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► **To cite this version:**

Martin van Den Berg, Klaas Brongers. The Business Ecosystem Perspective in Digital Strategies. 23th Working Conference on Virtual Enterprises (PRO-VE), Sep 2022, Lisbon, Portugal. pp.127-140, 10.1007/978-3-031-14844-6_11 . hal-04641996

HAL Id: hal-04641996

<https://inria.hal.science/hal-04641996v1>

Submitted on 9 Jul 2024

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The Business Ecosystem Perspective in Digital Strategies

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Abstract. According to literature, digital transformation requires an organization to develop a broad, holistic, and business ecosystem perspective on how digital technologies can be used to rethink and improve business models, products, services, and processes. The objective of this research is to empirically explore the claim that the business ecosystem perspective is one of the dominant views in organizations' digital transformation initiatives and more specifically in the digital strategy. We studied seven organizations in the Netherlands through semi-structured interviews and digital strategy documents. These organizations are aware of developments in their business ecosystem. However, their plans, as outlined in their digital strategies, mainly focus on improving internal operations. We also found that collaboration enablers are partially present in digital strategies. Digital strategies and subsequent digital transformations are mainly internally focused. We argue that collaborative business models must be developed at the business ecosystem level rather than at the individual organizational level.

Keywords: Digital strategy, Digital transformation, Business ecosystem, Enablers for collaboration, Collaborative networks.

1 Introduction

Digital transformation (DT) is a phenomenon that occupies many organizations and scientists. A systematic literature review demonstrates that the number of publications on DT steadily increased from 2000 to 2018 [1]. The worldwide spending on DT technologies and services in 2022 is projected on USD 1.8 trillion and is expected to increase to USD 2.8 trillion by 2025 [2]. A DT can lead to a significant transformation of an organization or an entire industry [3]. To be successful, a DT must be viewed in a broad, holistic, and organization-transcending perspective [4,5]. Components, systems, value chains, products, and processes of different organizations become more and more connected [6]. One of the terms that is being used to indicate the interconnectedness of organizations is business ecosystem [7]. While we endorse the importance of this ecosystem, we question the claim that the business ecosystem perspective is one of the dominant views in organizations' DT initiatives. If an organization wants to include the business ecosystem perspective in its DT, the digital strategy (DS) should be the first place to address that perspective. A DS can be seen as

the roadmap for a DT [8]. With this empirical study we want to explore the extent to which organizations incorporate the business ecosystem perspective in their DS. Empirical research of digital business ecosystems is needed to validate models and frameworks [9]. We consider our study as an empirical examination of the DS as one of the most prominent places to highlight the role and importance of the business ecosystem perspective.

Our main research question is: *to what extent is the business ecosystem perspective present in digital strategies of organizations?*

This paper is structured as follows: In Section 2 we present related work. The research method is explained in Section 3. In Section 4 we present the results, which are discussed in Section 5. Section 5 also describes the limitations. In Section 6 we summarize the conclusion.

2 Related Work

Our research focuses on investigating the business ecosystem perspective in DTs. But what is a DT? A DT is completely different from just changing the organizational structure or conducting experiments [4], [10]. Hartl defines a DT as the IT-enabled change in organizations through digitalization of products, services, core processes, customer touch points, and business models [11]. Such a DT has a disruptive effect on organizations. They must rethink their business models, organize the financing of their activities differently, look for new collaboration partners, increase the digital literacy of their employees, and bring about different culture values [11]. To be successful, the general opinion is that a DT must be viewed in a broad, holistic, and organization-transcending perspective [4,5]. Organizations these days strive for collaborative advantage. According to Roobeek et al. this requires diversity and agility, transparent collaboration in flexible networks, optimal use of competencies in the network, more opportunities to show leadership and entrepreneurship, and more contact with the outside world [12]. This organization-transcending perspective is indicated through terms like business ecosystem, extended enterprise, and collaborative networks [6]. In this research, we will use the term business ecosystem as defined by Peltoniemi and Vuori [7]. They defined a business ecosystem as "a dynamic structure which consists of an interconnected population of organizations".

