owner. But in fact, it might be the gravel supplier that we should develop an exciting service for.”*

(Extract from innovation lab, 2019-01-16)

It also questioned Sydved’s established focus on scaling established wood suppliers within the broader group of forest owners. For example, this came to light when envisioning access to the logged in pages of “My Forest” no longer being an exclusive service:

Digital innovation researcher: “*The value of a platform is not necessarily measured in the amount of Swedish Krona that you can trace to specific activities. It is rather about the use. The value of a platform is measured in interactions and transactions, regardless of whether they are monetized or not. Spotify was worth heaps before they had started to convert us to premium customers. And this is something you could start with tomorrow, [by] scaling the user base of “My Forest”. Play with the thought that “My Forest” is not a platform for Sydved’s suppliers. [Instead], “My Forest” is a platform for all forest owners in the region or even the country. [...]*”

[...]

System developer 6: “[...] *So that would include [offerings] for “forest owners – not yet suppliers”. That is, [we could] use the same log in [that we have], but just ask [a developer] on Friday: “Could you just fix a log-in function that does not require a supplier ID?”*”

(Extract from innovation lab, 2018-02-20)

It also questioned Sydved’s established geographical boundaries, which were limited to the southern parts of Sweden: “*In my world, anyone should be able to use [an app for ordering gravel] in the long run, [such as] a forest owner in the [northernmost parts of Sweden] that wants to order gravel from a supplier [in the same area].*” (Forestry developer, 2019-03-07).

All these beliefs were embedded in the established organizing principle of geographical separation, which meant that tasks related to wood matchmaking should be geographically dispersed across forest buyer districts and distributed across individual forest buyers areas. No salient manifestations of frame blending surfaced in the innovation labs on this topic.

Diversifying actors. Framing digital matchmaking involved shifting to seeing digital technologies as a means of diversifying the range of ecosystem actors in new ways. It focused on becoming all the more multi-sided in matchmaking, by using digital technologies for connecting new ecosystem actors to enhance the attraction of other ecosystem actors (Gawer, 2014). It raised new ideas on, for example, attracting new ecosystem actors who could offer new complementary services to the wood transaction such as insurance companies, sports communities and real estate agents. For these

new ecosystem actors, it was envisioned that it would be “[...] a good way for small businesses to gain visibility and a space [in the market]. It would be much more difficult for [each of] them to run their own website as they might not gain the same visibility on Google.” (Digital marketer, 2019-05-02).

These ideas questioned the boundaries of how Sydved perceived its established ecosystem, that was largely limited to wood supply. It also challenged the perceived reliance on individual forest buyers’ network access in their local communities for offering complementary services. At the same time, this topic blended with Sydved’s established package of “Forestry Services” where the range of ecosystem actors had grown over time. Over the years, it had come to involve, for example, planting and clearance services, which forest buyers offered as complementary services to make their wood purchase offering more attractive.

Diversifying offerings. Framing digital matchmaking involved shifting to seeing digital technologies as a means of diversifying offerings (Boudreau, 2012), such as by expanding the functionalities of established digital technologies. Many new ideas for new offerings emerged, such as calculating probabilities or offering predictions of wood market scenarios, increasing the traceability of wood from stub to end-product, and creating metrics for measuring the environmental impact of forestry. These ideas of new data-driven functionalities as services implicitly questioned Sydved’s past narrow use of data in creating offerings for ecosystem actors.

However, there was one exception where ideas of such offerings blended with an established service – the forestry management plan. Typically, these plans were updated around every tenth year, but some forest buyers had begun updating these more frequently as a service. They did so by visiting the forest properties more regularly to observe changes on the properties. Sometimes, forestry service suppliers helped with reporting changes on paper sheets. This comparison familiarized the idea of offering updated data as a service, albeit the envisioned frequency of generating and analyzing data were significantly different compared to the past practice of updating forestry management plans.

Personalizing offerings. Framing digital matchmaking involved shifting to seeing digital technologies as a means of personalizing offerings for each

individual's varying needs and wants (Gregory et al., 2021). It raised ideas of using a diversified portfolio of offerings to create adaptability, but also the need to learn of people's preferences and necessities through analyzing data that could provide insights into such aspects. It questioned the established approach, where it was essentially up to forest buyers to gain such insights of the forest owners in their area and act on them. However, it also questioned

In one way, talk of personalizing offerings blended with past efforts for pursuing more adapted offerings, especially the example of establishing Sydved's daughter firm SUSAB. It was founded in 1994 to appeal to a particular niche of forest owners, by offering tailored services for long-term forestry management of large properties. In the following example, the idea of using machine learning algorithms for predicting forest owner needs generated such a comparison:

Forestry developer: "*[We brainstorm about a new way of predicting and offering diverse services depending on the forest owners' changing needs], which we already do to some extent. But few [forest buyers] are working actively with it, that is, a forestry management offering. [SUSAB] is kind of doing this for large properties, but we could take on a greater responsibility for small properties. Very few [forest buyers] do so. [It would mean that] the forest buyer and owner have a deal that [the forest buyer] takes care of the property, making sure that it is cleared when needed, gravel is supplied when needed, snow is ploughed when needed etc. [...] That the offering for the forest owner is that "this is what we plan on taking responsibility for throughout this year".*

Forest buyer 8: "*[...] In essence, [it involves] doing what is needed [when it is needed] on the property, but it would still not be to bound by the "administration" concept.*"

(Extract from innovation lab, 2018-09-14)

Creating experiences. Framing digital matchmaking involved shifting to seeing digital technologies as a means of creating new kinds of experiences. This reflected ideas for the future that were less instrumental and more experiential, which would make ecosystem actors such as forest owners "*experience your forest in a new way*" (CMO, 2019-05-02). It included

examples such as offering interactive data visualizations through forestry simulations with gaming functionality and offering real-time data through live-streaming videos of wood production.

It also included new ways of generating digital content, for example, by using new hardware to generate new forms of digital content as well as editing it in new ways. A particular example was the idea to generate video and audio of forestry properties using drones to attract forest owners. It was envisioned that it would do so by portraying new perspectives, by evoking memories, and by evoking emotions: “*As with “Your Sydved representative”, a drone portal can establish personal connections [between people] and forests. [Unlike forest buyers], one can work with audio that “feels”, imagery that highlights, tempo that touches, spreading “health” [from a distance]. [...] Maybe you have heard of slow TV?*” (Consultant 10, 2019-05-02). To some extent, such ideas questioned how digital content generation had mainly been the responsibility of the marketing unit in the past, focusing on branding.

At the same time, ideas for creating experiences with digital content blended with the personal nature of relationships that forest buyers pursued with forest owners, as seen in the quote above. Additionally, Sydved was not unfamiliar with digital content generation but had developed an ambitious practice of distributing digital content generation to employees across professions. It blended with the marketing unit’s and web editors’ efforts of generating digital content for the webpage Sydved.se and social media: “*[We already do this] because we want to increase the frequency of logged in users, because if we do so, we will increase the frequency of business, in other words wood transactions.*” (CMO, 2018-02-20).

Monetizing transactions. Framing digital matchmaking also focused on exploring new ways to generate revenue in digital ecosystems (Parker et al., 2016, pp. 106-128). It involved shifting to seeing digital technologies as a means of generating revenue from transactions between ecosystem actors in new ways by charging a fee on each transaction. When discussing such ideas, it was questioned whether Sydved should make money on wood transactions at all in the future. On the contrary, it was suggested that an alternative would be to focus on making money on transactions of complementary services, as a means of scaling the total number of transactions.

In some way, this topic blended with Sydved's established business model. Sydved was familiar with generating revenue from transactions, where revenue was typically generated as margins on wood transactions between forest owners and mills. Additionally, some forest buyers had also begun to monetize transactions by charging a fee when brokering transactions of forestry services: "*To some extent, we already do that today as we have started discussing how to make profit margins on "Forestry services", that we have thought should be free of charge before [as means to ensure access to wood].*" (CMO, 2018-02-20).

Monetizing access. Framing digital matchmaking also involved shifting to seeing digital technologies as a means of monetizing access to digital applications. It implicitly questioned whether charging for transactions should remain the default business model. However, there was one established example that blended with this idea. Some forest owners had begun paying regularly for having their 10-year plan updated more regularly as a way to get access to new data related to their properties. This example of charging for access to a frequently updated forestry management plan was interpreted as an established form of "subscription".

6.1.2. FRAMING DIGITAL INNOVATION

The second prominent theme in Sydved's innovation labs was digital innovation (see Table 5 below). Broadly, it centered on talking about creating and developing digital technologies as process (Nambisan et al., 2017), such as those talked about in framing digital matchmaking. This theme covered eight topics.

Explorative innovation. First, framing digital innovation involved shifting to viewing the process of creating and developing digital technologies as explorative, meaning it requires trying different alternatives and learning what does and does not work during the process. Here, the innovation labs took inspiration from digital options thinking (Svahn & Kristensson, 2023), as to how to set in motion a process for identifying, developing, realizing, and potentially abolishing multiple digital applications was discussed (Rolland et al., 2018). This approach was fundamentally differ-

ent from Sydved's established approach to developing digital technologies, why no frame blending manifestations could be identified on this topic in the innovation labs.

It questioned a number of established assumptions. For example, it questioned the established assumption of treating spending on digital products and services as cost, and rather promoted the alternative view of such spending being an investment in assets. It also questioned Sydved's dominant "project thinking" that represented a linear view of work in developing digital technologies. At Sydved, projects typically had a pre-determined plan and an endpoint where new technologies were implemented. Thereafter, it typically entered a "maintenance" phase where new functionalities were seldom added. *"[Options thinking is different from] what we are used to doing in Sydved [where we] initiate a project with a project instruction. [...] [Our past projects have typically taken] a year to complete, from generating the project instruction to handing it over for maintenance. But what we don't have in the age of digitalization is time, it changes too fast, so once we launch our projects things have already changed. We cannot run it this way."* (CMO, 2018-09-14).

It also questioned established decision-making hierarchies, as options thinking implied a distributed mandate for decisions on investing in developing options without the involvement of the management team or the board. It also implied a new form of distributed decision-making on whether to abolish or continue with developing a particular option.

Forest buyer administrator: *"When we have invested in digital options, how will they be evaluated? So we know if they have "crashed" or "flown". [...] [If we don't consider this], there will be a risk of collecting a bunch of bad prototypes, that perhaps should be abolished."*

[...]

Digital innovation researcher: *"That was a key question, I think. Having a process for killing things is one of the most important things in making this work. Because that is not how we typically work. Usually, we continue with working on new things once we have decided to do so, then that is set in stone. This makes it very time-consuming to quit doing that. So that is a difference here."*

(Extract from innovation lab, 2018-09-14)

Ongoing innovation. Framing digital innovation also involved shifting to viewing the process of developing digital technologies as ongoing, meaning that it would continue over time even after the launch (Lehmann & Recker, 2021). It questioned the static nature of Sydved's established digital technologies that were designed for the benefit of ecosystem actors: “*“My Forest” is rather a place that [forest owners] don't visit that often, but maybe only when you have made a deal on wood production. And then it takes 10 years until you visit it again.*” (Digital marketer, 2019-05-02).

