Value Creation Beyond a Single Organization - A Conceptualization of Purpose and Collaborative Value Creation in Ecosystems

D I S S E R T A T I O N
of the University of St.Gallen,
School of Management,
Economics, Law, Social Sciences,
International Affairs and Computer Science,
to obtain the title of
Doctor of Philosophy in Management

submitted by

Christian Joachim Betz

from

Germany

Approved on the application of

Prof. Dr. Reinhard Jung

and

Prof. Dr. Christine Legner

Dissertation no. 5210

Difo-Druck GmbH, Untersiemau 2022

The University of St.Gallen, School of Management, Economics, Law, Social Sciences, International Affairs and Computer Science, hereby consents to the printing of the present dissertation, without hereby expressing any opinion on the views herein expressed.

St.Gallen, May 24, 2022

The President:

Prof. Dr. Bernhard Ehrenzeller

Acknowledgements

Four years ago, I embarked on a journey to better understand the phenomenon business ecosystems. In such ecosystems, digital technologies enable numerous interconnections between organizations. Creating products and services becomes more fragmented and distributed across various entities. Thus, success depends on an organization's ability to form and manage relationships with others to mobilize their individual knowledge and resources.

Similarly, this research endeavor and ultimately this dissertation is the result of numerous relationships. It was a privilege to work with so many inspiring and bright minds and I would like to express my gratitude for all conversations, discussions, arguments, questions, or feedback, which came out of these encounters.

I would like to thank my two supervisors Prof. Dr. Reinhard Jung and Prof. Dr. Christine Legner for their supervision and their valuable feedback. I also would like to thank my colleagues, collaborators, and friends for their ideas, advice, and open ears. Thanks for being part of this journey: Christoph Berentzen, Katharina Berner, Sven Biellmann, Jennifer Chang, Christian Dietzmann, Heiko Dosch, Dennis Eberlein, Michael Gasser, Roger Heines, Georg Imboden, Enrico Isceri, David Kauer, Daniel Le, Christoph Meinen, Cedric Moser, Anastasija Nikitin, Christophe Saller, Niklas Schmidt, Dennis Vetterling, Christine Warkentin, Diana Winckler. A special thanks goes to my friends Marc Burkhalter, Tim Klopsch, Ante Plazibat, Daniel Proba, and Katharina Schache for their relentless support. Thanks for believing in me!

Lastly, I would like to thank my family, especially to my father Hans-Erwin Betz, and my mother Jenny Zacharias-Betz. Every word in this dissertation is built on their success as parents, on their values, and on the safe and loving home in which they raised me. Thanks also to my brother Frederik Betz for all the childhood memories and, of course, countless memes.

Zurich, June 2022 Christian Betz

Zusammenfassung

Die rasanten Entwicklungen bei der Nutzung digitaler Technologien und ihre fundamentalen Auswirkungen auf den Aufbau und den Ablauf ganzer Organisationen sowie die Art der Leistungserbringung selbst, führen immer häufiger zu neuartigen Netzwerkstrukturen bestehend aus autonomen, jedoch voneinander abhängigen Akteuren. Diese sogenannten Ökosysteme (Ecosystems) können als eigene Strukturen auf dem Organisationsspektrum verstanden werden, welche Eigenschaften des Marktes sowie von hierarchisch integrierten Unternehmen vereinen.

Um einerseits das Phänomen besser zu verstehen und von anderen Untersuchungsobjekten abgrenzen zu können sowie andererseits, um betriebswirtschaftliche Entscheidungsprozesse zu unterstützen, werden oftmals Modelle herangezogen, welche den Analysefokus auf wesentliche Aspekte des Phänomens lenken und durch ihre Struktur Halt bei deren Diskussion geben. Allerdings zeigt sich bei der Analyse der bestehenden Literatur, dass bestehende Modelle (etwa Porters Value Chain) das Ökosystem Phänomen sowie die spezifische Wertschöpfungslogik, welche sich durch eine nicht-sequenzielle, organisationsübergreifende Systemlogik auszeichnet, nur unzureichend beschreiben.

Die vorliegende Arbeit beschäftigt sich mit diesem Technologie-getriebenen Phänomen und untersucht dabei einerseits den Zweck (Purpose) sowie die spezifische Wertschöpfungslogik dieser Organisationsformen. Basierend auf dem Design-Science Forschungsansatz werden dabei zwei Forschungsartefakte entwickelt, welche sowohl Forschern aus dem Bereich der Wirtschaftsinformatik als auch Praktikern aus unterschiedlichen Industrien dabei unterstützen soll, Ökosysteme zu verstehen, deren Funktionsweise zu beschreiben, und letztendlich die Teilnahme an solchen Ökosystemen zu realisieren.

Summary

The rapid developments in the use of digital technologies and their fundamental impact on the structure and operation of entire organizations as well as the nature of service provision itself are increasingly leading to new types of network structures consisting of autonomous, yet interdependent actors. These so-called ecosystems can be understood as unique structures on the organizational spectrum, which combine characteristics of the market as well as of hierarchically integrated companies.

To better understand the phenomenon and to distinguish it from other objects of investigation, on the one hand, and to support business decision-making processes, on the other hand, models are often used that direct the focus of analysis to essential aspects of the phenomenon and provide support for their discussion through their structure. However, an analysis of existing academic literature shows that existing models (such as Porter's Value Chain) do not adequately describe the ecosystem phenomenon and the specific value creation logic, which is characterized by a non-sequential, inter-organizational system logic.

This work deals with this technology-driven phenomenon and examines the purpose as well as the specific value creation logic of these forms of organizations. Building on the design science research paradigm, two research artifacts are developed to support both researchers in the field of business information systems and practitioners from different industries in understanding ecosystems, describing their functioning, and ultimately realizing participation in such ecosystems.

I Overview of Contents

II Table of Contents

III List of Abbreviations

ADR	Action design research
AIS	Association of information systems
API	Application programming interface
AWS	Amazon web services
BIE	Building, intervention, and evaluation phase
CCE	Competence center ecosystems
CCEW	Competence center ecosystems workshop
DAX	Deutscher Aktienindex (German stock index)
DLT	Distributed ledger technology
DR	Design requirements
DP	Design principles
DSR	Design science research
DSRM	Design science research methodology
EWG	Ecosystems working group
IEEE	Institute of electrical and electronics engineers
MAU	Monthly Active Users
PR	Practical requirements
PTS	PropTech Startup
RBV	Resource-based view
SDK	Software development kit
SDL	Service-dominant logic
TR	Theoretical requirements
VC	Venture Capital

IV List of Figures

V List of Tables

“We are all time travellers [sic] journeying together into the future. But let us work together to make that future a place we want to visit.”

Stephen Hawking (2018, p. 22)

1 Introduction

1.1 Research background and problem statement

This chapter provides the background, motivation, and research problem of this dissertation. It elaborates on the influence of technology on value creation, the emergence of ecosystems, and the resulting change of perspective on value creation. This lays the foundation of the problem statement at hand and, building on this, the research objective and the course of investigation are presented.