An important component of a DT is the DS [3]. This strategy functions as a kind of roadmap for the DT and "considers how digital technology can completely reshape the company's relationships—with customers, with employees, with the market as a whole—to create a digital edge, where digital information and physical resources combine in new ways to create value and revenue" [8]. Ideally, a DS should be part of the organizational strategy [13]. Gupta even argues that the DS should not be a separate strategy, but the leading strategy of an organization [10]. This study's focus is on the business ecosystem perspective in the DS as an important step in a DT.

Collaboration in business ecosystems can be enabled in different ways. In this research we used five enablers: 1) culture of collaboration, 2) governance for collaboration, 3) data centricity, 4) speed and boldness, and 5) digital literacy. The first three enablers are essential prerequisites for collaboration. Speed and boldness, and

digital literacy are important enablers for DTs, and therefore also for collaboration in business ecosystems. We discuss the enablers one by one.

By a culture of collaboration, we mean a culture in which organizational silos are broken down and data sharing is self-evident. Organizational silos impact business performance and create an inward, rather than an outward, focus [14,15,16]. A culture of collaboration is a prerequisite for collaboration in a business ecosystem [12].

Secondly, a certain form of governance for collaboration is required with a shift from a control orientation to a collaboration orientation [6]. Organizations often consist of silos. The step that needs to be taken is one towards organizations as collaborative networks. Gray calls this the connected company [17]. An organization that is also characterized as a holarchy or holocracy in which decision-making is pushed to the lowest viable organizational level [4], [17]. An agile way of working is a way to achieve this [4].

In a data-centric architecture data are separated from the application, become the central asset, and move into a network known as a data collaboration platform or data fabric. These platforms allow data to exist as a network, and this networked approach means that data can be shared and reused across various applications without making copies [18,19]. With data centrality, data copies and integration efforts can be reduced or even eliminated. As a result, collaboration and integration in business ecosystems becomes much easier [19].

DTs also require speed and boldness. Ross et al. distinguish between the operational backbone and the digital platform as two important building blocks that help companies succeed digitally. The operational backbone is "a coherent set of standardized, integrated systems, processes, and data supporting a company's core operations" [4]. The digital platform is defined as a "repository of business, data, and infrastructure components used to rapidly configure digital offerings" [4]. Bossert also distinguishes between a "fast-speed, customer-centric front end and a slow-speed, transaction-focused legacy back end" [20]. The words "rapidly" and "fast-speed" indicate that speed is required. And speed requires agility [4], [20]. Agility can be increased by delegating decision-making and working in an agile fashion. Next to speed, a certain boldness is required. Blackburn et al. demonstrate that a bold approach, in which new technology is used on a larger scale, pays off [21]. Organizations that apply this bold approach grow faster than organizations that work carefully and step by step. The time of cautious experimentation in a remote corner of the organization is over.

Finally, employees of organizations need a certain level of digital literacy. Employees should be encouraged and facilitated in learning and improving their digital skills. This requires actions such as increasing the digital knowledge and skills of employees and establishing DT leadership [22]. Data centrality is only successful if employees embrace it or, better yet, take the lead. Digital literacy is thus a precondition for data centrality. Martin defined digital literacy as "awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process" [23].

3 Research Design

Our research follows a qualitative research design and more specifically, an inductive approach in which we study organizations to collect observations as the basis for theories [24]. In line with Morsch, we prefer this approach over a deductive approach, such as how to improve strategy development to incorporate the business ecosystem perspective [25].

To collect observations, we found seven organizations in the Netherlands through our network of the Royal Dutch Computer Association (KNVI), two private and five public, who shared their DS with us. Table 1 contains an overview of the organizations and the interviewees.

We used semi-structured interviews and studied DS documents from the participating organizations. The interviews were held from February to June 2021 with the person responsible for the DT. Each interview was conducted by two researchers and resulted in a report that was supplemented and approved by the interviewee.

The combination of interviews and documents acted as a form of triangulation that allowed us to gather evidence and explanations for the presence of the business ecosystem perspective in the DSs.¹

Table 1. Organizations and interviewees included in this study.