The idea of an ongoing process was not entirely unfamiliar, although such renewal was oftentimes not prioritized due to lack of resources in the IT unit. For example, it blended with past improvements in Sydved's organization more generally, in discussions where participants stretched the time horizon to a more distant history: “*You could say that where we are today is also the result of past innovations. [...] Even though we haven't thought of it that way. [...] Just look at the systems we use and [how they have changed over time]*”. (Forest buyer 8, 2019-05-02). It also blended with a more recent example of improving implemented digital technologies, such as the newly introduced function on “My Forest” where the log-in function changed from requiring a supplier ID to a social security number. Similarly, it blended with Sydved's established ongoing process of generating digital content for social media and sydved.se.

Table 5. Manifestations of frame shifting and frame blending in framing digital innovation.

Theme	Topic	Frame Shifting	Frame Blending
Framing Digital Innovation	<i>Explorative innovation</i>	Shifting to seeing the process of creating and developing digital technologies as explorative	
	<i>Ongoing innovation</i>	Shifting to seeing the process of developing digital technologies as ongoing	Blending with past improvements of digital technologies and efforts of generating digital content for social media and sydvved.se
	<i>Generating data</i>	Shifting to seeing digital technologies as a means of generating data in new ways	Blending with established practices of engaging ecosystem actors in generating digital content
	<i>Analyzing data</i>	Shifting to seeing digital technologies as a means of analyzing data sources in new ways	
	<i>Sharing data</i>	Shifting to seeing digital technologies as a means of establishing a digital platform for sharing open data	Blending idea with established industry-shared platform for managing wood production data
	<i>Motivating engagement</i>	Shifting to expecting a need for motivating diverse ecosystem actors to engage in digital innovation	Blending with established process for engaging employees in innovation
	<i>Discouraging engagement</i>	Shifting to expecting a need for a reactive process for discouraging ecosystem actors' engagement in digital innovation	
	<i>Acquiring competence</i>	Shifting to expecting a need for acquiring competences in new ways	Blending with established education programs for ecosystem actors

The innovation labs also involved talking about how to innovate with data in new ways when framing digital innovation (Yoo et al., 2010).

Generating data. These discussions involved shifting to seeing digital technologies as a means of generating data in new ways. These ideas also raised hopes of being able to update data more frequently in the future,

or ideally, to provide real-time data. It included the potential use of new hardware for generating new types of data, such as multispectral cameras on drones, satellites and sensors. It was speculated that “*in 20 years, every tree will have a sensor*” (Consultant 1, 2019-01-16). It also included ideas for engaging ecosystem actors in generating data, that is, to crowdsource data. For example, there was talk of engaging forest owners in generating images and video of trees and providing feedback of their experiences of doing business with Sydved. These ideas questioned established practices for generating data as well as assumptions of established hierarchies and competence needs for it:

Digital innovation researcher: “*The immediate question that strikes me is: how does one get the forest owner to do the job [of generating data]? [...] I mean, we generate lots of data for Google and Apple. And the only reason we do so is that we get good services from them. In turn, they can do a lot of business on these spill data. What is the equivalent here? How can you make sure that the forest owners do this survey and generate the data that is missing - in their own interest?*”

[...]

CEO: “*Well there is indeed a revolution ahead when it comes to data quality of forests. The old truth, that there always must be an educated white-collar worker to do field visits to collect data about forests, is on its way to being reconsidered.*”

(Extract from innovation lab, 2018-02-20)

Some past examples blended with the ideas of crowdsourcing data. For example, there were existing examples in the forest owner app, where: “*forest owners can already mark traces and report on bark beetle attacked trees. So it generates a lot of emails with data on bark beetle [damage]. And that is good, but there's not simple way for me to share that information with forestry service suppliers. It rather creates more work for me. [...] And it renders too little wood for me to spend time doing it.*” (Forest buyer 2, 2018-09-14). Similarly, the idea of crowdsourcing digital content such as images and videos blended with how Sydved had distributed digital content generation on a

Sydved's Instagram account to a set of forest buyers, which made up data in the form of images, audio, video, and text.

Analyzing data. Framing digital innovation also involved shifting to seeing digital technologies as a means of analyzing data in new ways, including both existing data sources and potential new ones. It was talked about as a cornerstone for creating new value propositions, continuously improving value propositions, and improving knowledge of ecosystem actors' needs and wants. The envisioned functionality of a digital forestry management plan encompassed these ideas: *"If we have a digital forestry management plan, that is initially created from drone images that we or the forest owner generate, and potentially also satellite images that are already available, then we can see indications that something has changed [like a bark beetle attack]. With such analysis, we can proactively nudge the forest buyer to take care of this as soon as possible [as a service for the forest owner]."* (Consultant 5, 2019-01-16).

Exploring new ways of analyzing data fundamentally questioned Sydved's narrow past use of existing data as no frame blending manifestations were clearly discernable on this topic. An example of such was the vast data generated in wood production: *"There are date stamps and time stamps on everything we do in all our forestry services. And that would be excellent to make use of."* (Forestry developer, 2019-01-16). These ideas also raised questions about how existing data were organized, such as when talking about orchestrating transactions between forest owners and gravel suppliers: *"There are no connections in our established systems between forest owner data and geographic locations on maps. That is a problem. Forest owners are only connected to a [single] "dot" on their property. [...] [Also], the gravel suppliers we use today, they are categorized as "varying entrepreneurs". There are no connections in our systems that specify that they are [suppliers of gravel specifically]."* (Forestry developer, 2019-03-07).

Sharing data. Framing digital innovation also involved shifting to seeing digital technologies as a means of establishing a digital platform for sharing openly accessible data. Such a digital platform was envisioned as necessary to enable the scaling of volumes of data, diversifying types of data and making them available for others across Sydved's ecosystem. These discus-

sions involved questioning of Sydved's established infrastructure, based on locally stored proprietary data in silos: *"I don't believe our established infrastructure has the technical prerequisites for growing in the scale and scope we have in mind in the long run."* (CIO, 2018-09-14).

There was talk of realizing such an idea through collaborating with external partners outside the forest industry, perhaps by establishing joint ownership across industry boundaries of such infrastructure, to reap the benefits of data at scale and diversity. *"The best would be to join forces in the industry, because even if Sydved has moderately good production data, [imagine what we could do] if we have access to [our main competitor's data] as well. [...] [Also], building a forestry database ourselves is costly, and there are other initiatives by for example universities for doing so that we could join."* (CIO, 2018-02-20).

Despite potential actors and data, that could be part of such a digital platform, differing in scope and scale than Sydved had experience of, the idea of collaborating with others in such a way was not entirely new to Sydved. It blended with the established platform for forestry production data, Biometria, that was a joint effort of actors in the forest industry:

CEO: *"There is a tradition of doing something like that, so it doesn't feel like an impossibility whatsoever."*

[...]

CIO: *"[Forest industry actors] already share a lot of data actually, with [Biometria]."*

CEO: *"[Also], the platform for managing laser scanned images that the government will fund is a perfect example of a shared infrastructure where data-driven value creation should be of collective concern within the forestry industry"*.

(Extract from innovation lab, 2018-02-20)

Even the idea of collaborating with competitors in such a shared digital platform blended with Sydved's past. For example, Sydved had developed a digital platform for optimizing transport exchanges together with their

main competitor previously, as their established domain of competition was in purchasing rather than in logistics.

Motivating engagement. Framing digital innovation thereby also involved shifting to expectation of a need for motivating diverse ecosystem actors to engage in digital innovation (Parker et al., 2017). It included ideas on engaging non-employed software developers, collaborating with new partners outside the forest industry such as software firms and digital marketing agencies, and allowing broad internal contributions from employees. It was envisioned that Sydved could do so by offering development toolkits and by sharing data to ecosystem actors. It was even expected to be necessary for resourcing in the future: “*We don’t have the time, money or capacity to develop this ourselves. We gotta think like a platform business – we got to invite others to dance.*” (CMO, 2019-01-16).

This topic questioned several established assumptions. It questioned Sydved’s past reliance on the internal IT unit and partially the marketing unit for resourcing development. It also questioned the boundaries of Sydved’s established ecosystem, by including ecosystem actors beyond those immediately related to wood supply. Rather, there was talk about engaging a broad variety of actors across industries and sectors with an interest in innovating with data related to forestry and beyond. “*There will be consumers of this data that can be willing to pay for accessing it. Businesses in tourism for sure, but also insurance companies and banks would surely be interested in taking part of this data to do assessments of potential customers. Government would be interested in learning about ancient remains. And of course, other actors in the forest industry [would have an interest].*” (CIO, 2018-09-14).

It also questioned internal boundaries in the organization, by imagining how digital technologies could support participation regardless of employees’ formal belonging to a functional unit or to a geographical district:

CMO: “*In the next step, I think that we should publish all ideas we generate in an online forum to make it public for all Sydved employees. The thought behind that is that it will help create a sense of connection to this innovation process.*”

[...]

CIO: “[Another way] is to publish them on the website instead [to make it visible for anyone]. But yes, publishing on our [internal] Teams site has better opportunities for interactions.”

[...]

Head of Strategy Stora Enso Skog: “[Another way is to] post challenges. [...] And then, employees can send ideas [on how to solve them] openly so [others can] comment. [...] And then there could be a rating group that evaluates these ideas afterwards.”

(Extracts from innovation lab, 2018-09-14)

Motivating others to engage in innovation was not entirely new, however. It was often sarcastically blended with Sydved’s established “Suggestion committee”, where employees could send in broad innovation proposals that were reviewed by a board and rewarded with money if developed. However, the Suggestion committee was mostly ridiculed for its slow pace of realizing ideas and its established hierarchy:

Forest buyer administrator: “I think I have earned 20 000 Swedish Krona in the Suggestion committee but I quit sending in ideas five years ago. [...] None of my ideas were realized, but **now** they have developed the idea I sent in 2007 or 2006 or something which gave me 8 000 Krona. [...] It’s taken 11 years to go from idea to work. And that is why I am [participating in the innovation labs], because I have high expectations in this way of working. Fast and efficient”.

This comparison was brought up again later:

Forestry developer: “[It is] kind of like your [name of forest buyer administrator] idea from 2008 that now...”

Forest buyer administrator: “Now it is realized.”

Forestry developer: “And you received 8 000 SEK for it.”

(Extracts from innovation lab, 2018-09-14)

Discouraging engagement. Framing digital innovation involved shifting to expectation of a need for a reactive process for discouraging ecosystem actors' engagement in digital innovation. It did not blend with past experiences in the innovation labs. This topic questioned the belief that proactive planning was necessary to control innovation outputs. Instead, there was talk about rules for engagement that could guide ecosystem actors in desired directions, but also guide what Sydved could discourage and potentially "shut down" if undesired actions or outputs emerged:

System developer 6: *"We also need to have some type of control. Otherwise, the [ecosystem actors] will take over control and then this platform will become something we don't want at all." [...] "So we need to have a "button" where we can shut down [initiatives]. There are groupings in this world that we maybe want to exclude from [creating things on our platform]."*

[...]

