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Roadmapping in the Digital Transformation Literature

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Abstract. Digital transformation is vital for organizations in all sectors, as it changes value creation, customer relationships, and internal processes. A key concern in digital transformations is creating and executing an effective strategy that reimagines the organization. However, structured approaches for reimagination in a digital transformation are still missing. This paper contributes to this concern by reviewing how roadmapping is used in the digital transformation literature. Roadmapping is a flexible technique to support the strategic formulation of short- and long-range changes to software, business, organizational and structural aspects. Reviewing 28 papers on digital transformation, we uncovered five types of roadmapping for reimagining organizations: Product-Technology, Strategy, Business, Data, and Design. For these five types, we unfold the landscape of obstacles, opportunities, and context for different pathways to successfully reimagining organizations in digital transformations.

Keywords: Roadmapping · Process · Digital transformation · Literature review

1 Introduction

Over the years, organizations in nearly all industries have conducted initiatives to explore new digital technologies and exploit their benefits. The exploration and exploitation of software technologies often result in a wide variety of societal changes [44, 50, 55]. This process involves a reimagination of organizations through adopting software technologies, called digital transformation [10]. Digital transformation goes beyond the adaptation of software technologies, instead the transformation is understood as a far more fundamental change affecting all areas of human society [44, 50, 51, 55].

With the promise of multiple benefits, many organizations pursue digital transformation. However, the painful reality is that most transformations are not effective. 70% of complex, large-scale transformation initiatives do not reach their planned goals, which suggests that a radical technological change requires much figuring out [6, 40, 51]. The main concern that resonates in both research and amongst practitioners engaged in technological transformations is creating and executing a successful strategy [60]. However, too few studies explain how the two processes of strategizing and digital transformation interrelate [5, 45]. Existing literature suggests that organizations should embrace

the digital transformation journey as filled with uncertainty, but a strategic approach supporting the journey is needed [1, 10, 38]. Roadmapping, by definition, is a strategic planning framework to navigate and analyze an organization's business environment for potentially disruptive changes. Traditionally called Technology Roadmapping, the approach was used as a management tool for product or technology planning, forecasting and administration [46].

Since roadmapping emerged from industrial practice more than five decades ago, it has been adopted in a range of sectors to address many different strategic goals and organizational contexts [11, 28, 29]. The broad adoption of roadmapping practices emphasizes its flexibility and multi-dimensional reach, suggesting that there is no single roadmap that will be optimal for all organizations [11, 28]. Organizations engage in transformations through digital technologies with different competencies, resources, and cultures, and aim for distinctive goals. What the organizations have in common is the need to plan and determine the way forward for their digital transformation. According to the literature, organizations tend to deploy roadmapping when challenged by complexity, uncertainty, and ambiguity [29].

Multiple forms of roadmapping processes exist (e.g., product-, design- and technology roadmaps), but the application and implementation of roadmapping remain problematic, even more so when roadmapping a technological transformation [1, 10, 27, 38]. Existing literature on digital transformation has also emphasized the importance of roadmapping guiding digital transformation journeys [1, 9, 39, 45]. However, a process specifically for roadmapping digital transformations is yet to be developed [1, 39, 45]. Correspondingly, with this paper, we report an exploration of roadmapping in digital transformation literature to identify different approaches for this reimagination by addressing the research question: *How is roadmapping used for reimagining organizations in digital transformation literature?*

The paper is organized as follows: Sect. 2 presents the theoretical background on digital transformation and roadmapping. Section 3 presents the research approach, including the chosen search strategy, the applied selection process, and the analysis. In the following, the findings of the study are presented (Sect. 4) and discussed (Sect. 5).

2   Theoretical Background

This section presents how transformation through digital technologies is understood in existing literature, taking upon a broader understanding of the phenomenon. Next, the section associates digital transformation with roadmapping to identify how roadmapping can be used for reimagining organizations in the digital transformation literature.