	Industry	Type	Employees	Interviewee
O1	Healthcare	Public	17,000	IT Director
O2	Insurance	Private	600	CTO
O3	Pensions	Private	1,500	CIO
O4	IT services	Public	170	Director
O5	Hospital	Public	5,500	Head of business intelligence (BI)
O6	Municipality	Public	17,000	CIO
O7	University	Public	4,000	CIO

We wanted to discover to what extent the business ecosystem perspective is present in the DSs of these seven organizations, not primarily by asking for that perspective, but by discussing components of a DS in which that perspective may occur, such as drivers, vision, business model, and operating model.

Furthermore, we discussed five enablers for participating in business ecosystems. These enablers, which we discussed in Section 2, are culture of collaboration, governance for collaboration, data centricity, speed and boldness, and digital literacy.

We based the analysis of interview reports and documents on the components of a DS such as drivers, vision, business model, and operating model. These components acted as a-priori themes for analysis purposes to finally determine the presence of the business ecosystem perspective in DSs [26]. The results of this analysis are discussed in Section 4.1. Furthermore, we collected evidence from the interview reports and documents to determine the extent to which the enablers for collaboration are present in the DSs. The results of this analysis are discussed in Section 4.2.

¹ Access to the raw material and analysis can be requested from the first author

4 Results

First, we discuss the main characteristics of the DSs of the seven Dutch organizations, including the business ecosystem perspective. Second, we compare the enablers for collaboration one by one across the seven organizations.

4.1 Presence of Business Ecosystem Perspective in Digital Strategies

O1 offers different healthcare services to clients such as nursing, care, home care, mental healthcare, and care to people with a mental disability. At the heart of the DS are events in a client's life from birth to death, described from a business ecosystem perspective. These descriptions provide insight in the way O1 aims to collaborate with organizations like healthcare insurers, instances for childcare, instances for mental diseases, and other providers of healthcare services. Part of the DS are so-called focus areas. One of these focus areas is the way collaboration and the exchange of data should be organized. Some services require different healthcare service providers to collaborate. These service providers must have access to the client's data that are needed to deliver the required service. According to O1's IT Director *"The outcomes of our digital strategy must fit within the healthcare system. We are not free to optimize everything as we see fit. Funding is a permanent issue. There is broad awareness that we depend on collaboration in the sector. We can and must collaborate with other institutions to achieve more."* The introduction of technologies like cloud computing, digital workspace, and intelligent diapers require a certain scale. The best way to introduce such technologies is through an industry association and involving executive managers of associated organizations. These managers can ensure that there is support and funding. O1 is an example of an organization that has embedded the business ecosystem perspective in its DS and establishing concrete links to the client's life events.

O2 positions itself as the legal problem solver and offers legal insurance services. O2's strategy is to become a smart insurer. One of the pillars of this strategy is a DT which has an explicit dependence on the pillar new services and business concepts. A certain digital readiness, including infrastructure, is required to be able to realize new models and concepts. An important part of the DT is a solid foundation. In concrete terms, this means a replacement of legacy working methods. The CTO of O2 indicates the objective of O2: *"To create a digital portfolio of products and services with an ecosystem of partners and by using legal tech."* Currently, its challenge is to adequately serve the business by speeding up the time to deliver solutions and by translating customer demand into the most suitable solution. The switch to IT as an enabler must be made with careful attention to the costs. After all, the costs of IT have a direct effect on returns and premium levels. For the longer term, choices are made based on smart services, smart data, and smart culture. Young people do not want to buy traditional insurance services, which means that O2 must offer new types of services. Insurance services are under pressure anyway. Developing new types of services requires high-

quality customer and claims data and a culture that allows O2 to develop and innovate services. O2 is aware that it is part of the criminal justice chain, which is traditional in outlook and has hardly digitized. To sum up, O2 addresses the business ecosystem perspective in its DS. However, this perspective is not yet concrete. The digital readiness of O2 and of the criminal justice chain must be improved first.