1.1.1 The influence of digital technology on value creation

In "The Nature of Technology", in which Arthur (2009) describes the process of technological evolution in the context of society, he provides three basic definitions of what technology is: a) "technology is a means to fulfill a human purpose", b) "technology is an assemblage of practices and components", and c) "technology is the entire collection of devices and engineering practices available to a culture" (p. 28). These definitions encompass a very general idea of technology, namely processes, methods, and devices that are used to fulfill a purpose. In a similar way, organizations perform a variety of different activities using configurations of different technologies with the ultimate goal of creating value[1] for their customers (Porter, 1985, p. xv).

Over the last decades, technologies in the realm of information and knowledge had a significant influence on value creation (Powell & Snellman, 2004, p. 199). On the one hand, this comprises the production process in which information and communication technology (ICT) is used to enhance the value creation process, for example by supporting single functions, supporting functional areas, the design of integrated information-based processes across functions, integrating

[1] Value can be conceived of as use value (qualities of the product perceived by the customer in relation to their needs) and exchange value (monetary amount described by price) (Bowman & Ambrosini, 2000, pp. 2–3).

suppliers or customers to these processes, and ultimately to form complex network structures along the whole process of value creation (Oesterle et al., 2000, p. 4). On the other hand, information is increasingly becoming a part of the product itself, for example through embedded sensors, processors, and software, which in turn creates new possibilities for adding value (Porter & Heppelmann, 2014, p. 67). Data, information, and knowledge form an increasingly integral cornerstone of value creation in society, and as a result, researchers indicate that humanity has entered a new paradigm of economic activity: the *knowledge economy* (Powell & Snellman, 2004, p. 201).

Digitization and digitalization represent the fundamental cornerstones of this development. Digitization describes the representation of data in a digital form (technical perspective), therefore decoupling information from its physical carrier, while digitalization describes the broader application and resulting effects of the underlying technologies in an individual, organizational, or societal context (Alt, 2018, p. 399; Legner et al., 2017, p. 301). The wide application of digital technologies (i.e., internet technologies, analytical technologies, or mobile technologies (Henriette et al., 2016, p. 3)), is accelerated by continuously decreasing costs of data exchange (transaction costs) and costs of computation (marginal cost of processing) (Proba, 2021, pp. 2–3). This in turn creates various novel possibilities for organizations and individuals to develop new ways of interaction and create additional value.

According to Burkhalter (2019, pp. 2–10), digital technologies[2] influence value creation in two distinct ways. The first way involves the decoupling of information from its carrier which leads to changes in the organizing logic and innovation (Yoo et al., 2010, p. 725). Building on the St. Galler Business Innovation Model (Uebernickel et al., 2016, p. 4), such changes in organizational logic and innovation can be derived from three sources: process innovation, product and service innovation, and

[2] Digital technologies differ from other technologies in three characteristics: goods become re-programmable, data is homogenized, and goods obtain a self-referential character. For a detailed explanation, refer to Burkhalter (2019, pp. 6–8).

business model innovation. Process innovation occurs when novel means of how the organization operates to create value are designed and implemented (Swanson, 1994, p. 1706). Product and service innovation occurs, when components are being recombined to form new configurations (Normann & Ramirez, 1993, p. 66; Yoo et al., 2010, p. 725) whereas business model innovation occurs when existing business models are adapted or new business models are designed to realize additional value from a given product or service (Chesbrough, 2010, p. 355). The second way in which digital technologies influence value creation involves the use of information as a resource and the resulting positive feedback loops (Burkhalter, 2019, p. 8). Value creation based on information as a resource reveals three fundamental characteristics (Burkhalter, 2019, pp. 6–8). Firstly, it is a positive-sum game, meaning that sharing information increases the available information without a single party losing it. Secondly, it involves a superlinear growth of information due to information's quasi-infinite nature. Thirdly, the value of information increases the more it is used. As a result, this promotes the sharing of information and the creation of positive feedback loops to enhance products or services.

The combination of decreasing costs in the context of digitalization (transaction costs and marginal processing costs) and the influence of digital technologies on value creation (decoupling of information from physical assets and the nature of information as a resource in the context of process and product innovation) promotes the formation of network structures. Similar to the division of labor, described by Smith (1776, p. 17), individual actors form systems in which they contribute specific components towards an overarching purpose. Thus, these actors with their specialized form recursive, purposed systems (systems consisting of sub-systems) in the context of Arthur's definition[3] of technology (Arthur, 2009, pp. 28, 38–39 & 56). Enabled by digitalization,

[3] Arthur describes technology as a purposed system that consists of subsystems forming a recursive structure. He clarifies that organizations are also included in his definition, and describes organizations as "(…) cousins of technology (…)" (Arthur, 2009, p. 56), thus, it can be viewed as an analogy network structures consisting of different actors with their specific activities.

organizations increasingly become orchestrators of value co-creation in such systems and they thus must not only perform their own activities but are also required to take into account and build on other actors' activities (Burkhalter, 2019, p. 9). Ecosystems provide a unique example of such network structures, which comprise autonomous organizations who collaborate and "… co-evolve capabilities around a new innovation …" (Moore, 1993, p. 76). While there are other forms of networks structures, this phenomenon has gained particular interest in recent years (Jacobides et al., 2018, p. 2256).

1.1.2 Emergence of ecosystems

With more possibilities to form close relationships more effectively, value creation shifts away from a purely organization-centric perspective of value creation to a more inclusive view. The strategic imperative changes from positioning along a fixed value chain to a continuous reconfiguration of activities and relationships to create value (Normann & Ramirez, 1993, pp. 65–66), which means that organizations increasingly leverage the capabilities, resources, and ideas of others over which they do not have direct control (Baldwin, 2012, p. 21; Iansiti & Levien, 2004, p. 7). Organizations cooperate with others and embrace the fact that these external parties contribute with their unique skills and, to a large extent, under their own conditions. There are several examples of such ecosystems across the globe and of organizations that successfully leveraged the ideas and capabilities of others. For example, the US-based company Apple, the Germany-based company Delivery Hero, or the China-based company Tencent.

Apple famously demonstrated how leveraging the assets and ideas of others can lead to innovation, growth, and ultimately, success. When Steve Jobs introduced the Apple iPhone in 2007, and with it a new generation of mobile phones that could be configured with features and functionalities by the users according to their individual needs, Apple also introduced its App Store with a strictly regulated number of applications. Initially, the App Store offered 552 apps, of which 135 were accessible for free, but which were carefully curated in terms of their content and functionality (Snell & Cohen, 2008). In its early stages, Steve Jobs was convinced that access to the App Store should be restricted and carefully controlled for developers and the App Store was thus designed as a closed system. In response to a significant amount of pressure from both within and outside of Apple, Steve Jobs agreed to open up the App Store and to encourage external developers to create content (Dredge, 2011). As a result of opening the App Store and Apple's continuous effort to support external developers (e.g., by providing software developer kits), by 2020 there were more than 2 million apps available globally in the App Store (Statista, 2021) and a global developer community of 23 million external software developers by 2020 (Apple Inc., 2020). While Apple's success is a result of its innovative ideas and dedication to bringing these ideas to life, the company also surely benefited from the community of independent developers who contributed time and effort by programing apps. In contrast to traditional sourcing concepts, Apple embraced autonomy and individual ideas. While Apple does curate the content on the App Store to avoid illegal content, it does not interfere with how a specific app functionality should be programmed and it grants developers autonomy in their pricing decisions under the condition of receiving a share of the profits. Apple thus orchestrates the resources and activities of a global community of developers.