CMO: *"That is a relevant question that you pose. The openness we want to create [is about] finding a strategy for "what do we want to achieve?". Because if this is set in motion then we might not have control, and we are control freaks to start with."*

(Extract from innovation lab, 2019-03-07)

Acquiring competence. Finally, framing digital innovation involved shifting to the expectation of a need for acquiring competence in new ways (Mankevich & Svahn, 2021). It questioned the narrow scope of Sydved's established processes for sourcing competence, where many employees shared an educational background from the same university that specialized in agricultural sciences. One envisioned approach was to enhance Sydved's opportunities for internal competence development by educating employees and ecosystem actors on new subjects. This idea blended with "The Clearance Academy", which was Sydved's established process for educating forest buyers and forestry service suppliers in wood clearance.

Another idea was to explore new ways of recruiting competences to broaden Sydved's competence base with entirely new ones, even though it was still unclear what such competences could be useful for. This idea

blended with the recent recruitment process of the recently introduced “digital marketer” role, where the aim had been to attract a new colleague with competence in, for example, social media management and data analytics, who would participate in designing their own professional role at Sydved.

I have now provided insights into what was shifted and blended in Sydved’s innovation labs. I will now shift the analytical focus and examine the interactions between frame shifting and frame blending in the innovation labs.

6.2. INTERACTIONS BETWEEN FRAME SHIFTING AND FRAME BLENDING

On some occasions, interactions between frame shifting and frame blending were clearly discernible in the innovation labs. I will now illustrate interaction patterns by using quotes from events and situating when these patterns did and did not occur. When illustrating quotes in figures, I use dots for representing sentences, blue bold text for frame shifting and green bold text for frame blending. I embolden text where a similarity or difference with Sydved is implied or explicated. The events are slightly shortened to highlight the interaction patterns.

One interaction pattern is *frame shifting triggering frame blending*. The role of this interaction pattern is to construct similarity between an idea for the future and an organization’s past, thereby contextualizing a new idea by making it somewhat familiar. The pattern is unsurprising because a manifestation of frame blending depends on comparison with a manifestation of frame shifting. In the example below (Figure 7), the interaction pattern occurred in innovation lab 5 when framing digital innovation as an ongoing process (Table 5, ongoing innovation). The framing began with frame shifting when implying differences between Sydved’s envisioned process for innovation as compared to Sydved’s established process, the “Suggestion committee”. It triggered frame blending when the framing continued by highlighting similarities between an envisioned ongoing innovation process and Sydved’s ongoing process for generating digital content for social media.

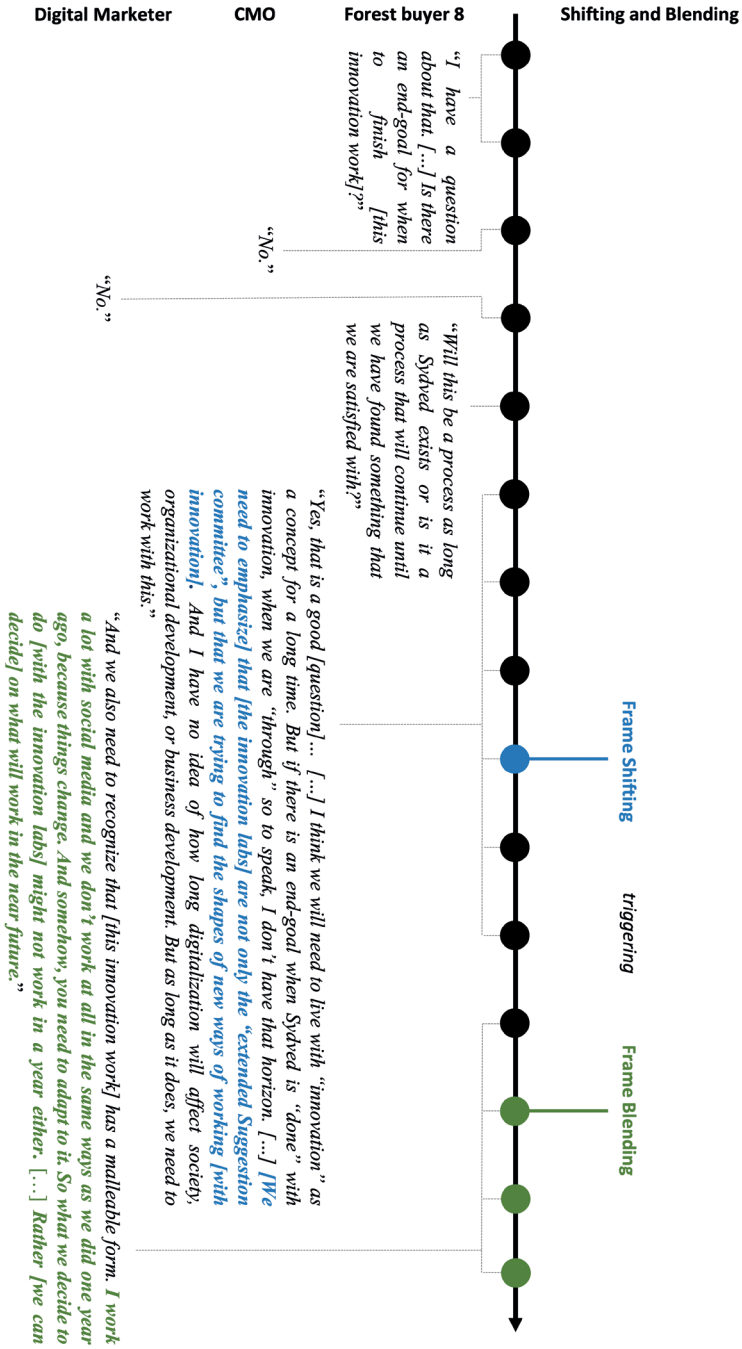


Figure 7. Illustration of frame shifting triggering frame blending.

Sometimes however, there was a time gap between frame shifting and frame blending when a topic was brought up again later on. On these occasions, frame blending was triggered by frame shifting that did not occur during the same event but in earlier events. In these cases, the interaction pattern must be interpreted in light of the overarching framing process. The following example from innovation lab 1 (Figure 8) demonstrates frame blending without frame shifting occurring in the same event. At the same time, this blending must be understood in context of what has been talked about before. Here, frame blending depended on shifts that occurred in several prior events during the innovation lab, where we had talked about seeing the process of developing digital technologies as explorative and ongoing (Table 5, explorative innovation, ongoing innovation) and seeing digital technologies as a means of offering more diverse offerings (Table 4, diversifying offerings).

The event began when the forestry developer spontaneously brought up Sydved's IT unit's past efforts in developing digital technologies. He used a house renovation analogy by arguing that Sydved's IT unit had primarily focused on maintenance of existing systems in the past ("changing the drains") as opposed to developing new cool digital functionalities for ecosystem actors ("decorating the bathroom"). Thereafter, the CEO articulated a blend by saying that this "drain work" had nonetheless been an ongoing process, in this sense similar to the requirements of digital innovation. Finally, the digital innovation researcher endorsed the blend, by clarifying that "maintenance" assumes an ongoing process.

Digital innovation researcher

CEO

Forestry developer

Shifting and Blending

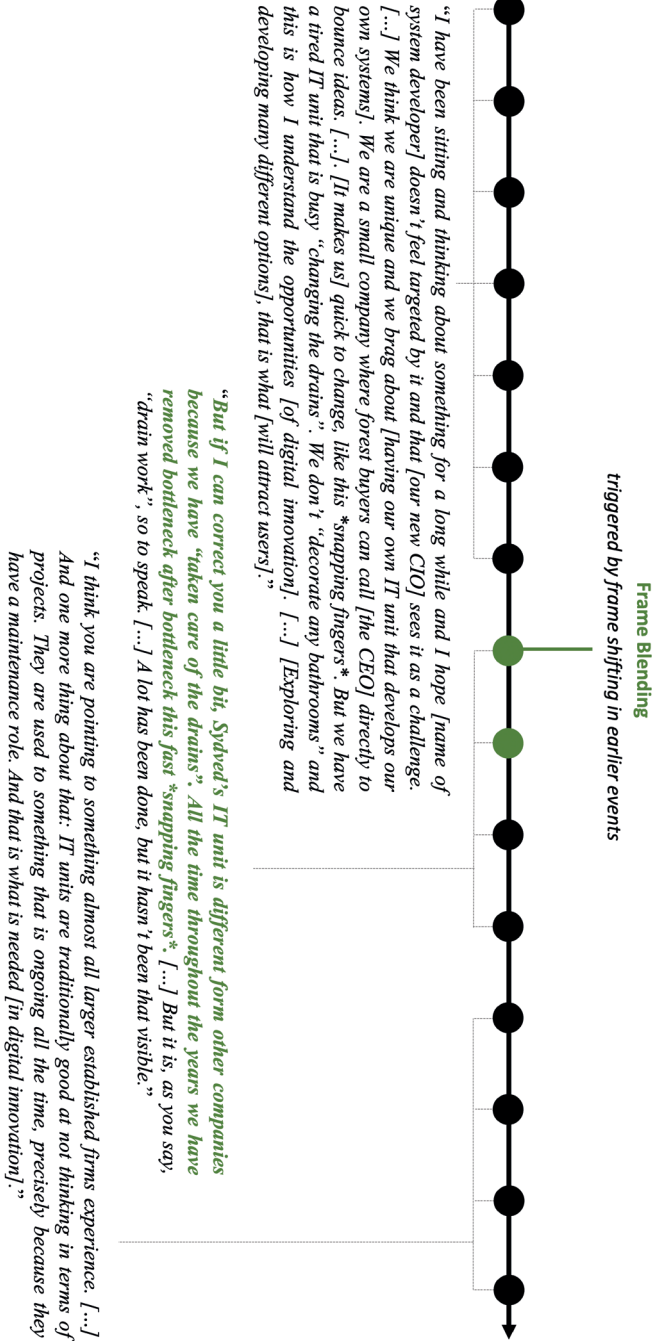


Figure 8. Illustration of frame blending triggered by frame shifting in earlier events.

At the same time, frame shifting does not always trigger frame blending. The innovation labs also revealed some situations when it might not do so. This is important for understanding why frame shifting occurred more often than frame blending across all innovation labs (see graphs in Figure 6). One situation when this pattern did not occur was when there were no past experiences at Sydved that were possible, or at least simple, to blend with a shift. As revealed by Tables 4 and 5, there were four manifestations of frame shifting that never manifested as frame blending during the innovation labs. These included the topics *attracting anyone*, *explorative innovation*, *analyzing data*, and *discouraging engagement*. At the same time, it does not mean that these “unblended” shifts cannot shape digital transformation, as *analyzing data* would later be enacted in Sydved’s digital transformation.