O3 provides pension administration services. The Dutch pension sector will soon change over to a new pension system. O3 is preparing for this changing landscape and wants to be at the forefront in terms of customer satisfaction, efficiency, and flexibility. For O3 customers, the new pension system means they need to switch to a new pension scheme by 1 January 2026 at the latest. In terms of strategy, O3 focuses on one sector and no longer on a multi-client approach. O3 also needs to deal with new market entrants that promise a low price per member. The latter aspect has a great impact on O3, which is substantially more expensive than new entrants. The strategy is then translated into financial targets as a dot on the horizon. The collaboration with another pension provider contributes to this. Parties with innovative business models are not yet seen as a threat. A stable IT landscape is a precondition for a DT. O3 achieves this with a cloud-first strategy and by devoting attention to security. According to the O3's CIO, *"The essence of a digital transformation is to find a balance between the business and IT. The role of the CIO is to explain the why, what, and how to all stakeholders. That is a balancing act, also between aspects such as agility, legacy and being in control. Innovation and operations must go hand in hand."* The future of O3 depends on developments in its business ecosystem. It seeks collaboration with another pension administrator and based on its DS it prepares for the new pension system.

O4 is a cooperative that develops IT solutions for providing social benefits. Its IT solutions are used by municipalities. The core system supports the implementation of social benefit laws and income schemes. O4 exchanges data with various organizations in the social benefit domain. O4 is transforming itself from a shared service center to a product supplier. The combination of municipalities acting as both owner and customer used to create tension regarding the provision of services. The outcome of a rethink of its business model is a product vision with a roadmap. According to the director of O4, *"This must lead to a market-compliant organization that must be able to deliver pay per use cloud-based services and enable us to compete with market parties."* The current application silos are transformed into value chains based on operational excellence. Parts of the rethink are divesting the data center, scaling down the organization, and adjusting the governance model. O4 wants to become a learning and scalable organization based on principles of high-performance organizations. The reorganization is a step-by-step process with a reduction of workforce, a focus on internal development capacity, and on both hard and soft skills. The new model offers opportunities for data-driven working and artificial intelligence (AI), such as explainable AI, and proactively approaching citizens with options that they are currently not aware of. In addition, policy effects can be predicted, and data made available to municipalities. O4 is an example of an organization looking to transform and reposition itself in its business ecosystem.

O5 is a hospital with 35 specialisms, and some 580,000 outpatient visits, 40,000 clinical admissions, and 46,000 daily admissions yearly. The hospital strives to provide value driven care in a time of personal and financial scarcity. The DS focuses on 1) the patient experience, 2) ecosystems, 3) the internet-of-things platform, 4) the healthcare information system, and 5) data and analytics. Data and analytics are the core of the DS. The goal of the hospital is to become a data-driven organization that will be able to add value within all hospital processes through insights obtained from data, where data has become a permanent and constant part of the work and is considered of tactical and strategic value. In this way, O5 provides better quality care based on data. According to the head of BI, *"The process information is now correct and 25 care paths and so-called 'patient reported outcome measures' have been elaborated. We are now ready to take the step to medical content data delivery and medical content analysis. This takes shape in a pragmatic way. We support pilots that are well-substantiated. The focus is on the actual usage and demonstrable changes and improvements."* Ambitions can differ greatly per department. The collaboration with external partners, such as providers of medical equipment, requires a focus on data ownership. Health insurers contribute to shaping new business models. Digital skills of employees are initiated through intensive supervision and motivation. There is explicit support from the executive board. The business ecosystem perspective is part of the DS of O5, albeit not the dominant one.

O6 is a municipality that consists of clusters, an administrative and corporate staff, and city districts. The clusters have expertise in a specific area, such as sports, youth, or parking. In the past, the decentralized IT environment consisted of thousands of applications and suffered from continuity problems. At that time, efforts were made to rationalize and consolidate, trimming down to around 1,000 applications and achieving lower costs. For several years now, IT efforts have been concentrated on the task towards reliable digital services. The added value must be recognizable within an extremely political context. Challenges are the accelerated technological developments, the city's tasks, the increased expectations on the part of citizens, an increased risk of cybercrime, and requirements from legislation (such as GDPR). O6 has a strong focus on digital government and digital society, acknowledging that digital is not neutral. There are limitations to the scalability of the infrastructure, limitations in continuity and uniformity, external threats, and the need for digital skills. There is no urgency from a burning platform. This allows a step-by-step approach. The migration to the cloud has started. The data organization is under construction. Deferred maintenance is addressed. Security is a priority. The human side is decisive for successful implementation of the DT. Agile working helps to connect with the line organization. Craftsmanship is the carrier of change. This offers perspective and makes an explicit cultural trajectory superfluous. Some departments work with customer journeys. Cooperation with other cities runs through the so-called common ground initiative of the Association of Netherlands Municipalities. There is awareness that municipalities must each rationalize their own IT landscapes to a minimum and gradually start working together in areas where there are similarities. Collaboration with parties in the business ecosystem, such as municipalities, suppliers, knowledge institutions, and other government bodies, is central to O6.