2.1   Digital Transformation

Digital transformation is reshaping the environment in which many well-established industries function [1]. Implementing or adopting a software technology alone does not correspond to technological transformation [51]. Instead, digital transformation is understood as a more fundamental change (i.e., disruptive changes) associated with the application of software technology in all aspects of human society [44, 50, 55]. The

leverage of technology in a specific context necessitates changes in the organizational and societal structure, which opens for innovative ways to create value in this ever-changing environment [3]. While leveraging technologies to create value, businesses deal with additional strategic, technological, and organizational challenges [26]. Thus, society is facing fast, radical, and uncertain changes due to the maturation of software as a mandate for organizations' survival in all industries [1]. Digital transformation literature emphasizes the importance of organizational readiness to address the challenges and changes introduced by such transformation (e.g., resource readiness, technological readiness, cultural readiness, partnership readiness, innovation valance, and strategic readiness) [19, 58]. As digital transformation changes most areas of society [40, 47], the role of software in digital transformation encompasses paradoxes and uncalled-for burdens [56]. Unsurprisingly, many organizations pursuing digital transformation do not reach their goal and consequently miss out on the expected benefits [40, 51, 58]. The inability to reach digitalization goals indicates that while we may have an advanced understanding of specific aspects of digital transformation, the process of the transformation in information systems and software business research or practice is still not well understood [8, 44, 55]. The obstacles to technological transformation is by large the (re-)organization and (re-)structure of existing resources and capabilities to propose new value creation-paths [46].

More recently, organizations have applied roadmapping as a technique with the aim of formulating business strategies for innovation that can address disruptive changes [11]. Thus, roadmapping may provide a strategic approach to digital transformation.

2.2   Roadmapping in Digital Transformation

Initially, technology roadmapping was mostly applied for product and technology planning. However, roadmapping has since been introduced to support other purposes, moving from focused units of analysis, such as product and technological platforms, to the broader context of business units, corporations, and industrial sectors [11]. While the application of roadmapping has changed, the approach's requirements and goals, once focused on tactical and operational planning, have been customized to fit applications aimed at strategic landscaping and planning. These changes involve the customization of roadmapping to different stakeholders, types of information, and roadmap architectures [11, 56]. Thus, roadmapping is a popular and prominent tool in technology management, strategic planning, and innovation [19, 46]. The dominant roadmapping methodology over the last 30 years is structured workshops, where cross-departmental teams of the organization are put together on fast-paced workshop sessions covering market, product, technology, and providing a first-cut product-technology roadmap out of the activity [18].

Roadmapping applications are generally influenced by two main factors: (1) scope (i.e., if it involves one or more organizations) and (2) motivation (i.e., what motivates the approach – strategy exploration or specific actions to reach predefined product-technology objectives [15].

Existing literature (see Table 1) points toward different purposes for roadmapping applications. However, product-technology and strategic planning are frequently mentioned and therefore seem to be the most important ones [24, 28]. Despite being frequently utilized, the difference between roadmapping for product-technology planning and strategic planning remains unclear. While the purposes unfolded in the literature are primarily grounded in their information contents or roadmap architectures, we distinguish between roadmapping based on their purposes for the practitioners. The purpose of roadmapping for product-technology is to provide a plan to support the development of products and technologies accordingly to technological opportunities and existing or emergent market needs. Subsequently, this roadmapping approach often includes analysis of products, technologies, and related markets, as well as defining the technical characteristics and goals to be achieved following a timeline.

Contrary to roadmapping for product-technology planning, the purpose for strategic planning is to provide narratives containing directions and choices the organization is expected to pursue in order to achieve its overall strategic aims. The analysis during this approach extends the boundaries considered in product-technology planning and includes any dimensions related to business success and strategic alignment across different organizations [11, 22].

Since product-technology and strategic roadmapping was introduced, multiple subtypes (e.g., business model, data-driven, and design-driven) have emerged (see Table 1), emphasizing how roadmapping is inherently flexible [11, 28].

Due to technological progress or competitive changes, the need to develop and adapt an organization's business model has become an important task for many. The challenge organizations face is the (re-)organization and (re-)structure of existing resources and capabilities in order to propose new value creation for the customer. To address volatile markets and to remain competitive, business model innovation roadmapping is a suggested solution [46].

Another acknowledged approach to remaining competitive is by leveraging data. To effectively incorporate data science into their business processes, literature emphasizes data-driven roadmapping as a solution [26, 43], which is necessary when transforming in uncertain market environments [1, 11].