A second situation when the interaction pattern did not always occur was when frame shifting was implied rather than explicit. This was common in the innovation labs, such as when introducing existing examples of digital matchmaking and digital innovation from other contexts without articulating what they could make different at Sydved in the future. For example, this occurred during innovation lab 3 when consultants talked about *sharing data* (Table 5). The way they talked about their ideas included many technological concepts that were foreign to several of the participants. As they were consultants, they possibly lacked sufficient deep contextual understanding for explicating differences and similarities between their ideas and Sydved’s past approach to managing data. Possibly, the choice of words may also have increased the difficulties for the other participants to blend, as these ideas were not followed by many comments or questions.

A third situation when this pattern did not occur was when blending had manifested in response to a specific shift before. For example, the latter part of innovation lab 5 revealed a strong dominance of frame shifting. This was a series of events when all participants had participated in at least two previous innovation labs and no new ideas were injected. Several of these were also people who engaged more frequently in framing also outside of the innovation labs. These prior experiences seemed to reduce the need for frame blending manifestations, likely because participants already had, and assumed that others also had, blended these ideas before. In other

words, frame blending was less likely to manifest if the group composition was stable over time and if no new topics were injected.

The second interaction pattern is *frame blending triggering frame shifting*. The role of this interaction pattern is to push framing forward, as it enables talking of more potential contextual differences. In other words, it enables the exploration of otherwise unseen detailed differences between an organization's past and an alternative idea for the future. In this way, it also explains why frame shifting occurred more often than frame blending in the innovation labs.

In the following example from innovation lab 3 (Figure 9), it occurred when framing digital matchmaking that explored how Sydved could develop a "road app" for *orchestrating transactions* between road service suppliers with forest owners (Table 4). First, forest buyer 12 blended the idea with the established matchmaking of Sydved's forest buyers by expressing how it could support them in what they already do. Next, this blend triggered frame shifting, where more detailed differences were explored between what the "road app" could enable and what forest buyers usually do. More closely, frame shifting manifested when (1) forest buyer 12 noted that it could mean that the task of selecting between available service suppliers would be distributed to forest owners as opposed to forest buyers (Table 4, distributing tasks), (2) the digital innovation researcher proposed that alternative ways of monetizing transactions with digital technologies could be designed for benefitting forest buyers as well (Table 4, monetizing transactions), and (3) forest buyer 12 returned to implying other differences in control in the scenario of distributing new tasks to forest owners with digital technologies.

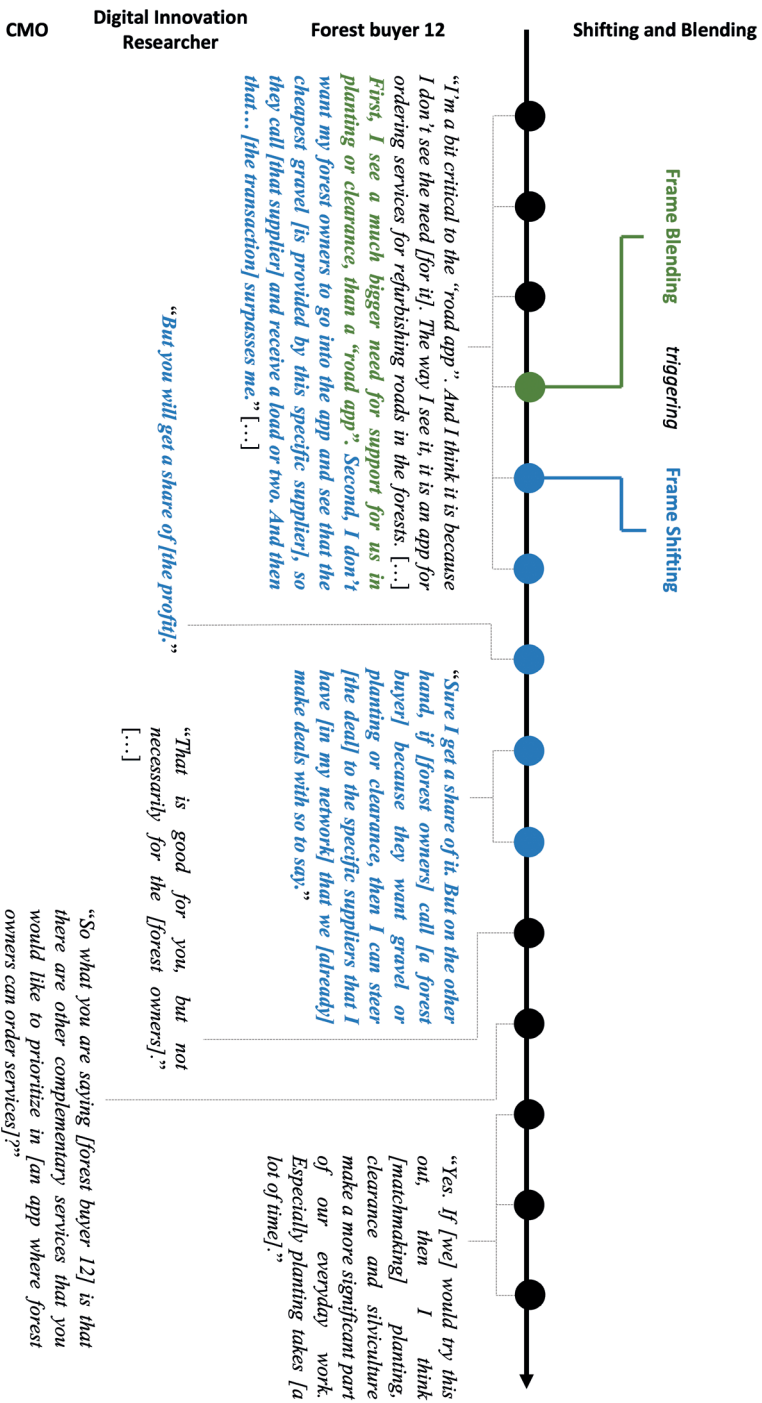


Figure 9. Illustration of frame blending triggering frame shifting.

The example in Figure 9 also indicates that this interaction pattern plays a role in negotiating meaning. The example revealed central incompatibilities that Sydved faced in digital transformation, namely the inherent differences in matchmaking between forest buyer brokering and digital ecosystem orchestration (Papers 1 and 2). In the example, the shifts that followed from the blend explored contextual alternatives so Sydved could accommodate this tension in the future. As seen, the shifts involved the idea of profit sharing between forest buyers and the company when monetizing transactions as a way to handle such incompatibility. Similarly, it concluded by selecting what specific task to distribute to forest owners so it would avoid being perceived as competing with tasks valued by forest buyers.

Taken together, frame shifting and frame blending can both enable each other. At the same time, interactions between frame shifting and frame blending can occur more or less intensely. Some events in the innovation labs were characterized by a dynamic interaction pattern, meaning that they oscillated “back and forth” from frame shifting, to frame blending, to frame shifting again over a short time span.

The following example from innovation lab 3 includes one such intense interaction pattern while discussing the idea of a new digital application, namely “Skogen Live”, that emerged throughout the labs (Figure 10). It was a digital option for sharing existing and new types of data throughout the wood production process with forest owners. Prior discussions of “Skogen Live” during the innovation labs had involved many manifestations of frame shifting, such as *building relationships*, *diversifying offerings*, *generating data*, and *analyzing data*. These shifts would come to be enacted in Sydved’s digital transformation.

The example in Figure 10 began when the forest buyer administrator suggested a split of the “Skogen Live” application based on similarities and differences to Sydved’s past. Thereafter followed a “back and forth” discussion of what these similarities and differences consisted of, which created the intense interaction pattern between frame shifting and frame blending. It was, at times, not even clear what similarities and differences were implied (i.e. “completely new things, more or less”). The overall discussion in the event made clear that the digital option was viewed as being similar to how Sydved’s forest buyers usually communicated updates from ongo-

ing wood production by telephoning forest owners. This blend stimulated more frame shifting. It was envisioned as different from this practice by speculating that it would be automated and include new data sources over time, even beyond wood production data. Finally, it was added that “Skogen Live” would be different because it would offer new ways to signal to forest owners what needs to be done on their properties.

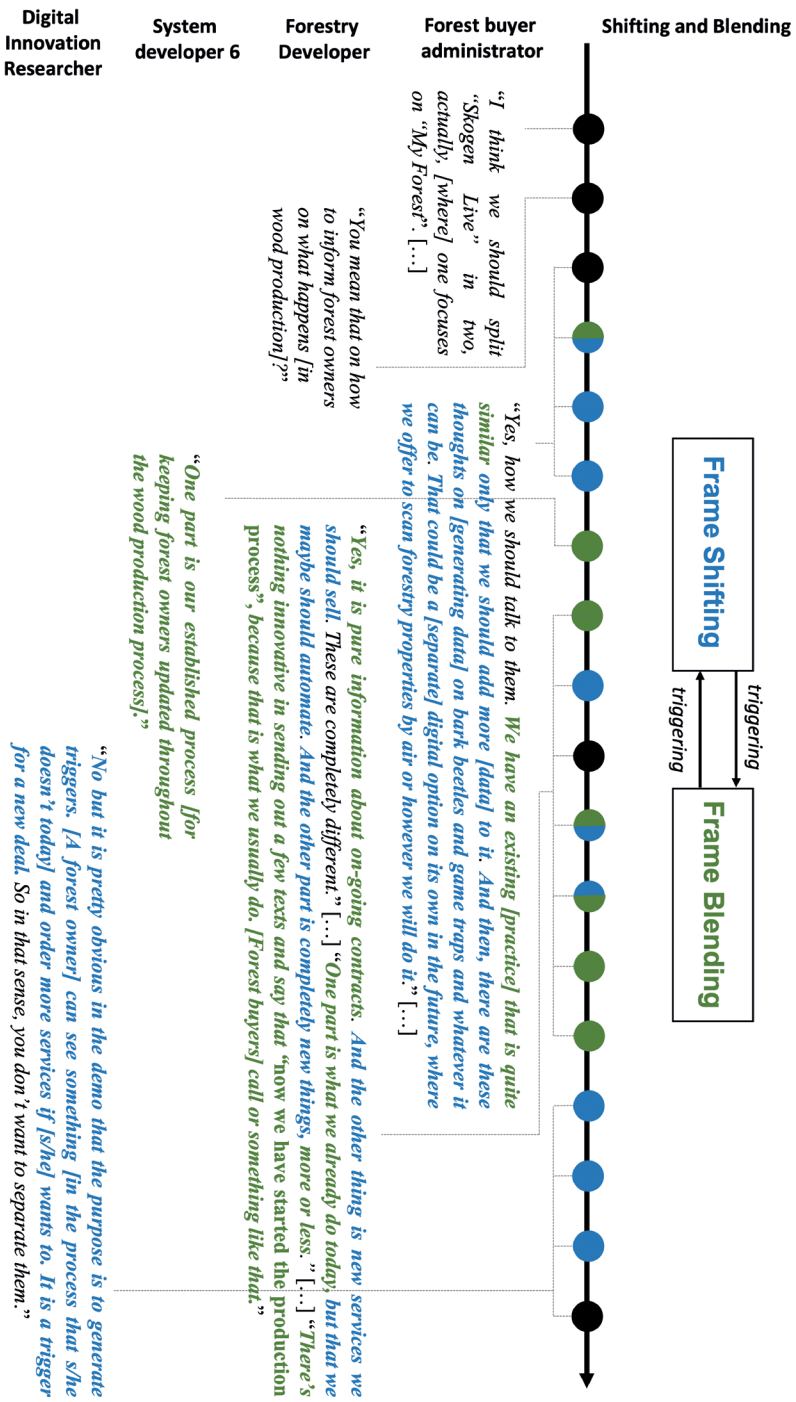


Figure 10. Illustration of dynamics between frame shifting and frame blending.