O7 has an educational model with an international outlook and a multidisciplinary approach: education and research are best organized in teams rather than individually, the notion of diversity and multidisciplinary approaches, and forging links with different stakeholders in the city, the region, Europe, and the rest of the world. A CIO was appointed to bring the position of IT to a strategic level by shaping the DS. The DS focuses on education, research, business operations, and IT. In addition, the DS has three themes: create value, be efficient, and comply and cyber security. The DS touches on three dimensions: people, process, and technology. Updating the DS is now in sync with updating O7's overall strategy. SWOT analyses are used for this purpose. CIOs from other universities are aligned on a common thread and benchmarked. The domain representatives are becoming aware of what digitalization means for them. Everyone now has an opinion and that creates a new dynamic. The customer journeys of the student and the researcher are partly discussed in the DS. The step towards integral support of business operations means a business transformation. The ambition in terms of DT is still modest. Data-driven working and applying AI are in the interest of the research domain. The DS was compared with another university. In terms of content there appeared to be 90% similarity. The CIO points out that "*The content of a digital strategy is not that exciting. The essence is the process of getting the right people together and agreeing on the content of the digital strategy. And that is different in every organization, partly due to cultural differences.*" O7's DS demonstrates business ecosystem awareness. For the time being, the focus is on the transformation of the IT function.

4.2 Presence of Enablers for Collaboration in Digital Strategies

In this section we compare the seven Dutch organizations in terms of the extent to which the enablers for collaboration are present in their DSs. More specifically, we judge the degree of activities already performed and planned on the enablers as part of their DSs. The enablers are judged against an ordinal scale following ISO/IEC 33020 [27]. The basis of this judgment is the evidence we found in the interview reports and DS documents. Table 2 contains the results, which are explained in more detail.

Table 2. The extent to which the enablers for collaboration are present in the digital strategies of organizations. N=Not, P= Partially, L=Largely, F=Full, based on [27].

	O1	O2	O3	O4	O5	O6	O7
Culture of collaboration	P	P	P	L	L	P	P
Governance for collaboration	N	P	P	L	P	P	P
Data centricity	P	N	L	N	L	P	N
Speed and boldness	P	N	P	P	P	N	P
Digital literacy	P	P	P	P	P	P	P

Culture of collaboration. O1 is aware of the need for collaboration. Implementation is still limited. Clients' life events are described from a business ecosystem perspective. O1 has an eye for broad collaboration in the sector. O2 addresses the business ecosystem perspective in its DS based on customer journeys and wants to move towards

a culture of continuous improvement and an agile way of working. These perspectives are not yet concrete. The digital readiness and the criminal justice chain need to be improved first. O3 implemented agile working and BizDevOps. The focus is on the involvement and enthusiasm of employees. O4 moves from silos to value chains, from a government to a market organization. O5 is creating a culture in which agile working, value creation, and data-driven working takes center stage. O6 aspires to achieve coherence, collaboration, and openness. Agile working helps to connect with the line organization. Collaboration with other cities runs through a so-called common ground. O7 organizes collaboration in teams rather than individually with the notion of diversity and multidisciplinary approaches, and forging links with different. O7 wants to implement agile working and DevOps.

Governance for collaboration. O1 still needs to address governance aspects. A DS program director has been appointed. O2 moves towards an agile way of working. Empowerment of product owners has started. O3 implemented agile working and BizDevOps to bring people together. O4 works on a fit-for-purpose organization based on value chains within a market-based governance structure, including a supervisory board. O5 implemented agile working and installed an enterprise information steering committee in which different interests are represented and initiatives are prioritized. O6 pays attention to unambiguous and coordinated management, changes in financial management, connection with line management with responsibilities to product owners, the introduction of agile working and DevOps, and the importance of cooperation. O7 integrates processes and technology that support the whole IT value chain and can facilitate agile working, DevOps, and rapid application development. Close multi-disciplinary collaboration is encouraged.