While technology is rapidly changing, customers are no longer just seeking products and services but experiences. Traditional approaches (i.e., product-technology and strategic) are no longer sufficient [30, 31]. Accordingly, design-driven roadmapping approaches grounded in creating customer experiences have emerged (see Table 1), as increased customer focus is a requirement for survival [30, 31].

Overall, reimagining a digital transformation may entail five roadmapping frameworks: product-technology, strategy, business, data, and design (see Table 1). The main aspects these roadmapping frameworks address are described in Table 1. These frameworks form the theoretical foundation for our analysis of digital transformation literature.

The existing literature covers several aspects of roadmapping, such as methods and best practices or challenges related with this technique. However, to the best of our knowledge, research specifically targeting digital transformation strategy formulation is still scattered [1]. Exceptions to this are studies conducted by [1, 11, 26, 41, 46], who

Table 1. Overview of roadmapping frameworks identified in digital transformation literature

Roadmapping framework	Exemplars references	Main aspect of digital transformation
Product-Technology	[24, 25, 27, 38, 41, 52]	An approach to support alignment between product and technology planning in an environment with continuous maturation of digital technologies
Strategy	[11, 16, 29, 36]	An approach to support strategic plans, actions, and alignment across different contexts and organizations in an environment with increased collaboration
Business	[15, 22, 46]	An approach to changing business models to support new value-creation paths as a mandate for survival
Data	[20, 26, 32, 43]	An approach to support exploitation of data for competitive advantage in an environment with increasing volume, heterogeneity, and speed of data
Design	[1, 30, 31, 42]	An approach to support changing customer perspectives, needs and wants

address roadmapping associated with aspects of digital transformation (see Table 1). We will review digital transformation literature to improve our understanding of how roadmapping is used to reimagine organizations.

3 Research Approach

We investigated the digital transformation literature following the guidelines by Templier and Paré [53] to increase the quality and trustworthiness of the review with transparency. The notion of transparency ensures consideration of whether the search strategy aligns with the research question and allows readers to judge if the methods used and decisions made were appropriate. The guidelines cover three major phases, once a research question is established, (1) search the literature, (2) select the papers, and (3) analyze and synthesize the papers and interpret the findings [53]. The point of departure is in the research question regarding how roadmapping processes are used for reimagining organizations in digital transformation literature (see Fig. 1).

We searched the digital library, Scopus, using the search terms roadmapping or roadmaps and digitalization or digitalisation or digital transformation. Since we have a specific interest in roadmapping, we narrowed down the search to this term, thus not including connotations e.g., strategy, guideline, planning, as these differ from roadmapping. The search was performed the 20th of June 2022. As digital transformation is a contemporary topic, the search is restricted to the timespan 2015-Present. While digital transformation has evolved, it was after 2014 that research on digital transformation increased significantly [44]. The literature search resulted in a total of 229 papers. These
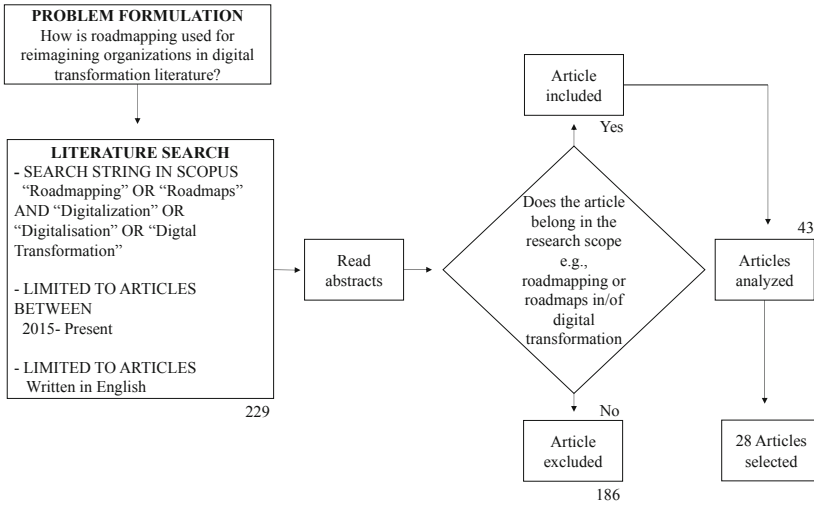
Fig. 1. Workflow of the literature review process.

were screened for inclusion using a deductive approach based on the five identified roadmapping frameworks (see Table 1). The inclusion criteria are that a paper must refer to roadmapping a digital transformation, it must be a full paper, and it must relate to the multiple changes introduced through digital transformation (e.g., software, collaboration, innovation, re-structuring of organizations etc.). The screening process identified several papers not reporting roadmapping associated with digital transformation, leaving us with 43 papers. These were the reviewed and full text examined papers. This review led to the further exclusion of 15 papers, leaving us with the final set of 28 papers (see Table 3 in Appendix).