I will now proceed to detailing how meaning-making shaped digital transformation at Sydved. I do this by studying the developments of “My Forest” between 2013 and 2022, which is an example where Sydved’s digital transformation became especially salient. The left-hand column contains the narrative of the digital application’s change over time, as well as the related organizational changes that enabled and resulted from these changes. The right-side column displays in what way these changes represent the enactment of new meaning that redirected Sydved’s digital transformation.

6.3. DIGITAL TRANSFORMATION – A NARRATIVE OF SYDVED’S ”MY FOREST”

I am “My Forest”. Since 2013, I have gradually become an increasingly active part of organizing in Sydved’s digital ecosystem. Initially, I was designed by the cross-functional “Sydved Online team”, consisting of employees from the marketing, IT and forestry development units. They joined forces because there was a need for adapting to “contemporary expectations of digital communication” amongst forest owners (CMO, PowerPoint slides 2014-03-06). Then, they created the website *sydved.se* because they wanted to attract, scale, and build stronger relationships with forest owners.

At the time, they thought that this would be achieved by publishing inspirational and educational digital content, as well as guiding forest owners to find their local forest buyer district and personal forest buyer in their forest property area, regardless of where in Sweden they lived. They misjudged my potential for organizing at the time, as they reasoned that “an increasing digital use won’t affect or change the business model” (CMO, PowerPoint slides 2014-03-06). Rather, they reasoned that more information and inspiration would trigger more business as is.

I was essentially a wood supplier exclusive feature of *sydved.se*, which is why I was equipped with a log in-function to control access. I carried the forestry management plan in PDF, communi-

Enacting new meaning of ...

2013

Building relationships

Creating experiences

cated information such as wood measurements from production processes, and presented personalized news from forest owners' local districts. I also showed a map and data of forest owners' properties from public records, which was the only feature for any forest owner. I was supplemented by a Google Analytics tracking code so the number of visitors I attracted was visible to the Sydved Online team.

To keep the contents of *sydved.se* frequently updated, the Sydved Online team decided to engage a number of forest buyers from each district in November 2013. The marketing coordinator distributed access to *sydved.se* that offered tools for easily generating digital content. As such, web editors would contribute by generating digital content that "mirrored our business locally" across the geographically dispersed districts, to make the experience of interacting with me even more personalized (CMO, 2018-01-04). Gradually, the marketing coordinator became increasingly focused on incentivizing the web editors' efforts and setting rules for engagement. I remember that the marketing coordinator predicted when giving access to web editors that: "we will probably need some form of policy/guidelines for what we publish on the site" (Agenda first web editor meeting, 2013-11-29).

I received more attention from the Sydved Online team around 2017. My role in scaling became upvalued, as the number of logged in users became an official KPI and the goal was set to increase it from 2600 logged in suppliers/month in January 2018 to 4000 by the end of the year (PowerPoint slides web editor meeting, 2018-03-01). They saw my potential for emergence and added some extra features to make me more attractive, such as exclusive content about taxes. They also reduced barriers for accessing my contents, by making it possible to log in with the national personal ID number instead of a Sydved unique supplier ID. The marketing coordinator was nonetheless frustrated with the IT unit's limited resources that could be devoted to make the services I offered more attractive and my functionalities updated more frequently: "I don't know for how long I have had a number of points that haven't been fixed, because other things have been prioritized." (Transcript, 2018-01-14). To

Diversifying offerings

Personalizing offerings

Generating data

Distributing tasks

Personalizing offerings

Ongoing innovation

Motivating engagement

Discouraging engagement

2017

Scaling relationships

Diversifying offerings

Ongoing innovation

adapt to the need of making my development more emergent, one system developer became a shared resource of the marketing and IT unit at the beginning of 2018, thus reallocating more resources to my development.



Figure 11. Print screen of sydved.se 2018-11-16 from Way Back Machine. I am shown as a green rectangle in the upper right corner.

A second important injection to the Sydved Online team was the new digital marketer that joined us in June 2018. I recall that the marketing unit advertised for “a creative colleague that can build a digital platform where [Sydved] can convey personal and safe services and offerings.” (Advertisement, 2018-01). The digital marketer brought new competences such as social media marketing, data analytics and graphical design. She quickly demonstrated an interest in analyzing more aspects of my abilities to attract and retain forest owners, such as the number of returning visitors during a month, what specific sydved.se pages attracted visitors, how people moved around the different pages and time spent on specific pages. The broadened analytics revealed that I did not perform as desired: “We feel like [...] [wood suppliers] visit the website,

2018

Analyzing data

Acquiring competence

and “My Forest” is surely interesting, but [after logging in] they just leave. So, we need to work with making “My Forest” more attractive, especially esthetically, and [making it easier to] navigate.” (Marketing coordinator, 2018-11-14).

Therefore, the marketing unit initiated a redesign of sydved.se in the latter part of 2018. They turned to an external partner outside of the forest industry for new resource injections and perspectives, essentially a digital marketing agency. The renewal basically focused on improving the graphical design and the web editors’ tool for generating digital content, rather than developing new functions. It proved difficult and costly to create integrations to Sydved’s established systems and data, as the new sydved.se was developed on a new platform. As a result, the redesign I had was essentially new “make-up” (Meeting notes, 2018-12-03) in line with what the partner envisioned for me in the short-term future. They also removed some barriers for interacting with me when the new sydved.se was launched in February 2019. To put me in the spotlight, I was shown immediately on the front page of sydved.se. It was also clarified that my button was a call to “log in”, as some wood suppliers likely weren’t familiar with the term “My Forest”.

*Motivating
engagement*

*Creating
experiences*

*Ongoing
innovation*



2019

Figure 12. Print screen of sydved.se 2019-03-16 from Way Back Machine. I am highlighted on sydved.se’s front page.

I sensed a sharper shift in direction around the beginning of 2019. The new cross-functional team “Team Innovation”, formed the year before, had engaged in a series of “innovation labs”. They also had a

budget for investing in multiple digital options. It was a response to new entrants and initiatives that focused on digital matchmaking of wood and digital innovation in our digital ecosystem. “Skogen Live” was the first digital option to be developed which was a new service for automatically increasing communication to forest owners by combining existing data sources from various sources in the wood production process, generated by machines and service suppliers. At this point, “Skogen Live” meant that wood suppliers received and could respond to SMS with updates from ongoing production processes. It was developed in collaboration with a new partner in IT during the year, and launched as a prototype in November 2019. The digital marketer took the lead with much engagement from the forestry developer too, and they also engaged some system developers from the IT unit in the technological development.

The launch of the first version of “Skogen Live” also triggered some organizational changes. The digital marketer mentioned that she had new tasks. It involved coordinating improvements of “Skogen Live” with the IT partner and Sydved’s IT unit, as they sought to continue developing it after launch with the help of feedback from ecosystem actors and learnings from eventual mistakes. For example, they needed to rethink the messages to wood suppliers, as some had approached production sites which could become a potential security risk. It also involved interacting with wood suppliers, which was ordinarily a task undertaken by forest buyers. The need to adapt arose as some began replying to the texts which were sent to the digital marketer’s e-mail: “I have become some sort of customer service. “Hello there and welcome to admin” [laughing]”. (Transcript, 2019-12-19). The following months, the need increased and others from the marketing and forestry development unit engaged in this new task too. As the CMO described: “We haven’t predefined [responding to Skogen Live texts] as a routine, it has rather emerged from [employees’] engagement. And this has become some form of embryo for learning how to work with a back-office solution in the long run, I think.” (Transcript, 2020-04-20).

Diversifying offerings

Explorative innovation

Analyzing data

Building relationships

Ongoing innovation

Generating data

In February 2020, I became the center of attention for the “Skogen Live” constellation, as the digital marketer, the forestry developer and the IT partner wanted to make a web-based interface of the service to “make our suppliers log in to “My Forest.” (Digital marketer email, 2020-02-03). This ambition was also reflected in the more ambitious goal for logged-in suppliers/month, set to 5160 for 2020. I was enhanced with new functions for visualizing updated data from ongoing wood production processes, such as a dashboard that demonstrated completion of a process in percentage. I was also redesigned to work with mobile devices, so I would become more accessible when interacting with wood suppliers independently of their location.



Figure 13. Print screen of sydved.se 2021-10-01 from Way Back Machine. My new data visualizations are illustrated on the front page.

Despite the intentions that I would be continuously improved with new functionalities over time, the emergent process was hampered for two main reasons. The first was Sydved’s established infrastructure and external IT partners’ inability to navigate it. The process of identifying options and the development of “Skogen Live” resurrected these issues, which was why the CIO and CMO pushed for a migration to a cloud platform for data management. The management team decided to make this shift in December 2019 which brought with it adaptations to the IT unit’s priorities. For example, the system-developer shared between IT and marketing returned to the IT unit. Regardless, the process would take years to realize.

Building relationships

Diversifying offerings

Ongoing innovation

Analyzing data

The second was the start of the covid-19 pandemic that resulted in options development being essentially paused by management, why for example the “road app” that they had talked about and prototyped was abolished. However, the CIO and CMO advocated that “Skogen Live” should be made an exception. Fortunately, I witnessed a rebellious side of the digital marketer and the forestry developer that avoided a halt in my development despite these conditions: “The goal for [us] is to try to make smaller changes that improves the user experience and make [“My Forest”] more attractive (despite that we really aren’t allowed to). When [we have shifted to the cloud platform], everything will need to be redone either way, so that is why [the CIO and CMO] don’t want us to do too much, other than “a face lift”.” (Digital marketer, e-mail 2020-12-07). So they did, and in April 2021, I was relaunched as the “new My Forest”.

In 2021, I noticed some further adaptations that accelerated my development somewhat. In March, Sydved recruited a new change manager/business developer to the IT unit that became a welcome resource injection for coordinating our “Skogen live” constellation. In June, they changed IT-partner to one that had previous experience of our systems. They also implemented a new support e-mail on sydved.se where users could send in feedback that was used for further improvements. I noticed effects of these adaptations in the latter part of 2021. Then, they focused on improving my abilities for visualizing data from the forestry management plan, by making forestry property maps more interactive and good-looking. They also began exploring crowdsourcing data as they allowed for forest owners to make notes in the forestry management plans and for forest buyers to supply data on actions taken in specific forest areas. However, I don’t think they understood the full potential of crowdsourcing at this point as they neither used this data for updating the forestry management plan, nor innovated with this new data source.