Another example in a different industry is the Germany-based company Delivery Hero, which built a large food-ordering and delivery network and operated in 44 countries as of January 2020 (Delivery Hero, 2020, p. 5). Over a diverse set of different platforms, Delivery Hero enables customers to order food from restaurants and organizes the home delivery through a large network of internally and externally appointed riders. Restaurants can use Delivery Hero's 133 local platform subsidiaries (e.g., Talabat or Carriage in its Africa and Middle East region, Yogiyo or foodpanda in its Asia region, foodora or PedidosYa in its America region, or RestaurangOnline Sverige AB in Europe) to offer their cuisine. The dishes are either delivered by the restaurant, picked up by the customer, or delivered by one of the Delivery Heros riders (Delivery Hero, 2020, p. 60). The service spectrum that is offered by the conglomerate comprises digital technologies to enhance the user experience (i.e., order platforms), technology-based partner solutions (i.e., order processing, tracking, or business intelligence), and logistics services (rider scheduling, fleet management, or route optimization) and therefore, supports the whole value creation process (Delivery Hero, 2020, pp. 10; 61). The company is thus able to orchestrate value creation starting with the customer need, over the preparation of dishes, and finally to the delivery of the finalized products. In their fiscal year 2019, Delivery Hero was able to coordinate a gross merchandise value of 7.4 billion Euro[4] (Delivery Hero, 2020, p. 61) by leveraging the benefits of digital technologies and without complete ownership or control over all resources and capabilities involved. Although there is also criticism of the established business, for example, that the employment conditions for the fleet of riders are not satisfactory (Woolsey, 2018), the company significantly grew its operations since it started in 2011 and managed to make a listing in the DAX benchmark as of September 2020, as one of the largest stock market listed companies in Germany[5] (Barnert, 2020). In contrast to traditional alliances, Delivery Hero enabled restaurants to increase their access to customers via digital channels, without interfering in the restaurants' core competencies. As a result, Delivery Hero was able to develop and coordinate a whole network of restaurants, riders, and customers.

The third example of a company that orchestrates complex network structures is the Shenzhen-based company Tencent, famous for its WeChat mobile app[6]. WeChat was launched in 2011 as a simple peer-to-peer messaging software similar to WhatsApp. Users primarily have

[4] Gross merchandise value (GMV): total value of orders (including VAT) transmitted to restaurants.
[5] The Deutscher Aktienindex (DAX) measures the largest German listed corporations based on market capitalization and represents approximately 80% of market capitalization of listed companies in Germany (Deutsche Börse, 2016).
[6] Original name 微信 (Pinyin: Weixin) meaning “tiny message”.

the opportunity to build a network of friends, exchange text messages, voice messages, or pictures and share *moments* on their timeline. By the end of the fiscal year 2019, there were almost 1.2 billion monthly active users (MAU) on WeChat worldwide (Tencent, 2020). The success of this application, however, is not just a result of the communication functionalities. Since 2015 WeChat offers so-called *mini programs*, which are software snippets that integrate additional functionalities on top of the WeChat app, and which are developed by independent organizations to offer their products and services on the WeChat platform (Tencent, 2021). For example, bike-sharing companies such as Mobike and Ofo offer their customers access to their bike fleet via WeChat: customers can locate, book, and pay for the bikes without leaving WeChat. At present, there are numerous bike-sharing companies in China, with approximately 900 thousand shared bikes in Beijing alone (Jie, 2020), and thus there is a big market that can be accessed via the WeChat platform. The Chinese transport operator Didi Chuxing, a ride-hailing platform that acquired the Chinese subsidiary of Uber in 2016, operates similarly and integrated its services into WeChat via a mini program solution (Crabtree, 2018). By 2020, Didi served more than 550 million customers globally (Ciaccia, 2020). There are numerous examples of other product and service providers who offer their services via a mini program on WeChat, such as the shopping platform Alibaba or the famous restaurant chain Haidilao. Recent numbers show that there are more than 400 million users who made at least one purchase using WeChat, which accounted for approximately 123 billion US dollars in transaction value in 2019 alone (Wei, 2021). By 2018, more than 1 million mini programs were already available on WeChat (Liao, 2018). With numerous functionalities that are being offered as mini programs by various autonomous parties, WeChat orchestrates a complex network of value creation activities.

Like Apple, Delivery Hero, or Tencent, there are various examples of organizations across the globe that invested time and effort to co-evolve their own as well as others' capabilities to participate in such network structures. Many of today's most successful and fast-growing companies saw the importance of these ideas and leveraged them as a core component of their own business models (Birkinshaw, 2019, p. 3).

As described above, the decreasing costs of applying digital technologies (Loebbecke & Picot, 2015, p. 151), the nature of digitally-enhanced value creation (Burkhalter, 2019, pp. 4–5), and the resulting, the modular value architecture provide the necessary conditions for ecosystems to form (Jacobides et al., 2018, p. 2260). Modular design describes the decomposition of services into nearly independent service building blocks (Baldwin, 2012, p. 20) which can be recombined in various ways in the sense of the recursive nature of technology (Arthur, 2009, pp. 38–39): systems of purposed systems.

The phenomenon of ecosystems requires a change of perspective in various domains, such as business model design (Burkhalter, 2019, p. 19), organizational leadership (Moore, 1998, p. 167), inter-organizational collaboration (Adner, 2017, p. 44), or strategic decision making (Jacobides, 2019a, p. 132). On an even more fundamental level, a shift of perspective of how to conceptualize value creation in ecosystems is necessary, since value creation is distributed across autonomous organizations in a complex system, to understand how organizations can participate and position themselves in, as well as develop, such networks.

1.1.3 A perspective on value creation in ecosystems

As described above, ecosystems refer to network structures in which distinct organizations contribute as autonomous actors (Jacobides et al., 2018, p. 2260) towards a commonly shared set of goals (Moore, 1993, p. 76, 1998, p. 180), purpose, or a job to be done (Autio & Thomas, 2018, p. 14). Organizations form multilateral relationships and co-create value (Jacobides et al., 2018, p. 2265; Pikkarainen et al., 2017, p. 5) with specialized activities from various domains or industries (Payne et al., 2008, p. 84). Therefore, ecosystems form a unique organizational structure on the spectrum of free competitive markets (Fuller et al., 2019, p. 2) and hierarchical control (Jacobides et al., 2018, p. 2266). Actors form complex value creation systems (Normann & Ramirez, 1993, pp. 65–66; Ramirez & Mannervik, 2016, p. 35) in which value does not just only flow from the left to the right (Eisenmann et al., 2006, p. 2), but where value is created through a complex set of relationships between these actors. With the term ecosystem being used widely and ambiguously (Autio, 2021, p. 2) and the available tools and concepts (e.g., markets, industries, value creation), which are largely being organization-centric (Moore, 1993, p. 76; Prahalad & Ramaswamy, 2004b, p. 6), it is increasingly difficult to specifically describe value creation in such complex networks. Therefore, this dissertation aims to clarify two distinct problems. Firstly, the conceptual ambiguity, where the concept of ecosystems cannot be clearly distinguished from other concepts, despite various attempts to specify the underlying concept. This raises the questions of how to participate in and how to develop ecosystems. Secondly, the interorganizational and non-sequential system logic of value creation, where activities are distributed across multiple organizational entities. This raises the question of how such a value creation configuration from a network perspective can be conceptualized and how to decompose such a system into a manageable analytical grid.