The following phase was to inductively analyze the 28 papers to identify how roadmapping is used for reimagining organizations in digital transformations. We employed qualitative content analysis [23] to understand how roadmapping is used in digital transformation literature. Qualitative content analysis is appropriate when the purpose is to identify themes across various texts. Our content analysis entailed an examination of the selected articles to identify patterns and distinct themes of roadmapping in the selected digital transformation literature. Correspondingly themes were identified through repeat reading and conceptualized grounded in the literature, and highly based on the research question (see Sect. 1). We started by categorising the selected literature i.e., into their relations to the identified five roadmapping frameworks, so it could be managed better. From there we progressed to coding, here our main focus was the frequency a potential code occurred and the direction in which the content appeared in e.g., opposite, positive or negative. Thus, themes were developed in an highly interative process from the coding and in discussion amongst the authors. However, the analysis of the selected literature was conducted with a limited perspective, as we did not look beyond the five roadmapping frameworks to ensure understanding [23]. The results we present in the following section unfold how the five roadmapping frameworks and roadmapping in digital transformation literature intersect.

4 Findings

To answer the research question, we identified distinct themes of roadmapping approaches (i.e., obstacles, opportunities, and context) in the digital transformation literature (see Table 2). With no specific roadmapping approach for digital transformation, we unfold several roadmapping approaches which address different aspects and obstacles of digital transformation in the literature.

Table 2. Overview of roadmapping themes in digital transformation literature

Roadmapping framework	Obstacles	Opportunities	Context
Product-Technology An approach to support alignment between product and technology planning in an environment with continuous maturation of digital technologies Phaal et al. [41]	[4, 19, 37, 44, 55, 58]	[12, 17, 19, 36, 37, 49, 55]	[2, 4, 9, 12, 21, 34, 40, 44, 58]
Strategy An approach to support strategic plans, actions, and alignment across different contexts and organizations in an environment with increased collaboration de Oliveira et al. [11]	[2, 5, 9, 21, 34, 35, 37, 40, 45, 49, 51, 55, 59, 60]	[5, 19, 40, 45, 49]	[9, 35, 40, 45, 54, 60]
Business An approach to changing business models to support new value-creation paths as a mandate for survival Schaller et al. [46]	[14]	[2, 7, 33, 48, 49, 58]	[4, 21, 34, 44, 55]
Data An approach to support exploitation of data for competitive advantage in an environment with increasing volume, heterogeneity, and speed of data Kayabay et al. [26]	[4, 43]	[20, 43, 45, 48]	
Design An approach to support changing customer perspectives, needs and wants Kim et al. [30]	[37]	[4, 5, 49, 59]	[4, 58, 59]

Table 2 provides an overview of how existing research grounds its focus. Based on the table, we argue that existing digital transformation research predominantly focus on obstacles and opportunities related to product-technology and strategy roadmapping. Consequently, research in digital transformation literature related to business, design and especially data roadmapping are scarce. Because of this, we cannot establish whether

data has less obstacles or context, as it is at the current time, a matter of less research within this roadmapping framework.

4.1 Obstacles

According to the literature, organizations might face various obstacles when reimagining their future during digital transformations. These obstacles during technological transformations stem from improper strategy formulation or implementation [9, 34, 35, 37, 49]. This literature emphasizes how digital transformation strategies seek to coordinate and prioritize the many independent threads of digital transformation [9, 37, 45, 60]. Yet, the strategy for reimagining organizations for digital transformation is predominantly limited to specific domains of the transformation (e.g., use of software, value creation, innovation, business). While committing to one domain for reimagination might pay off [49], it is mostly discouraged [5, 37]. There is a tendency to employ IT strategies for reimagination focused on managing the IT infrastructure within an organization, with a relatively limited impact on driving innovations in business development. This restricts the product-centric and customer-centric opportunities that arise from new digital technologies, which often cross organizational borders.