Creating experiences

Ongoing innovation

2021

Creating experiences

Ongoing innovation

Generating data

Acquiring competence

In the middle of 2021, I sensed that a more intense change in direction was underway again. It was in response to the board's request for reorganizing in order to become more "efficient" that was initiated in this year. The management team identified forestry services as one of many areas in Sydved's business that could be undertaken more efficiently. This was viewed as an opportunity for the CMO and CIO: "[We thought that] this is our chance to open the door for injecting [digital platform thinking] in this process. We'll establish a business unit based on platform thinking, as an environment where we can explore new service development." (CMO, transcript 2022-03-31). As a result, a new sub-unit of the marketing unit was implemented in 2022 as part of a larger reorganizing initiative – "Forestry services" – of which the former forestry developer became head. He described that "[the goal of the unit is to] offer and develop forest services of high quality [which may include] entirely new digital tools for forest owners." (Head of Forestry Services, Instagram post 2021-12-17).

In 2022, I experienced a new shift towards becoming more active in orchestrating transactions. To begin with, I will offer services to complement wood transactions. The first one will help forest owners access clearance service suppliers, closely resembling the "road app" of which there was talk of before. To start this development, there are efforts to organize data on forestry service suppliers in our established ecosystem that provide such services. The idea is to distribute new tasks to forest owners, while at the same time reducing time spent on matchmaking complementary services for forest buyers: "It makes it easier for us if the forest owner can be the one who clarifies what should be done [and where]. [...] What they have drawn on the map and written, that constitutes the work order. We only need to make sure that it flows through the system, to a service supplier that will do the job. Then – click – it is done." (Head of Forestry Services, Transcript 2022-03-30). It is intriguing how I can make something Sydved has always done so fundamentally different.

Diversifying offerings

Explorative innovation

2022

Orchestrating transactions

Distributing tasks

Building relationships

Diversifying offerings

Generating data

Analyzing data

7. DISCUSSION

In this thesis, I have shown that frame shifting and frame blending are useful for conceptualizing meaning-making in digital transformation. At this point, it is however relevant to ask why this conceptual framework is needed and how it is different from existing digital transformation research that investigates meaning-making and temporality. Therefore, I will now unpack how this conceptual framework differs from five related literature streams in the digital transformation literature. In the following, I distinguish these five literature streams based on what theoretical perspectives they apply and divide them based on what area they mainly focus on, that is either meaning-making or temporality. Admittedly, this division is somewhat artificial because all processes carry assumptions of time, as stated above (Reinecke & Ansari, 2017, p. 403).

7.1. A DIFFERENT PERSPECTIVE ON MEANING-MAKING IN DIGITAL TRANSFORMATION

Frame shifting and frame blending offer a new way to unpack micro-level meaning-making in digital transformation as compared to two theoretical perspectives that are commonly applied for investigating the role of meaning and meaning-making in existing digital transformation research, namely technological framing and institutional logics (see overview in Table 6).

The first extant literature stream on meaning-making in digital transformation is technological framing research (Azad & Faraj, 2008, 2011; Klos & Spieth, 2021; Lundberg et al., 2022; Pignot et al., 2020; Spieth et

al., 2021; Young et al., 2016). This theoretical perspective provides conceptual tools for investigating meaning-making of the characteristics of a new technology, motivations for adopting it, and how it could be used on a daily basis (Davidson, 2006; Orlikowski & Gash, 1994). This literature stream has typically focused on managing inconsistencies and incongruences between frames, that is how differences between frames within or between groups can be reduced (Azad & Faraj, 2008; Lundberg et al., 2022; Young et al., 2016), as well as on the politics of technological framing (Azad & Faraj, 2011; Pignot et al., 2020).

Frame shifting and frame blending differ from technological framing because they approach the micro-level meaning-making of how interpretations, motivations for, and use scenarios of (digital) technologies are made and changed in discursive interactions. Put differently, they provide conceptual tools for approaching meaning-making through “talking”, where diversity of participants is useful for exploring a broader variety of frame differences (Gray et al., 2015; Lane & Maxfield, 1996). Although Young et al. (2016) acknowledged that technological framing involves perspective-taking as a way to “engage in appreciating the perspectives of other groups” (ibid., p. 499; Boland Jr & Tenkasi, 1995), it is, at best, described as taking place without explaining how it plays out on the micro-level and how it is useful in technological framing.

Frame shifting and frame blending also differ as they provide conceptual tools for a more careful examination of the role of temporality in meaning-making of technologies (Benner & Tripsas, 2012). Although technological framing assumes a temporal dimension, especially a future orientation, it does not take center stage. For example, motivations for adopting a technology assume interests, needs, and even desires for achieving something with it in the future. Consequently, extant research has covered future-oriented approaches to technological framing such as forecasting (Klos & Spieth, 2021). However, the interplay of past and future is not recognized, although it is explicit in research on strategic framing of technologies more broadly (Hoppmann et al., 2020). For example, the narrative perspective on strategic framing emphasizes the importance of ““plot[ting]” sets of social and material elements from the past, present, and future into a comprehensible narrative” (Garud & Giuliani, 2013, p. 159).

Imagine a scenario of applying a technological framing perspective to the Sydved case. With this framing, meaning-making in the innovation labs could be viewed as technological framing of the “technology concept” digital platform (Leonardi, 2011) and emerging prototypes of digital applications such as “Skogen Live”. Such an analysis could describe innovation lab participants’ understanding(s) of characteristics of “digital platforms”, motivation(s) for exploring digital platform applications, and future use scenarios of such applications in ecosystem actors’ practices, as well as compare over time how they changed.

However, this perspective is limited for unpacking the role of discursive interactions in making such interpretations, motivations, and scenarios in the innovation labs. Thereby, it would not appreciate the role of exploring differences and similarities between Sydved-specific potential futures and its past, as well as why diversity of participants was useful in the process. This is what frame shifting and frame blending provide a conceptual framework for talking about. Generally, participants without Sydved backgrounds were important for frame shifting to manifest in the innovation labs, because they could expand the topics for new ideas for the future and question Sydved’s past from new angles. They involved people from software development, digital marketing, digital innovation research, and, in part, the newly recruited CIO. Similarly, participants with long-term experience of working at Sydved were important for frame blending, because they could suggest more similarities between new ideas and Sydved’s past. They included, for example, forest buyers and the CMO. Clearly, efforts to reduce or negotiate differences manifested too in Sydved’s innovation labs. For example, different interests surfaced when talking about and negotiating what ecosystem actors to matchmake between in the future (Figure 9). However, to only focus on such events would not accurately portray the role of discursive interactions and participant diversity in the innovation labs.

The second literature stream that investigates meaning-making in digital transformation is research that applies institutional logics for theorizing digital transformation (Baiyere et al., 2020; Berente et al., 2019; Gawer & Phillips, 2013; Oborn et al., 2021; Selander & Jarvenpaa, 2020; Skog, 2019; Tumbas et al., 2018). Institutional logics refer to “socially constructed, historical patterns of material practices, assumptions, values,

beliefs, and rules” (Friedland & Alford, 1991; Thornton & Ocasio, 2008, p. 101). Thereby, they are a priori formed belief systems that “cluster” meaning and practice (Purdy et al., 2019, p. 409). Organizational contexts typically embed plural logics (Oborn et al., 2021), and new ones can penetrate such contexts by typically both being retrieved by employees and injected in them, such as by being inscribed in applications of technology (Berente et al., 2019; Gawer & Phillips, 2013). While new institutional logics provide new meaning that guide new practice, they also provide somewhat malleable resources for meaning-making in an organization (Purdy et al., 2019). Thereby, this perspective also raises questions such as how a new logic is contextualized within an organizational context.

Frame shifting and frame blending differs from the institutional logics because they offer conceptual tools for unpacking the role of discursive interactions in micro-level meaning-making (Gray et al., 2015; Purdy et al., 2019). This has received limited attention in the digital transformation literature. Here, institutional logics research has typically been applied for understanding what can constitute a “new logic”, such as a crowd work logic (Selander & Jarvenpaa, 2020), a digital business process management logic (Baiyere et al., 2020) and a digital matchmaking logic (Paper 1). It has also been useful for identifying different possible organizational responses following the penetration of a new logic that co-exist with extant ones within organizational contexts (Berente et al., 2019; Selander & Jarvenpaa, 2020), as well as different responses to the injection of a new digital technology amongst actors guided by different logics within organizations (Oborn et al., 2021).

Table 6. Different perspectives on meaning-making in the digital transformation literature.

Conceptual framework	Technological Framing	Institutional Logics	Frame Shifting and Frame Blending
Perspective on meaning-making in digital transformation	Meaning-making of characteristics of new digital technology, motivations for adopting it and how to use it on a daily basis. It is useful to reduce differences between frames in technological framing.	An a priori formed logic that comprises both new meaning and practice penetrates an organizational context, for example, by being inscribed in new digital technologies. There are different organizational responses to handling the co-existence of new and existing logics.	Meaning-making in discursive interactions where (1) frame shifting manifests when exploring what could be new in potential futures which involve digital technologies in different ways, and (2) frame blending manifests when identifying what might remain of an organization's past in such potential futures.
Example references	Azad and Faraj (2008, 2011), Young et al., (2016), Pignot et al., (2020), Klos and Spieth (2021), Spieth et al., (2021), Lundberg et al., (2022)	Gawer & Phillips (2013), Tumbas et al., (2018), Berente et al., (2019), Skog (2019), Baiyere et al., (2020), Selander & Järvenpää (2020), Oborn et al., (2021)	

Imagine applying an institutional logics perspective to the Sydved case. One could then possibly claim that a “digital platform logic” was injected into Sydved’s ecosystem through, notably, the launch of a new digital platform for wood matchmaking. Thereafter, Sydved employees also retrieved this logic by setting up collaborations with researchers, new partners, and newly recruited employees. In this way, the innovation labs created a space to “nurture” this new logic (Hinings et al., 2018, p. 57). Next, an institutional logics perspective would put focus on the organizational response in terms of how the new digital platform logic as enacted in the practice of digital matchmaking through, for example, “My Forest” co-existed over time with the existing “matchmaking logic” as enacted by, for example, forest buyers (Selander & Jarvenpaa, 2020).

Frame shifting and frame blending differ from institutional logics because they unpack the role of “talking” in contextualizing a new logic within an organizational context. Because such talk is situated on the micro-level, it can approach questions such as how and why similar new “logics” penetrate many organizations but nonetheless lead to different appropriations and enactments in different organizational contexts (Purdy et al., 2019). In Sydved’s innovation labs, participants devoted significant efforts to contextualizing the “digital platform logic” by questioning and blending elements of Sydved’s past based on what this new logic could imply for its future. For example, the new offering “Skogen Live” and the idea of orchestrating transactions between forest owners and clearance service suppliers were talked into being by innovation lab participants that shifted and blended these ideas with, for example, past developments of “My Forest” and conventional matchmaking (Paper 1). In this way, it is not enough only to focus on how a new logic is injected or retrieved for understanding meaning-making in digital transformation, but it also requires attention to what employees “make” with it (Purdy et al., 2019).