Firstly, to understand how to participate in and develop ecosystems, it is important to clearly define what ecosystems are and to distinguish them from other concepts. The term ecosystem is applied broadly and addresses a wide range of different perspectives (Autio, 2021, pp. 2–3). Various terms try to distinguish different ecosystem types, e.g., business ecosystems (Jacobides et al., 2018, pp. 2256–2257; Moore, 1993, p. 76), innovation ecosystems (Adner & Kapoor, 2010, p. 2), platform ecosystems (Gawer & Cusumano, 2014, p. 423), knowledge ecosystems (Valkokari, 2015, p. 18), service ecosystems (Vargo & Lusch, 2011, p. 184), etc[7]. Other authors use platforms, which are often considered as an inherent building block of ecosystems (Gawer & Cusumano, 2014, p. 418), to create meaningful and distinct classes of such network structures, namely transaction platforms and innovation platforms (Cusumano et al., 2020, p. 49). Similar to this approach Pidun et al. (Pidun et al., 2019, p. 3) introduced transaction ecosystems and solution ecosystems. Guggenberger et al. developed a two-dimensional typology of ecosystems and introduced five district types: socio-centric, symbiotic collective, centrally balanced, orchestrating actor, and structured resource sharing ecosystems (2020, pp. 9–10). These ecosystem classifications are often overlapping (Autio, 2021, p. 2) and only provide limited explanatory value concerning what ecosystems specifically are and for deriving managerial implications from this information. Additionally, traditional concepts such as industry or market are also only of limited value in this context. Ecosystems comprise organizations with unique capabilities and resources, oftentimes from various industries (Fuller et al., 2019, p. 6; McPhee et al., 2017, p. 3; Moore, 1993, p. 76). Such networks may span industries, such as production, high-tech, or logistics, and combine activities from various areas to configure the overall offering. Hence, ecosystems must be understood as a hybrid organizational form on the spectrum of market and hierarchy (De Meyer & Williamson, 2020, p. 80; Jacobides et al., 2018, p. 2266; Williamson & de Meyer, 2012, p. 31). Competitive markets create advantages such as efficiency, flexibility or quickly adjusting prices, given that the value of objects can easily be priced (Adler, 2001, p. 216). Hierarchies rely on authority as a coordination mechanism (Adler, 2001, p. 216) but have the advantage of lower transaction costs, efficient alignment of specialist activities, and reduced uncertainty and risk (De Meyer & Williamson, 2020, p. 80). However, this raises the question of where exactly ecosystems can be located on the organizational spectrum to reduce the conceptual ambiguity. Thus, it is essential to specify what ecosystems are, so that (1) ecosystems can be distinguished from

[7] There are several literature reviews available, which try to propose and structure ecosystem types: e.g., (Faber et al., 2019), (Seppanen et al., 2017), or (Knodel & Manikas, 2015).

other related concepts, (2) they can be uniquely defined as a new or under-researched phenomenon, and (3) that the findings can be used to derive managerial implications that translate into action (Autio, 2021, p. 3). This requires conceptual precision and order of the underlying constructs, for example by developing a typology (Bailey, 1994, p. 1) as a way to theorize (Doty, 1994, p. 232) about a phenomenon.

The second problem addresses the specific value creation activities in ecosystems. The overall purpose of an analysis of value creation activities is twofold: (1) to understand what activities an organization should perform and (2) to understand the configuration of activities that enables the organization to add value and to compete with others (Amit & Zott, 2001, p. 496). However, the process of value creation and value capture (Lepak et al., 2007, p. 181) is distributed across multiple organizations in different roles. In addition, it is not entirely clear which value creation components require special attention because they are essential to understand the specific value creation context. Value creation in ecosystems must be conceptualized on several levels. Different actors contribute individual resources and capabilities in their specific roles. Burkhalter (2019, pp. 79–80) proposes four role archetypes: the user, the provider, the orchestrator, and the contributor. Each actor, including the user (or customer), is considered an active part of the value creation process (Autio & Thomas, 2018, p. 4; Vargo & Lusch, 2004). In addition to these value creation activities, there is a coordination need, which involves activities that ensure the alignment of the individual roles' activities (Jacobides et al., 2018, p. 2260). Thus, ecosystems as an organizational structure can be conceptualized as comprising distinct value creation components, for example, value creation and coordination activities. This goes in hand with Mintzberg, who proposed that: "The structure of an organization can be defined simply as the sum total of the ways in which its labor is divided into distinct tasks and then its coordination is achieved among these tasks" (1983, p. 2). Nevertheless, the biological metaphor also takes the networks' environment into account – the so-called abiotic component (Jax, 2006, p. 240; Pickett &

Cadenasso, 2002, p. 3). While several frameworks for the analysis of value creation are available, these traditional tools only provide limited value for the analysis in the context of ecosystems (Betz & Jung, 2021a, p. 1; Jacobides, 2019a, p. 132; Peppard & Rylander, 2006, p. 131). The value chain, for example, analyzes value creation in the context of sequential, long-linked production technologies (Porter, 1985, pp. 33–43). Stabell and Fjeldstad (1998, p. 420) recommended the value shop as a framework for cyclical, technology-intensive value creation processes in the context of Thompson's definition of interdependencies (1967, pp. 54–55). Other network-oriented value creation frameworks, such as Stabell and Fjeldstad's value network (1998, pp. 427–430), or Christiansen and Rosenbloom's value network (2013, p. 238), describe value creation as a system of components, however, without mediating activities for coordination or actor alignment. As a result, there is a nascent conceptual gap between traditional value creation frameworks and the ecosystem perspective, which this dissertation tries to address by proposing a unique analytical perspective of value creation in ecosystems.

This leads to two problems that underpin the motivation for this research project. Firstly, in the light of the conceptual ambiguity and the wide use of the term "ecosystems" it is important to develop a reference point that helps researchers and practitioners to discuss what ecosystems are, how to participate in an ecosystem, and how such ecosystems develop. Secondly, value creation is distributed across multiple organizations and subsequently, a more adequate analytical perspective on value creation in ecosystems that focuses on the relevant components from a network instead of a single-organization perspective is necessary.

1.2 Research goal and research questions

This dissertation aims to contribute to a better understanding of value creation in ecosystems, which appears valuable both from a theoretical and from a practical point of view (Jacobides et al., 2018, p. 2256). The area of investigation is defined as a sub-set of three distinct analytical perspectives.