IT strategies present system-centric roadmaps to the future use of technologies in an organization, but they do not necessarily account for the transformation of products, processes, and structural aspects that go along with the integration of technologies [21, 37, 59]. While digital technologies need to become central to how organizations operate, technologies nor software should be the organizations' only solutions to reimagining themselves [5, 45, 58]. Accordingly, obtaining a close fit between digital transformation strategies, business software strategies, and all other organizational and functional strategies is critical [21, 37, 55, 59]. Such an aligned strategy might help overcome the significant obstacles of outlining *what* the target of the strategy is [14], *how* this target is reached [21, 37, 59], in addition to *how* new technology and data is embedded into existing products and services to obtain new value creation [4, 5].

Digital transformations drive increased collaboration among organizations. Inter-organizational digitalization efforts represent dynamic, oftentimes random combinations of actors with various goals and motives that do not necessarily align with an organization's actual interests [59]. Yet the literature does not offer guidance on facilitating inter-organizational digitalization efforts that aim to realize benefits beyond single organizations [2, 34]. This obstacle to reimagination is exacerbated by uncertain activities in collaborative transformation efforts in practice.

A strategy may be critical for mapping organizations' transformation, but its success depends less on strategic inspiration than on addressing the internal obstacles to digital transformations [9, 35, 40]. These internal obstacles are related to the specific organizations undergoing a transformation, typically divided into inertia (i.e., absence of resources and capabilities) and resistance to change, often caused by a lack of visibility of the potential benefits of new software [4, 19, 43, 55, 58].

Despite various efforts to guide digital transformation, there are many recent examples of organizations unable to keep pace with the new digital reality [5, 44, 51, 58]. This inability to keep up shows that the obstacles organizations face when reimagining themselves in digital transformations continue to pose a great challenge.

4.2 Opportunities

Potential opportunities of transforming using digital technology are manifold and include areas of strategy, business, data, product/technology, and design. To increase the chances of pursuing the multiple opportunities that come with digital transformations, organizations should formulate and implement strategies that go beyond IT strategies. An approach to such alignment is emphasized by [5, 36, 37, 58], who argues that organizations should balance four dimensions: (1) use of technologies, (2) changes in value creation, (3) structural changes, and (4) financial aspects, in addition to, (5) customers, (6) competition, (7) data and innovation [19]. The realization of organizational goals and objectives requires a strategizing process enacted in between IT and business strategies [5, 7]. This process results in a shared understanding across the organization that simultaneously guides the IT investment and decision-making [55].

Organizations must address changing customer demands to remain relevant by utilizing the opportunities new software brings [59]. To do so, two strategies are emphasized: customer engagement and digitized solutions strategy [49, 59]. A customer engagement strategy relies on analytics applied to a growing repository of customer data, to better understand and respond to changing customer demands [49]. Leveraging analytics provides an opportunity to build better customer experiences, which results in competitive advantage [49, 55]. While a customer engagement strategy provides an opportunity to respond to changing customer needs, a digital solutions strategy provides an opportunity to anticipate customer needs. Thus, a digital solutions strategy tries to reimagine what it could do for customers by combining existing competencies with the capabilities offered by new software [49].

The term "*transformation*" means that digital usages integrally enable new types of innovation [17]. Digital innovations induce significant changes in an organization's products and services, business processes, or business models, which can only manifest if organizations are adequately prepared. To yield the competitive opportunities of digital innovations, organizations must prepare their information systems landscapes to accommodate digital innovations [59]. To do so, the digital transformation literature point to various enablers, which allows software or services to be used for the reimagination of organizations: (1) enabling organizational IT to accommodate digital innovations, (2) enabling organizational structures to enable digital innovations, (3) enabling organizational culture to accommodate digital innovations and (4) enabling organizational capabilities [59], in addition to (5) digital data to improve prediction and decision, (6) automatization, (7) digital customer access and (8) networking) [48].