Data centrality. O1 demonstrates that it is working on this enabler, both within the organization and in the business ecosystem. O1 defined projects on data-driven working, data infrastructure, and data exchange with a standardization committee. O2 sees smart data as a basis for long term choices. Architecture diagrams mainly show an application-centric approach. Change towards a data-centric approach is under preparation. O3 pays a lot of attention to data quality and has a data platform. There are data stewards, a tool for data definitions, and there is a data governance board that anchors ownership of data. A data delivery platform is linked to source systems by which it created a single source of the truth. Algorithms are being used. O4's focus on data is low due to priorities, complexity, and sensitivity. A new set-up of the organization offers future opportunities for data-driven working and AI. O5 has a pragmatic and emerging approach, based on architectural choices and the data-management standard DAMA DMBOK®. Data becomes a fixed part of the work and is of tactical and strategic value. O6 wants to focus on data and AI, including a focus on ethics and privacy. The data organization is under construction. O7 is interested in the research domain for data-driven working and the application of AI. These initiatives are still limited. O7 intends to create a data infrastructure and a data governance with supporting services like data scientists and data stewards.

Speed and boldness. O1 has little shared sense of urgency to work with new technologies. Gradually, it is realizing that the DS is profitable. O1 demonstrates boldness in taking events in a client's life from birth to death at the heart of its DS. O2's customers feel little urgency to digitize. The strategy has been translated into projects that are in progress. Many legacy systems have been replaced by SaaS. O2 wants to take customer journeys as a starting point. O3 shows boldness in preparing for a changing pension landscape and wants to be at the forefront of pension administration in terms of customer satisfaction, efficiency, and flexibility. O4 shows boldness in transforming itself to a market-compliant organization within a few years. External input is used as a leverage. A roadmap supports the step-by-step change. O5 lends shape to innovation in a pragmatic way based on 25 care paths and patient reported outcome measures. It supports pilots that are well-substantiated. The focus is on actual use and demonstrable changes and improvements. Successful boosters serve as an example. O6 has no urgency from a burning platform, which allows a step-by-step approach. The DS is mainly driven by opportunities for improvement. O7 shows boldness in transforming IT to an enabler. Key for the coming years is to build the foundations for future developments in education and research. This is its first step in its initiatives to change from running the university to differentiating the university.

Digital literacy. Digital literacy is on everybody's agenda. O1 pays attention to digital skills. Elaboration is ongoing. Digital skills receive ample attention: how can we make work more fun and do it better. It takes language skills into account because of low literacy among employees. O2 pays attention to digital skills as a part of digital readiness. O3 plotted technological developments in the form of a radar to determine the impact of these developments on the organization regarding competencies, both business and IT, including culture and soft controls. O4 changes to a learning organization based on principles of a high-performance organization. The focus is both on hard and soft skills. O5 improves digital skills by intensive guidance and by motivating. Medical staff is committed and open to new technology. There is explicit support from the executive board. O6 uses craftsmanship as a carrier of the intended change. From the viewpoint of professional content, employees are involved in the development of digital skills. O7 trains people to align their mindset and skillset with the IT organization's manifesto. A coaching managerial style and a T-shaped skillset enable working in multi-disciplinary teams with end-to-end process responsibility.