The first analytical perspective builds on the increasing technological advancements in the context of information systems. As described earlier, the decreasing costs of leveraging digital technologies (Loebbecke & Picot, 2015, p. 151) and the nature of digitally enhanced products (Porter & Heppelmann, 2014, p. 66) are considered key aspects when analyzing ecosystems. Digital technologies support a modular value architecture with so-called *thin crossing points* where transaction costs are low (Baldwin, 2008, p. 4) and where transactions (e.g. resulting in cooperation) can potentially occur, which is a fundamental requirement for ecosystems to develop (Jacobides et al., 2018, p. 2261). These discrete crossing-points allow for different components to be un- and rebundled to form complex systems in a network (Normann & Ramirez, 1993, pp. 65–66) with actors and their individual resources and capabilities from various domains (Rong et al., 2013, p. 76). Some researchers put a particular focus on the underlying technical infrastructure, often addressed by the concept of a digital platform (Eisenmann et al., 2011, p. 1273; Gawer & Cusumano, 2014, p. 417). Although a platform may play an important mediating role in ecosystems (Parker et al., 2017, p. 7), it is not in the analytical focus of this dissertation, which rather focuses on the relationship structure among the participants. With the increasing importance of digital technologies and the application of software in the value creation process (Proba, 2021, pp. 12–13) this dissertation analyzes value creation in ecosystems from a design-oriented information systems perspective (Oesterle et al., 2010, p. 1).

The second analytical perspective builds on the ecosystem phenomenon and its underlying constructs. As mentioned above, the term ecosystem is broadly used which makes an analysis of the concept and its implications challenging in practice (Autio, 2021, p. 3). With various sub-types such as business, innovation, platform, knowledge, and service ecosystems, etc. it is important to locate this dissertation project within the framework of current research activities. Building on Moore, ecosystems are understood as communities of actors, who "(…) work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations" (1993, p. 76). In addition to this definition, Adner (2017, p. 42) incorporates multilateral relationships and the alignment of activities into his definition and thereby places more emphasis on the structure of the actors' relationships in the ecosystem. Jacobides et al. adopt this perspective and include complementarities and non-hierarchical control in their definition (2018, p. 2264), thus further clarifying the relationships of the value creation activities, namely, that they complement each other, and the actors' autonomy regarding their decision-rights in that one party does not control all actions. Autio stresses the dynamic nature of ecosystems, which constantly evolve and produce "… unprompted, unpredictable innovative outputs …" (Autio, 2021, p. 5). This dissertation builds on these ideas and understands ecosystems as the "… dynamic structure of different interdependent yet autonomous actors, who coordinate their complementary activities towards a shared purpose to co-create" (Betz & Jung, 2021a, p. 6124).

The third analytical perspective leverages the understanding of ecosystems as an organizational structure. As outlined in the previous section, ecosystems form a hybrid organizational structure between market and hierarchy (De Meyer & Williamson, 2020, p. 54). Moreover, the dissertation builds on Jacobides et al. (2018, p. 2259) in the sense that ecosystems should be conceptualized as generally being open (Gulati et al., 2012, p. 34), albeit with certain boundary conditions, for example, access to a platform (Gawer & Cusumano, 2014, p. 420) or rules of engagement (Autio & Thomas, 2018, p. 12). Adner uses the term *defined membership* to address the set of partners in an ecosystem, but instead of a tightly controlled regime, he explicitly uses the "… joint value creation effort as a general goal" as the linking element for such membership (2017, p. 43). This stands in contrast to other concepts such as that of the business model[8], as an ecosystem must be understood as a contextual medium of interaction for the co-creating participants, while a business model refers to the value architecture, that is, the arrangements of the specific components within that structure (Burkhalter, 2019, pp. 89–90). Thus, the dissertation builds on the idea of ecosystems as organizational structures in which actors leverage shared institutional logics to co-create value (Autio & Thomas, 2018, p. 11; Lusch & Nambisan, 2015, p. 163).

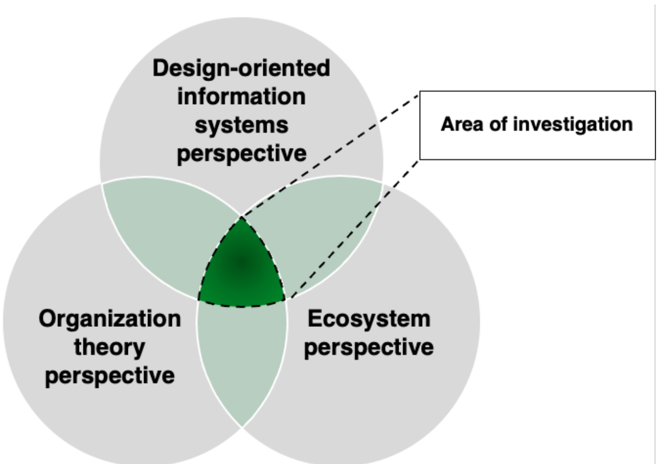


Figure 1: Area of investigation of this dissertation

Figure 1 summarizes the three analytical perspectives as the field of investigation for this dissertation. In the context of the above-described problem space, the dissertation is located at the intersection of the three perspectives with the following overarching research objective:

[8] The business model can be understood as being a template of how a firm conducts business (Zott & Amit, 2010, p. 222).

Helping organizations to participate in ecosystems and to analyze how value is created in ecosystems by classifying the shared value purpose and identifying the relevant value creation activities.

The dissertation addresses several goals. Firstly, to support organizations who want to understand what ecosystems are, especially given the wide use of the term as described previously. Secondly, to provide guidance on how to participate in an ecosystem. Thirdly, to develop a conceptual grid of value creation components in ecosystems and to identify relevant value creation activities within these components. This is achieved by a thorough analysis of the shared value purpose (Betz & Jung, 2021a, p. 6127; Burkhalter, 2019, p. 186), which acts as an overarching reference point or vision towards which the actors direct their value creation activities in an ecosystem. Additionally, the concept of value creation is thoroughly analyzed in the context of ecosystems. The term *value creation* is used in the context of the *value creation process* building on Lepak et al., who endorse a "… contingency perspective that explicates how value is created from the vantage point or perspective of a particular source" (2007, p. 183) and provide three sources of value creation: individuals, organizations, and society (Lepak et al., 2007, p. 182). Concerning the above-described area of investigation (see figure 2), this work builds on the value creation process on an organizational level. To address this overarching research objective, a design-oriented research methodology was chosen (see section 3) with the aim of building purposeful artifacts to answer unsolved problems (Hevner et al., 2004, p. 78; March & Smith, 1995, p. 253). Two research questions (RQ) were derived from this research objective.

Research question (RQ) 1: How can the shared value purpose in ecosystems be classified?

With the conceptual ambiguity and traditional concepts of industries or markets not applying to ecosystems, RQ1 addresses the classification of the shared value purpose instead of the ecosystem itself. In this way, the research approach tries to provide a new analytical lens and to avoid conceptual problems such as an organization-centric perspective on ecosystems or the overlapping types as described in section 1.1 (e.g., business and innovation ecosystems). This is facilitated by developing a typology, i.e., a research artifact of the type model (March & Smith, 1995, p. 256).

Research question (RQ) 2: What are the relevant value creation components in ecosystems and what value creation activities can be identified?

As various actors are involved in value creation in ecosystems in their specific roles, a network perspective on value creation that comprises all relevant activities is necessary. This dissertation aims to develop a framework of value creation in ecosystems. A framework can be understood as a "… a set of classes that embodies an abstract design for solutions of a family of related problems …" (Johnson & Foote, 1988, p. 23). The framework comprises specific classes (or components and identifies relevant value creation activities, while the artifact type is defined as a model (March & Smith, 1995, p. 256). The research activities for the development of the proposed model were split into two sub-questions, sub-RQ2a and sub-RQ2b:

Research question (RQ) 2a: What are the relevant value creation components in ecosystems?