Digital transformation brings increased market opportunity. The implementation of digital transformations is achievable by deploying technologies such as the IoT, AI, and big data [19, 45]. Organizations with effective transformations deploy more technologies than others [12], which might seem counterintuitive, given that a broader suite of technologies could result in more complex execution of transformation initiatives and more opportunities to fail. Consequently, having these technologies on hand is only one part of the story. To gain the multiple opportunities that come with new software, organizations should make the technology-supported changes that differentiate successful digital transformations from the rest [12, 40]. Adding technology does not automatically confer expected benefits; these benefits must be unlocked, which can only happen

through organizational changes [2, 40]. To do so, a benefits dependency tool to identify and map all required changes is presented, so expected benefits and outcomes are delivered. Additionally, it clarifies how this change is supported and shaped by technologies [40].

Data and information are already considered commodities, meaning that organizations need to upgrade their information and digital ecosystems to acquire knowledge and wisdom, to get a competitive advantage [20, 43, 45]. Thus, the main objectives of digital transformations are obtaining new data and using this data to reimagine old processes [4]. Turning attention towards a more data-oriented approach allows for the opportunity to gain new knowledge and in turn, reimagine business models and operations [48]. Such opportunities for reimagination can be pursued by initiating five different phases (i.e., (1) digital reality, (2) digital ambition, (3) digital potential, (4) digital fit, and (5) digital implementation) [33, 48].

4.3   Context

Digital technologies alone provide little value when reimagining an organization. Their use within a specific context enables an organization to uncover new ways to reimagine itself [9, 44, 55, 60]. Accordingly, approaches to transformations are often very specialized and restricted to the reality and context of the specific organization and its activities [21, 60].

Digital transformations in a technological and software context are often viewed in terms of their impacts on markets, products, and services [12, 21, 49, 58]. However, to ensure the digital transformation initiative has momentum, the transformation of organizations needs to be considered in not only the context of technology but also business changes [2, 40] and the necessary customer orientation [58, 59]. The literature stresses how business changes should be made considering three domains (i.e., finance, marketing, and innovation management) [4, 21]. Digital transformation in the context of business may have an internal perspective (i.e., a resource-based view) and an external perspective (i.e., one of structural change) on the way value is or can be created as a result [34]. The exploration of dynamic capabilities in the digital transformation context is of particular interest. Dynamic capabilities are seen as key capabilities, not only in terms of being ready for transformation through the use of technology but also able to exploit its potential [34].

When reimagining an organization for digital transformation in the context of strategy, two circumstances should be fully understood: (1) where a specific organization want to end up, by gaining an understanding of the internal and external environment, the culture, the capabilities, and beliefs, (2) how digital tools come to be used widely and effectively so that they can create an environment that provides optimal conditions [35, 45, 54].

Overall, our review shows the most common objective for reimagining organizations in digital transformation literature relates to product-technology, strategy, and business. Thus, digital transformation literature on roadmapping is centered on typical strategy issues. Less than half of the selected papers includes roadmapping concerned with design and data, consequently providing limited views on the opportunities and existential obstacles of design and data. Additionally, what goes across the literature, is the call for

a strategy approach, specifically targeting a multidimensional-oriented vision of digital transformation, which oversteps the restrictive technological view. However, such a strategic approach is still at its early stage. Lastly, our findings include the multiple contexts in which digital transformation must be viewed to uncover new ways of reimagining organizations.

5   Discussion

This study aims to advance knowledge on how roadmapping is used for reimagining organizations in the digital transformation literature. Taking a point of departure in five roadmapping frameworks (see Table 1), our analysis of 28 papers identified three main themes: (1) obstacles, (2) opportunities, and (3) context (see Table 2) in roadmapping approaches for digital transformation. Accordingly, we uncovered how roadmapping is used for reimagining organizations during digital transformations (cf. Table 2 and Sects. 4.1–4.3). Most importantly, connecting these two different research streams is notably different from what is commonly known and focused on in the digital transformation literature.