7.2. A DIFFERENT PERSPECTIVE ON TEMPORALITY IN DIGITAL TRANSFORMATION

I will now shift to discussing how frame shifting and frame blending offer an alternative approach to deal with temporality in digital transformation, as compared to existing research that in different ways investigates the interplay of potential futures and past in digital transformation (see overview in Table 7). There are three main theoretical perspectives that are applied for investigating this area, namely digital options and digital debt, path creation and path dependency, and exploration and exploitation. Meaning-making is undeniably important in these perspectives too but its micro-level dynamics are rarely unpacked.

The first literature stream on temporality in digital transformation applies theory on digital options and debt (Rolland et al., 2018; Sandberg et al., 2014; Svahn & Kristensson, 2023; Svahn et al., 2015; Woodard et al., 2013). These concepts focus on how to leverage digital technologies to

accomplish digital transformation. In this stream, digital options embed a future orientation. They are small investments in digital technologies to acquire a right – but not an obligation for full investment – to take possible action in the future if conditions are beneficial (Sambamurthy et al., 2003; Sandberg et al., 2014). They are, therefore, means for coping with future uncertainties because they maintain some degree of flexibility of choosing between open alternatives in the future (Svahn & Kristensson, 2023; Svahn et al., 2015) – and for enhancing the scope of future opportunities given the self-referential character of digital technologies (Kallinikos et al., 2013; Yoo et al., 2010).

On the other hand, digital debt assumes a past orientation. It refers to a build-up of implemented and embedded digital technologies that result from past technology investment decisions (Rolland et al., 2018). Digital debt is not always a burden for doing something differently as it can be leveraged to achieve short-term future ambitions. It can, however, hamper organizational efforts to achieve longer-term future visions if it becomes expensive to ensure that digital debt remains operable, of high quality and evolvable over time as ecosystem conditions change (Rolland et al., 2018; Tom et al., 2013). Such potential future costs are difficult to foresee when making the decision to plant debt given the uncertainties of what unfolds in the future (Kruchten et al., 2012). This stream of research has been useful for understanding relationships between and management of digital options and debt as a portfolio approach to digital transformation akin to financial investments (Woodard et al., 2013).

Implicitly, leveraging digital options and digital debt involves meaning-making. The literature describes that it is involved in understanding what digital options thinking is (Svahn & Kristensson, 2023) as well as in identifying digital options and evaluating their potential (Sandberg et al., 2014). Similarly, it is involved in identifying how to make use of digital debt for accomplishing digital transformation (Rolland et al., 2018).

Let us view the Sydved case from the perspective of digital options and digital debt. From this view, Sydved's innovation labs involved the identification and development of digital options such as the “road app” that was dropped and “Skogen Live” that was eventually realized. It also

involved ideating how the established digital debt “My Forest” could be leveraged, such as for setting “Skogen Live” in motion in the near-lying future (Figure 10). This framework would have approached these innovation labs as a process for leveraging digital options/debt and would have sought explanations for why it was or was not productive in building a portfolio of digital options (Svahn & Kristensson, 2023) and managing digital debt (Rolland et al., 2018).

Frame shifting and frame blending differ as compared to this perspective because they can unpack how digital options were talked into being, how talking served to leverage digital debt for realizing these options, as well as for making meaning of digital options thinking as a different process for approaching digital innovation at Sydved. In this perspective, these outputs were a result of the discursive interactions that took place in the innovation labs. For example, the digital option “Skogen Live” was talked into being through frame shifting and frame blending when talking about, for example, building relationships, diversifying offerings (Table 4), and analyzing data (Table 5). Similarly, talking about ideas of digital options thinking as a process involved frame shifting to seeing digital innovation as explorative (Table 5).

The second literature stream on temporality in digital transformation is literature that applies a path perspective (Bohnsack et al., 2021; Henfridsson & Yoo, 2014; Rolland & Hanseth, 2021; Zhang et al., 2021). A path is described as how work is carried out to accomplish a particular goal, amongst all possible ways to carry out work to accomplish this goal (Pentland et al., 2022). Time is embedded into the path concept, as paths “embody a dialectic between the past and the future” (ibid., p. 207). In this theoretical perspective, path creation (Garud & Karnøe, 2001) and path dependency (Sydow et al., 2009; Vergne & Durand, 2010) are core concepts for approaching temporality. They are interrelated (Singh et al., 2015) as “the former directs attention to the creative forces of agency, and the latter emphasizes the continuity of collective arrangements toward a future” (Mouritsen & Dechow, 2001, p. 356). In this way, path creation allows for alternative futures that build on historical paths yet deviate from them, making new paths partially shaped but not determined by

the past (*ibid.*). By elevating the notion of agency, these concepts focus on accomplishing digital transformation through making choices about digital technologies.

The path perspective has recognized the role of meaning-making in path creation, but it has not focused on the role of discursive interactions for it. Meaning-making is prevalent in associated notions such as “mindful deviation” (Garud & Karnøe, 2001), where meanings are viewed as “the motors driving human agency” and meaning-making centers on creating narratives that weave temporal orientations together (Garud et al., 2010, p. 769). Similarly, it is prominent in mechanisms identified in extant research, such as “imaginative projection” that refers to envisioning an alternative future to guide the early formation of a new path, and “reflective dissension” where people identify differences between established things and a new path (Henfridsson & Yoo, 2014).

Think now of applying a path perspective for an analysis of Sydved’s digital transformation. From this view, we can understand the innovation labs as a space for “mindful” work, such as imaginative projection and reflective dissension. In parallel, Sydved gradually created the path of becoming a digital ecosystem orchestrator (Paper 2). Notably, they took a critical step for creating this path when choosing to connect existing forestry service suppliers that could provide clearance services with forest owners in 2022, in collaboration with a new partner from outside the forest industry. At the same time, this path also partially built on the established path. In this example, they chose to build on the established user base of “My Forest” as well as forest buyers’ established relationships with service suppliers in the ecosystem. However, the path perspective raises questions such as why some paths, in Sydved’s case that of becoming a digital orchestrator, are created amongst all possible paths (Pentland et al., 2022).

Although frame shifting and frame blending do not offer a complete answer to this grand question, they elaborate on the role of talking in identifying what possible path to create as well as in identifying what of established paths to build on. At Sydved, it is clear that talking specifically about topics associated with digital platforms and digital ecosystems was essential for creating this new path and simultaneously building on, for

example, “My Forest”. In this way, talking was grounded in a specific “digital transformation discourse” that provided both resources and constraints for path creation. This is, however, not the only available discourse on digital transformation. For example, another “digital transformation discourse” that existed in the same ecosystem and temporal context focused on digitalization of forestry supply chains (Holmström, 2020). Talking grounded in such a discourse would likely shape digital transformation in a different way. Notably, such a discourse does not build on ideas of distributed networks that underlie the notion of digital ecosystems to the same extent, because the supply chain concept builds on the analogy of a linear chain (*ibid.*). Consequently, it is difficult to see how a path of digital ecosystem orchestration that involves digital matchmaking and digital innovation can be created based on this alternative discourse.

Table 7. Different perspectives on temporality in the digital transformation literature.

Conceptual framework	Digital Options and Digital Debt	Path Creation and Path Dependency	Exploration and Exploitation	Frame Shifting and Frame Blending
<p>Perspective on temporality in digital transformation</p>	<p>Leveraging digital technologies by (1) investing in digital options that expand future action possibilities, and (2) managing digital debt that accumulates from past digital technology investments.</p>	<p>Making choices about digital technologies for creating new paths towards an alternative future that both (1) deviate from, and (2) build on established paths that were created in the past.</p>	<p>Learning through engagement with digital technologies through balancing (1) exploration of new digital technologies, value propositions, knowledge bases and processes for long-term future prosperity, with (2) exploitation of established things for short-term future gains.</p>	<p>Meaning-making in discursive interactions where (1) frame shifting manifests when exploring what could be new in potential futures which involve digital technologies in different ways, and (2) frame blending manifests when identifying what might remain of an organization's past in such potential futures.</p>
<p>Example references</p>	<p>Woodard et al., (2013), Sandberg et al., (2014), Svahn et al., (2015), Roland et al., (2018), Svahn & Kristensson (2022)</p>	<p>Hentfidsen and Yoo (2014), Bohnsack et al., (2021), Roland and Hanseth (2021), Zhang et al., (2021)</p>	<p>Gregory et al., (2015), Svahn et al., (2017), Magnusson et al., (2020), Winelius et al., (2020), Smith and Beretta (2020)</p>	

The final literature stream on temporality in digital transformation that I will discuss applies theory on exploration and exploitation (Gregory et al., 2015; Magnusson et al., 2020; P. Smith & Beretta, 2020; Svahn et al., 2017; Wimelius et al., 2021). These concepts focus on learning through engagement with digital technologies when approaching digital transformation. Here, time is prominent because learning in organizations takes place through balancing the exploration of new things for long-term future prosperity with the exploitation of established things that have been built up in the past for short-term future gains (Levinthal & March, 1993; March, 1991). In digital transformation, engagement with digital technologies involves both searching, acquiring, and developing new things to explore with digital technologies as well as exploiting digital technologies for refining existing things such as technologies, products, services, processes and knowledge bases (Gregory et al., 2015; Magnusson et al., 2020; P. Smith & Beretta, 2020).

Since digital transformation requires both exploration and exploitation, existing research has shown that digital transformation involves contradictions that benefit from being addressed when they become salient (Svahn et al., 2017; Wimelius et al., 2021). This literature stream thereby often adds theory on paradoxes (W. K. Smith & Lewis, 2011) and ambidexterity (Andriopoulos & Lewis, 2009) to theorize such contradictions and their management. In this stream, meaning-making is subtly implied in, for example, the role of developing visions that guide what to explore and exploit in the future (Gregory et al., 2015; Svahn et al., 2017). Developing visions implies both meaning-making and a future orientation but the micro-level dynamics of such process is rarely unpacked. Additionally, meaning-making seems to play a role in addressing contradictions as they emerge, by, for example, envisioning how to possibly accommodate both poles of them (Wimelius et al., 2021).

Imagine applying the exploration/exploitation lens to Sydved's innovation labs. In this view, these labs would be understood as spaces for developing a vision that guides what to explore and exploit as well as for learning through exploration and exploitation with digital technologies. One could possibly claim that a vision was developed throughout the innovation labs of "becoming a digital ecosystem orchestrator" (Paper 2), that consisted

of ideas of digital matchmaking and digital innovation. One could then also claim that this overarching vision guided what to do when exploring new things, such as analyzing data in new ways for the application “Skogen Live”, and exploiting established things, such as integrating “Skogen Live” on the existing channel for forest owners “My Forest”. However, the perspective does not unpack the role of discursive interactions involved in developing such a vision at Sydved, searching for what to explore and exploit in digital transformation, and addressing contradictions as they emerge.