RQ2a develops the conceptual grid, a taxonomic system (Nickerson et al., 2013, p. 338), as the process of developing a taxonomy, instead of applying the system. Therefore, the relevant components of value creation in ecosystems are identified. The term relevant implies that certain aspects are deliberately omitted (e.g., it is assumed that the analysis of activities such as firm infrastructure or human resources is done separately from an analysis of ecosystems) while other components are put into focus on a network level.

Research question (RQ) 2b: What are the relevant value creation activities in ecosystems?

RQ2b applies the taxonomic system developed under RQ2a and identifies specific value creation activities within the proposed components. In this way, the overall framework from RQ2 directs the analytical focus from one organization towards a network perspective of value creation to understand (1) what activities an organization could perform and (2) the configuration of activities that enables the organization to add value and to compete with others (Amit & Zott, 2001, p. 496). The result of this analysis is a research artifact of the type model (March & Smith, 1995, p. 253).

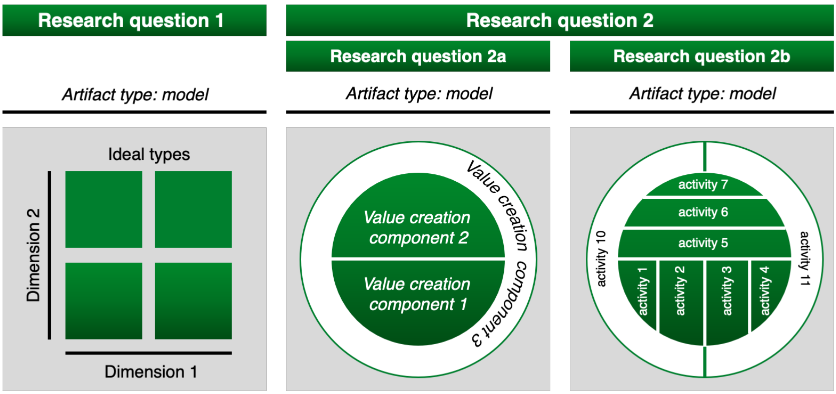


Figure 2: Overview of research artifacts

The described research artifacts based on RQ1, RQ2a, and RQ2b represent complementary results that may be used in combination to address the overall research objective: to understand what ecosystems are, how to participate in ecosystems, and to make decisions on how to position an organization in ecosystems. The overall goal of the research artifacts is to help to address organizational problems identified (Hevner et al., 2004, p. 77) in the previously defined problem space. In addition to that, this dissertation aims to extract prescriptive knowledge concerning how to design artifacts to solve the prescribed problems (Gregor &

Jones, 2007, p. 23; Walls et al., 1992, p. 37), and subsequently follows design science research (DSR) as an overarching research paradigm (see Gregor, 2006; Hevner et al., 2004; Hevner, 2007; March & Smith, 1995; Peffers et al., 2007).

The target audience of this work are on the one hand researchers in the areas of business information systems, innovation management, and business strategy, who are working on organizational problems in the context of digital technologies. On the other hand, the work aims at supporting practitioners in the areas of business development, product development, product management, and innovation management who are trying to conceptualize value creation in complex networks.

1.3 Dissertation outline

To answer the research questions and to derive prescriptive knowledge from this process, this dissertation is structured into six sections. Section 1 elaborated on the research background, described the motivation, the overall problem space, and the resulting research objective. This section also formulated the resulting research questions. Section 2 discusses the theoretical foundations, focusing on the concept of value creation and the phenomenon of ecosystems. In addition, a structured literature review discusses current research in ecosystems and outlines the research gap. Section 3 describes the underlying research methodology. The dissertation follows DSR as an overarching research paradigm and uses the consortium research approach with specific elements from action design research (ADR) to answer the research questions. In section 4, the results of the analysis are presented, and the research artifacts are built and evaluated. Section 5 discusses the findings and elaborates on their implications for academic research and practical application. Section 6 summarizes the findings, discusses the limitations of this research, and provides an outlook for further research activities. The dissertation structure is summarized in figure 3.

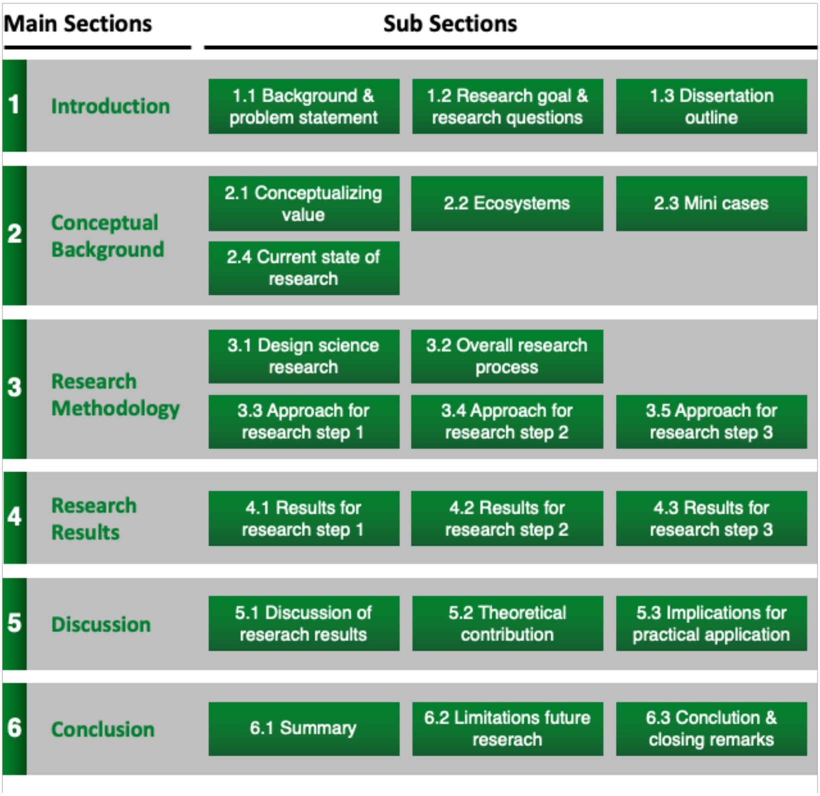


Figure 3: Outline of the dissertation

2 Conceptual and theoretical foundation

This section introduces the underlying concepts and the theoretical foundations upon which the rationale for this dissertation is built. Therefore, the concepts of *value* and *value creation* are examined in detail, followed by a discussion of the *ecosystem* phenomenon. Building on this, five mini case studies are examined, followed by a structured literature review that outlines the research gap.

2.1 Conceptualizing value

2.1.1 Value, value creation, and value capture

While the concepts of *value* and *value creation* are central to management and organizational analysis, however, some researchers argue that the notions of *value* and *value creation* are still poorly understood (Grönroos & Voima, 2003, p. 134; Lepak et al., 2007, p. 180; Woodall, 2003, p. 1). To better understand the terms, it is helpful to decompose the concepts and to discuss (1) the term *value creation*, (2) the process of *value creation*, and (3) *value capture* based on Lepak et al. (2007, p. 180).