Our review expands on the existing digital transformation literature by explaining how roadmapping is used to reimagining organizations in digital transformation. To the best of our knowledge, the existing literature has not explicitly related roadmapping to digital transformation literature. The exception being one study conducted by Zaoui and Souissi [60]. The result of their study is an overview of the most significant phases of digital transformation as suggested by literature and emphasizes the need for a multidimensional approach to such transformation. Roadmapping, can offer such approach. Our research extends their findings by relating the two research streams i.e., transformation and roadmapping, thereby unfolding a new landscape of different pathways to digital transformation. What goes across digital transformation literature is that in the digital age, organizations should consider changes to the five domains of digital transformation, which are related to customers, competition, data, innovation, and value [19, 55]. Yet, the most studied dimension in existing research is constrained to software technology [19]. We do not reject the relevance of technology for targeting digital transformation. However, the attention given to technology comes across as conflicting with the understanding that digital transformation goes beyond the adaptation of technologies [4, 44, 51, 55]. Digital transformations typically require fundamental organizational, structural, cultural, and technological changes [5, 19, 44, 51, 55, 60]. Correspondingly, digital transformation literature emphasizes that a key concern in digital transformations is creating and executing an effective strategy that reimagines the organization [60]. To address this concern, most digital transformation literature tries to identify strategies or steps for designing and implementing digital transformation [17, 60]. However, the ongoing acceleration of digital technologies in today's software-enabled environment introduces opportunities and obstacles for organizations to continuously chase digital transformations to survive and compete [1, 5].

Digital transformation is taking much longer and facing more difficulties than expected [5, 44], and many organizations have been unable to keep pace with the new digital reality [5, 6, 40, 44, 51]. This inability to keep up suggests that despite efforts

to address a strategy for digital transformation, organizations lack specific guidelines for formulating, implementing, and evaluating digital transformation strategies [5, 45]. These gaps in our understanding require additional research. While we have an advanced understanding of specific aspects of digital transformation [55], we still know very little about creating multi-dimensional reimaginations of organizations in digital transformations. Roadmapping, by definition, is such a strategic planning and forecasting framework to navigate and analyze an organization's business environment for potentially disruptive changes. However, software engineering innovations might emerge at any time and are almost impossible to predict [13]. Relating roadmapping to digital transformation, we provide software-enabled organizations a new landscape for technology innovation, new business models, and cross-industry collaboration.

In conclusion, our study expands existing literature by relating roadmapping to the digital transformation literature. This literature study provides a landscape of how roadmapping is used to reimagine organizations during digital transformations. While digital transformation has evolved over time, this literature review unfolds how the call for a strategic approach, specifically targeting a multidimensional-oriented vision of digital transformation should be recognized as one of the main challenges in digital transformations.

We acknowledge that our study is not without limitations, the most important of which we summarize as follows. First, applying restrictions, i.e., concerning the publication language and timespan, to our search strategy poses a threat to generalizability since some studies of interest may not have been captured. Additionally, the search string itself has a limitation, as some papers may deal with the research topic but use terms that were not covered by the selected search strings. To address this limitation we recommend future researchers to include connotations of roadmapping to strengthen the theoretical framework (Table 1) and to open up for any new emerging roadmapping frameworks. Second, with content analysis, challenges of achieving validity and reliability arise. While our analysis is not necessarily replicable the notion of transparency allows readers to judge if the methods used and decisions made were appropriate.

To further this research, we recommend two directions for future research. First, we recommend more elaborate theorizing of a roadmapping approach targeting digital transformation with empirical insights from case studies and surveys. Second, future research should further explore the nature and implications of roadmapping used for reimagining organizations in digital transformations in practice through action research and design science research.

Appendix

Table 3. Each table cell contains the reference to the paper and its respective authors

Overview of selected literature for analysis		
[2] Askedal et al.	[20] Han and Geum	[44] Reis et al.
[4] Bordeleau et al.	[21] Hausberg et al.	[45] Ribeiro
[6] Brown and Brown	[33] Krey	[48] Schallmo et al.
[7] Bughin et al.	[34] Kraus et al.	[49] Sebastian et al.
[9] Chanias et al.	[35] Leonardi	[51] Tabrizi et al.
[12] de la Boutetiére	[36] Letaba & Pretorious	[54] Tongskulroongruang & Chutima
[14] Egor	[37] Matt et al.	[55] Vial
[17] Gebayew et al.	[40] Peppard	[58] Westerman & Davenport
[19] Hajishirizi et al.	[43] Pora et al.	[59] Wiesböck & Hess
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