Frame shifting and frame blending differ from this view because they are centered on the role of talking in creating such vision and searching for possible things to explore and exploit to pursue it. However, it is not so simple that frame shifting equals exploration and frame blending equals exploitation. For example, frame blending manifested in talk that was both “exploration-oriented” and “exploitation-oriented”. When ideating how to motivate engagement in digital innovation, it blended with Sydved’s established “Suggestion committee” (Table 5, motivating engagement). In this case, the blending underpinned a perceived urgent need to explore something new in the long-term. However, when talking about new ways of distributing tasks, it blended with established examples of task distributions in the ecosystem, such as in pushing the autonomy of forestry service suppliers (Table 4, distributing tasks). In these cases, frame blending stressed that such established processes should be exploited in the short-term.

Additionally, frame shifting and frame blending manifested in discursive interactions when dealing with the contradiction in digital matchmaking of how to accommodate both digital matchmaking through orchestration and forest buyer brokering in the future (Figure 9). More precisely, there was talk that served to negotiate which ecosystem actors to connect directly with forest owners and not in future digital matchmaking to avoid conflicts with forest buyer matchmaking. Against this background, I will now outline the contributions of this thesis.

7.3. IMPLICATIONS

The thesis contributes a new conceptual framework to the digital transformation literature, namely frame shifting and frame blending. This conceptual framework is useful for investigating *both* micro-level meaning-making and temporality in digital transformation. Broadly, it resembles the classic meaning-making challenge in innovation, that of balancing familiarity and novelty (Hargadon & Douglas, 2001; G. Wang et al., 2022). As with this challenge, frame shifting and frame blending represent the interplay of potential futures and the past when shaping digital transformation. They explain how meaning-making in discursive interactions shapes digital transformation where (1) frame shifting manifests when exploring what could be new in potential futures which involve digital technologies in different ways, and (2) frame blending manifests when identifying what might remain of an organization's past in such potential futures. It is a dynamic process where frame shifting and frame blending interact in the exploration of what could be new and what could remain in digital transformation. By center-staging “talking”, this conceptual framework elaborates on the relationship between dynamic digital ecosystem conditions and different digital transformation responses to such ecosystem-level changes (Berente et al., 2019; Fayard et al., 2016; Noesgaard et al., 2023; Selander & Jarvenpaa, 2020).

This contribution has methodological implications for studying digital transformation. It points to the necessity to spend a significant amount of time gaining a deep understanding of how digital transformation is shaped. Researching it is resource-intensive because it requires longitudinal data that include vast data on discursive interactions. To access, collect, and analyze such data, researchers must immerse themselves in the context, acquire a deep understanding of it, and make a long-term commitment to engage with it closely. Furthermore, engaging in these activities likely involves ethical dilemmas that are difficult to foresee and require careful efforts to avoid causing harm when they emerge during the study. Additionally, researching digital transformation requires flexibility in most cases, because employee engagement in meaning-making can suddenly appear in response to rapid changes in digital ecosystems. Therefore, the timing of studying digital transformation must be “right” and conditions

for studying it under equal circumstances do not present themselves again. Without such resource-intensive and timely efforts, we cannot study how frame shifting and frame blending manifest, interact, and shape digital transformation.

On a minor note, the thesis has implications for extant attempts that seek to distinguish digital transformation from IT-enabled organizational change, although this thesis does not directly engage in this discussion (Skog, 2019; Wessel et al., 2021). It has been proposed that one out of two aspects that distinguishes digital transformation from IT-enabled organizational change is a shifted rather than enhanced organizational identity (Wessel et al., 2021). In contrast, frame blending manifestations at Sydved show that digital transformation can involve integrating meanings of a core, distinguishing and enduring aspect of an organization (Albert & Whetten, 2004), in this case matchmaking. At Sydved, matchmaking between mills, forest owners, and a diverse set of forestry services were examples of core activities that manifested as frame blending when framing digital matchmaking. These observations thereby challenge the generalizability of the claim that digital transformation always involves a shift in organizational identity.

Finally, the thesis contributes to the framing literature by building and elaborating on the theoretical understanding of frame shifting and frame blending (Werner & Cornelissen, 2014). It also extends the field of application of these concepts to digital transformation as an area of concern. In digital transformation, frame shifting and frame blending work together and enable one another (Cloutier & Langley, 2020; Farjoun, 2010), they manifest and interact in discursive interactions (Gray et al., 2015; Purdy et al., 2019), and they center-stage a temporal dimension of meaning-making (Kaplan & Orlikowski, 2013). The many empirical observations of manifestations and interactions of frame shifting and frame blending in Sydved's digital transformation represent solid empirical support for this contribution.

7.4. LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

I expect that frame shifting and frame blending form a useful conceptual framework for investigating meaning-making in digital transformation beyond the Sydved case. At the same time, there is a need for future research to examine their roles and dynamics both more broadly across organizational and temporal contexts, as well as in more detail.

As the findings of this thesis are based on a single case study, there were no opportunities for comparison with other contexts. Therefore, additional case studies of frame shifting and frame blending as well as comparative case studies make a promising avenue for future research to address this limitation. Such future research would be useful for analyzing how differences in frame shifting and frame blending manifestations/interactions shape digital transformation responses in different ways. Some limitations of choosing Sydved as the case are useful for setting directions for such future case study research.

First, Sydved is an incumbent firm that was founded in 1979. This means that there were rigid established frames in place at Sydved, where at least some frame elements had solidified over a quite a long time-span (Tripsas & Gavetti, 2000). Future research can thereby examine frame shifting and frame blending in organizational contexts with shorter histories, such as start-ups and scale-ups. In these contexts, it is possible that different individual-level frames, as opposed to shared organizational-level frames, are at play to a larger extent that can affect how frame shifting and frame blending manifest and interact (Kaplan & Tripsas, 2008).

Second, Sydved is an incumbent “matchmaker firm”. It is likely that being an incumbent matchmaker created especially good conditions for frame shifting and frame blending to manifest, as there were “obvious” similarities and differences between digital matchmaking in particular and the established matchmaking practice. It would, therefore, be interesting to investigate frame shifting and frame blending in both other types of firms, such as manufacturing firms, and in other types of organizations, such as public sector and social movement organizations. Third, it would be interesting to study frame shifting and frame blending in different organizational cultures. It is, for example, possible that there was an epis-

temic stance at Sydved that impacted the many manifestations of frame shifting and frame blending where, for example, the inclusion of diverse participants was valued in meaning-making (Fayard et al., 2016).

A second limitation of this thesis is that it does not unpack in depth how different ways of “designing” spaces for meaning-making impact frame shifting and frame blending. Although meaning-making occurs in employees’ everyday activities (Purdy et al., 2019), the innovation labs were examples of spaces where meaning-making was especially intense because of how they were set up (Figure 6), in terms of, for example, choices of what participants to include or not, and what resources to make use of for stimulating meaning-making, such as different digital technologies.

Consequently, a promising area for future research is to study the implications of different designs of meaning-making spaces for shaping digital transformation. For instance, future research can study how different group configurations impact frame shifting and frame blending. One way to study it would be by comparing focus groups that are designed differently within an organization (Eisenhardt, 1989), for example, by experimenting with designing focus groups differently in the same organizational context (Klos & Spieth, 2021). To exemplify from the Sydved case, comparing how frame shifting and frame blending manifested in the innovation labs with the management and board meetings would have been interesting for this purpose.

Future research can also study how interactions with technology impact frame shifting and frame blending. A complementary theoretical perspective could be useful for this purpose. In related research, Wang et al. (2022) drew on theory of embodied cognition for highlighting the role of corporeal experience of interacting with physical and digital technologies in meaning-making where new meanings were “progressively extended” throughout the development of digital products (G. Wang et al., 2022). Another option can be to take a sociomaterial approach for unpacking the distinct temporal orientations of both human and nonhuman participants as well as their entanglement in meaning-making (Venters et al., 2014). A third option can be to theorize the role of technologies as “temporal boundary objects” in meaning-making during digital transformation, which are material objects that “represent time” and can activate discursive interactions in context (Metze, 2017; Yakura, 2002, p. 956).

Finally, some methodological choices of this research had limitations for in depth unpacking of the role of interactions between frame shifting and frame blending. In the thesis, I chose to analyze meaning-making in a few selected innovation labs and digital transformation by tracing the changes surrounding one specific technology over a limited time period. This approach was useful for showing the role and dynamics of frame shifting and frame blending. At the same time, it created more questions about the role of the interactions – or potential lack of interactions in some situations - between frame shifting and frame blending for shaping digital transformation.

For example, the analysis revealed that some frame shifting manifestations never triggered frame blending in the innovation labs. These were scaling relationships (Table 4), explorative innovation, analyzing data, and discouraging engagement (Table 5). At the same time, it is still possible that these were blended outside of the innovation labs. For example, it could have been possible to blend discouraging engagement, since it was enacted in the early developments of “My Forest” in the context of setting rules for distributed digital content generation. Further, one of these “non-blended” shifts was nevertheless enacted in the changes connected to “My Forest” following the innovation labs, namely analyzing data. Additionally, it is possible that these new meanings could have been enacted outside the context of “My Forest”, or that they could be in the future developments of it. One area for future research is, thereby, to pay specific attention to the role of possibly “unblended shifts” and their implications for shaping digital transformation given their inherent “foreignness” (Selander & Jarvenpaa, 2020).

7.5. INSIGHTS FOR PRACTITIONERS

A simplified way to understand meaning-making in practice is to think of it as idea generation. It is helpful for practitioners to be aware of the role of frame shifting and frame blending when engaging in idea generation during digital transformation. Throughout the research with Sydved, I had many conversations with Sydved’s CMO where we discussed challenges of talking about digital ecosystems and digital platforms in terms of balancing *questioning* (the word we used in context for frame shifting) with

anchoring (the CMO's word) when generating, articulating and inspiring engagement for new ideas. Over time, I came to understand "anchoring" with help from theory as frame blending. Awareness of the combination of frame shifting and frame blending is important for both how to arrange, and how to participate, in idea generation during digital transformation.

When arranging activities for idea generation, it is important to create beneficial conditions for both frame shifting and frame blending to manifest. They thrive on interactions between people with different roles, backgrounds, and identities who together explore similarities and differences between new ideas and an organization's past. At Sydved, innovation labs included both people with long-term experience and knowledge of Sydved and its ecosystem, as well as people who brought different perspectives on digital platforms and digital ecosystems from other organizations, industries and sectors - without being colored by preunderstandings of Sydved the same extent. Notably, Sydved's CMO was particularly careful to moderate the discussions so that all participants express their views.

When participating in idea generation, people can actively seek to compare what an organization could do differently in the future with what has been done in the past by an organization – and voice such thoughts. Participants can also pursue balance between questioning established viewpoints with familiarizing new ideas for those who represent the organization in question. Further, there were some people at Sydved who, over time, acquired both Sydved specific understanding and knowledge of digital platforms and ecosystem. This was helpful because these participants could more easily switch between "perspectives" in idea generation as well as distribute the word to create such balance. Consequently, organizations can devote resources for supporting that some participants in idea generation understand both perspectives.

At the core, frame shifting and frame blending rests on the idea that meaning-making in digital transformation is constituted by comparing ideas for what could be new in potential futures that involve digital technologies with what an organization has done in the past. I hope these findings will prove useful for future research as well as for practitioners who experience digital transformation in their work lives.

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