(1) Value. The term *value* addresses different ideas. *Value* can be distinguished, for example, into *use value* and *exchange value* (Bowman & Ambrosini, 2000, p. 2; Chesbrough et al., 2018, p. 932; Marx, 1867, p. 2). *Use value* refers to the subjective (perceived) qualities of a product or service in relation to customer needs (Bowman & Ambrosini, 2000, p. 2) or the utility that is realized by its use or consumption (Marx, 1867, p. 2). *Exchange value*, on the other hand, refers to the monetary amount that is realized through the exchange of products and services between different actors (Bowman & Ambrosini, 2000, pp. 2–3; Marx, 1867, p. 2). Additionally, Lepak et al. (2007, p. 182) indicate add that determining the *value* of a product or service from the user perspective requires novelty and appropriateness[9] to be perceived as valuable. In other words, it involves an innovation that increases the user's benefits for a product or service to be perceived as valuable (or more valuable than other alternatives) (Priem, 2007, p. 220).

In addition to the concepts of *use value* and *exchange value*, there is another conceptualization of value that is rooted in the service-dominant logic (see section 2.1.2): *value in context*. The concept of value in context describes how specific resources, for example, information, have a distinct value in a specific context, whereby context defines value. Context can be understood as the unique actors with specific relational (reciprocal) ties among them (Chandler & Vargo, 2011, p. 40; Wassermann & Faust, 1994, pp. 17–18). Actors can therefore draw on other actors as resources, where the context determines the value of these resources. For example, one can listen to a music record at home, where the listener sets the context. One can also enjoy the music record with a friend, whereby the value may be perceived differently when both enjoy the music together as the context here is set by the relational tie among the two persons. Another example would be a huge concert, where thousands of listeners are present, and jointly set the context. In this context, it is important to note that the presence of the audience and their enjoyment cannot be "owned" by a single actor but is rather co-owned by all attendees. As Chandler and Vargo (2011, p. 39) noted, that context influences value co-creation and markets through its influence on resources. While actors are always part of various contexts, one context may influence other actors and their context as well. Chandler and Vargo (2011, p. 41) proposed a multi-level conceptualization of context comprising the micro-context (constituted by dyadic relationships among actors), meso-context (constituted by dyadic and triadic relationships), and macro-context (constituted by several triadic relationships in a complex network).

[9] Lepak et al. (2007, p. 182) build on Amabile's (1983, p. 33) definition of creativity to explain the subjective evaluation of the product or service.

Subjective or perceived *value* (*use value*) can be conceptualized from differing perspectives, for example, an economic, psychological, sociological, or ecological perspective (Ouden, 2012, p. 23). Others categorize *value* as functional or instrumental, experiential or hedonic, symbolic or expressive, and cost or sacrifice value (Smith & Colgate, 2007, p. 20). In contrast, some authors describe *value* as a combination of certain elements, such as functional, emotional, life-changing, and social impact elements for natural persons (Almquist et al., 2016, p. 51) or table stakes (i.e., meeting specifications, or regulatory compliance), functional value, ease of doing business value, individual value, and inspirational value (Almquist et al., 2018, p. 76). Holbrook (2002, p. 12) developed a typology of consumer *value* that conceptualizes value along the dimensions “extrinsic and intrinsic” and “self-oriented and other-oriented”.

These and other conceptualizations (see Woodall, 2003; Woodruff, 1997) of *value* underline the complexity of this construct. Unless otherwise specified in a broader sense, this dissertation builds on the terms *use value*, *exchange value*, and *value in context*, and excludes questions concerning how subjective value can be further explained or specified. This leads to the question of how *value* is created in the first place.

(2) Value creation. The term *value creation* refers to the process of how value emerges as a result of an intervention (Bowman & Ambrosini, 2000, p. 5; Marx, 1867, p. 5). Porter (1985, p. 33) describes this process as a sequence of *value creation* activities from the design, marketing, delivery, and support of a product or a service. Innovation, entrepreneurship, organizational culture, and organizational learning represent such capabilities, which transform input (e.g., raw materials) into a valuable output (Lado & Wilson, 1994, p. 705). Bowman and Ambrosini (2000, p. 7) further define entrepreneurial labor, in its essence, as the knowledge of how to direct this resource transformation in order to create new *use value*. While this already provides a suitable conceptual foundation, Lepak et al. (2007, p. 183) extend this view on *value* *creation* with a contingency perspective, specifying the level of analysis of *value creation*: (a) the individual level, (b) the organizational level, and (c) the societal level. Individuals create *value* by performing novel tasks, services, jobs, etc., for example by applying knowledge and skills directed to create *use value* for the beneficiary (Lepak et al., 2007, pp. 183–184). On the organizational level, value is created by performing physically and technologically distinct activities (Porter, 1985, p. 38), with the source of the new *value* being e.g. innovation, new configurations of activities, organizational knowledge, etc. (Lepak et al., 2007, p. 182; Sirmon et al., 2007, p. 228; Smith et al., 2005, p. 349). On the societal level, *value* is created by continuous improvement and innovation of existing industries and competing in new ones (Porter, 1990, p. 652). In addition, *value* is created through policy decisions, for example, those that enable and promote entrepreneurial development (Lee et al., 2007, pp. 276; 268; Lepak et al., 2007, p. 186). This dissertation builds on the *value creation* process – both on an organizational and societal level – and regards it as the performance of activities to transform or combine (complementary) resources. With a *value creation* process defined, this leads to the question of what *value capture* is since literature distinguishes these constructs (Chesbrough et al., 2018, p. 933; Jacobides et al., 2006, p. 1200; Makadok & Coff, 2002, p. 10).

(3) Value capture. *Value capture*, also referred to as *value appropriation* (Lepak et al., 2007, p. 187), or *value allocation* (Priem, 2007, p. 221), refers to the realization of profits from exchange *value* (Bowman & Ambrosini, 2000, p. 9) or put differently, the difference between *exchange value* that a firm receives for a product and the *exchange value* that a firm pays to its suppliers (Makadok & Coff, 2002, p. 10). The distinction between *value creation* and *value capture* is important as it accounts for the possibility that the value creator may lose or share some of the *value* they create with other stakeholders (Lepak et al., 2007, p. 187). This is referred to as *value slippage* and is either caused by competition or by specific isolation mechanisms (Bowman & Ambrosini, 2000, p. 2), whereby it may reduce profitability (Bowman & Ambrosini, 2000, p. 8) in cases where the relative *use value* is high but relative *value capture* is low (Lepak et al., 2007, p. 187). This in turn reduces the company's incentive to participate in *value creation*. According to Lepak et al. (2007, p. 187), the analysis of *value capture* and the respective isolation mechanisms can also be facilitated on (a) an individual level, (b) an organizational level, and (c) a societal level. On the individual level, isolation mechanisms, and the ability to *capture value*, refer to the position of the individual in a social network, the nature of relationships, and specialized knowledge or skills (Lepak et al., 2007, p. 189). On the organizational level, isolation mechanisms may be identified, for example, by analyzing the *value creation* process itself and pointing out the cost- or differentiation advantages (Porter, 1985, p. 38). From a resource perspective, isolation mechanisms are the result of rare, inimitable, non-substitutable, and valuable resources (Barney, 1991, pp. 105–106). On the societal level, isolation mechanisms allow whole nations to *capture value* and are the result of factor conditions (e.g., skilled labor infrastructure), strong demand conditions (nature of home-demand for products or services), related and supporting industry infrastructure, and firm strategy, structure, and rivalry (the conditions under which companies are established, organized, and managed) (Porter, 1990, p. 111).