5 Discussion

The results of this empirical research clearly demonstrate the presence of the business ecosystem perspective in DSs of organizations. However, most of these DSs mainly focus on improving internal operations and the IT operating model. The exemption is O4, which will adopt a different business model. The other six organizations do not have plans to change their business model. DSs and subsequent DTs are mainly internally focused. The business ecosystem perspective is not yet dominant. One of the reasons is that the key business functions of some of these organizations, especially the public organizations, are likely to remain stable over time. O7 will continue to offer

education and research, O1 and O5 healthcare services, and O6 services for its citizens. Related to this is that all organizations, except O4, have a DS that is aligned with, but not an integral part of, its organizational strategy. Another reason is that some of the organizations, such as O2, O6, and O7, first want to improve their IT operations to get a better starting position for external collaboration. In their book "Designed for Digital", Ross et al. argue that most organizations want to fix their operational backbone before they develop digital offerings [4]. A third reason why the business ecosystem perspective is not yet dominant is that when individual organizations develop strategies, their focus is not primarily on the business ecosystem but on themselves. Each organization has its own purpose and business goals. By developing strategies, they want to achieve these goals. Likewise, a business ecosystem should be viewed as an organization and its purpose, business goals, and strategies must be developed considering distinctive features of a business ecosystem such as more complexity, co-evolution, and more emergent outcomes [7], [28]. We thus argue that collaborative business models must be developed at the business ecosystem level rather than at the individual organizational level [6]. Our view is supported by the growing need for data centrality. This is difficult to achieve for an organization alone and requires collaboration at the business ecosystem level as data flows through ecosystems.

Apart from the extent to which the business ecosystem perspective is present in DSs, it is of importance for individual organizations to prepare for collaboration. The five collaboration enablers we examined show that, on average, these are only partially present in DSs. The importance of collaboration is evident for the organizations we surveyed, and they pay attention to creating a culture of collaboration. They are aware of their place in the business ecosystem and acknowledge that changes in their business processes require a multi-disciplinary approach. This is expressed in approaches such as agile working, BizDevOps, and setting up customer journeys and value chains. These approaches have an accelerating effect in bringing people together. Finding and implementing an appropriate governance for collaboration is proving difficult. Organizations are aware that they need to break down silos and move to collaborative networks. To achieve this, they pushed decision-making powers to lower organizational levels with approaches such as agile working. Governance appears to be a learning process. Data centrality is an existential topic, requires long-term commitment and is gaining in importance, as our research shows. Most of the researched organizations follow a gradual path and work out the consequences of data centrality well. Overall, the seven organizations demonstrate some boldness and less speed. They have taken ambitious steps to adopt digital technologies in their DT with the DS as their compass. Working methods have been adapted to this, as evidenced by a choice for agile working and BizDevOps. The benefits of agile working lie more in the multidisciplinary approach than in speed. In addition, the organizations take the time to properly analyze the consequences of choices for digital technologies. Digital literacy is a topic that is addressed by all organizations, albeit partly. All DSs contain activities to improve digital skills. There is broad awareness that changes in the way of working are only successful if employees embrace them or, better yet, take the lead.

This research has its limitations. Although we studied seven organizations, more research is needed to confirm our proposition that collaborative business models must be developed at the business ecosystem level rather than at the individual organizational

level. Furthermore, our sample of seven different organizations may not be fully representative of organizations with DT initiatives and corresponding DSs. The organizations we studied are all based in the Netherlands, and our sample contains more public organizations than private organizations.

6 Conclusion

The organizations we empirically studied are aware of their business ecosystems. However, this research demonstrates that DSs and subsequent DTs of individual organizations are mainly internally focused. Consequently, we argue that collaborative business models must be developed at the business ecosystem level rather than at the individual organizational level.

For researchers, this perspective opens new research avenues. An interesting research question is how collaborative business models can be successfully developed in a business ecosystem. This question is especially interesting for the public sector. Our research shows that organizations in the public sector strongly adhere to the business functions they have been assigned. Who should take the lead in developing collaborative business models in the public sector? Another research question is to which extent the business ecosystem perspective could gain in importance if the digital strategy was a more integral part of the organizational strategy. Our research shows that most digital strategies, although they are aligned with the organizational strategy, they are not yet an integral part of it and are certainly not the leading strategy of the organization. A third research question is what the relationship is between the extent to which the enablers are present in an organizations' DS and the successrate of that organization in collaborating in business ecosystems.

For practitioners, such as DT leads and enterprise architects, this research offers insights in how they could prepare their organizations for collaboration in business ecosystems.

Acknowledgments. We would like to thank Rob Baarda, Frank Brongers, Paul Morsch, Pascal Ravesteijn, Marlies van Steenberg, and Leon Strous for their review comments.

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