These ideas lay the conceptual foundation for *value creation* throughout this work. More specifically, the dissertation addresses the aspects regarding *value creation* in ecosystems outlined in the following. Firstly, the term *value* refers to the concept of *use value*. Secondly, *value creation* is understood as a process that transforms or combines resources to create *use value*. While the term *process* may be used in the literature, it should not be limited to a static sequence of interconnected activities, but also refers to a system perspective of *value creation*, as described by Norman & Ramirez (1993). Thirdly, in accordance with the overall research objective, the concept of *value capture* is excluded from the analysis as the dissertation aims to describe *value* and the *value creation* process in ecosystems. A separate in-depth analysis would be required to describe *value capture* and the suitable isolation mechanisms related to it.

Before analyzing different conceptualizations of *value creation*, it is important to first address some concerns relating to its earlier conceptualizations. Firstly, the concept builds on a producer- or supplier-orientated perspective (Priem, 2007, p. 221). *Value creation* is often understood as a sequence of activates that follow a “downstream” system of interconnected actors (Porter, 1985, p. 34), in which each actor adds further resources until the final product is finished (Chesbrough, 2011, p. 86; Priem, 2007, p. 221). On the one hand, this perspective is a result of strategic management, which aims to identify the specific production factors that result in higher firm performance (Rumelt et al., 1991, p. 4). On the other hand, industrialization and more recently digitalization (see section 1.1) have increasingly separated *value creation* activities (production and consumption decisions) in time and space (Wikiström, 1996, p. 364). Secondly, researchers pointed out that the *value creation* concept is a rather product-oriented idea, while *use value* may instead be a change of state, or in other words, a service instead (e.g., a hole in the wall instead of the electric drill)[10] (Chesbrough, 2011, p. 86; Christensen et al., 2005, p. 4). These concerns are addressed by the concept of *value co-creation* and *service-dominant logic*.

2.1.2 Value co-creation and service-dominant logic

The role of the customer, or even the customer’s customer, has been evolving from a passive audience towards active players in the marketplace: they are considered to contribute knowledge and skills through their willingness to learn and experiment and to engage in active dialogue with the supplier (Prahalad & Ramaswamy, 2000, p. 81). Prahalad and Ramaswamy (2000, p. 80) coined the term co-creation to

[10] While this example describes an important mindset shift, critical voices point out that it is in fact not the hole in the wall that is wanted by the customer, but the hanging picture on the wall (that is, the experience of the picture on the wall), where different components, e.g., the wall, the drill, the nail, and the picture etc. all contribute to an overall solution.

describe how the customer takes on an active part in the *value creation* process. Customers can leverage various developments for a deeper involvement in the *value creation* process, e.g., access to information, decreasing geographical limits, the emergence of networks of interconnected actors, tools for experimentation, and active feedback (Prahalad & Ramaswamy, 2004a, pp. 4–5). As co-creators of value, the customer and the provider collaborate to create a service experience, for which they jointly define the problem, and which provides a personalized solution for the individual circumstances (Prahalad & Ramaswamy, 2004b, p. 8). Thus, the perspective of *value creation* shifts from a supplier-oriented perspective to a broader, experience-oriented perspective[11]. Attention on the *co-creation* concept has grown over the past years, for example in information systems, economics, management, and marketing (O'Hern & Rindfleisch, 2010, p. 88), with a new perspective on the concept of *value creation* emerging in the latter stream: the *service-dominant logic* (SDL) (see Grönroos, 2006, 2011; Vargo et al., 2008; Vargo & Lusch, 2004, 2011).

While *value co-creation* addressed the concern of an excessively production-oriented perspective on *value creation*, SDL builds on the *co-creation* idea and puts the service at the center of attention[12] (Lusch & Nambisan, 2015, p. 156). While a product or good represents a physical manifestation of *value creation* activities, a service represents the intangible characteristics of *value creation* e.g., in the interaction of different actors (Grönroos, 1990, p. 27; Kohlborn, 2012, pp. 31–32). SDL considers both physical products and services as a means to transfer specialized skills as a fundamental unit of exchange, whereby the customer is always a *value co-creator* (e.g., when using or consuming a physical product, or when interacting with a service provider)(Vargo & Lusch, 2004, p. 6). SDL, therefore, shifts the perspective on *value*

[11] For a systematic literature review on co-creation, see Voorberg et al. (2014).
[12] SDL distinguishes between service (overall integration of activities from several actors including the customer) and services (the manifestation of the activities of the single actors).

creation away from a product as a unit of output to a service perspective and includes both the provider and the customer.

This dissertation uses the *value co-creation* idea and SDL as extensions of the *value creation* process. This system perspective, where multiple actors collaborate to *create value*, appears to be a suitable analytical lens for the conceptualization of ecosystems, as already used by other authors (see Autio & Thomas, 2018; Betz & Jung, 2021a; Burkhalter, 2019; Lusch & Nambisan, 2015; Matthies et al., 2016).

2.1.3 Existing models to conceptualize value creation

As mentioned in section 1.1.3, although there are already several tools that describe the process of *value creation*, they show limited usefulness when describing *value creation* in ecosystems. Jacobides states that "traditional strategy frameworks are of little help when designing or participating in such an ecosystem" (2019a, p. 132). Peppard and Rylander (2006) clarify the role of the dematerialization of products, (e.g., through digitalization): "... as products and services become dematериali[z]ed and the value chain itself no longer having a physical dimension, the value chain concept becomes an inappropriate device …" (p. 131). Eisenmann et al. (2006) implicitly underpin these concerns by elaborating on the flow of value in the context of platforms and two-sided markets: "In traditional value chains, value moves from left to right: To the left of the company is cost; to the right is revenue. In two-sided networks, cost and revenue are both to the left and the right" (p. 94). Other authors provided similar arguments for a necessary shift towards an altered perspective of *value creation* (see Normann & Ramirez, 1993, p. 66; Parolini, 1999, p. xix; Tapscott & Ticoll, 2000, p. ix). To underpin this, the following section discusses various models of *value creation* with varying conceptual foundations, for example differing production technologies (section 2.1.3.1–section 2.1.3.3), network or system perspectives (section 2.1.3.3), and finally, in the context of digital technologies (section 2.1.3.4). The literature review in section 2.4

subsequently provides a structured approach to identify *value creation* conceptualizations.

2.1.3.1 Value chain

In his book, Competitive Advantage, Porter introduces the concept of the *value chain* (Porter, 1985, pp. 33–43). The *value chain* breaks down a single company into distinct *value creation* activities: (a) primary activities, including inbound logistics, operations, outbound logistics, marketing and sales, and service, and (b) support activities, including firm infrastructure, human resource management, technology development, and procurement (Porter, 1985, p. 37), as shown in figure 4. Primary activities have a direct impact on *value creation* while support activities enable and improve the former (Stabell & Fjeldstad, 1998, p. 417). The configuration of these activities, either through a cost advantage or differentiation (Porter, 1985, pp. 62; 119), as well as linkages between the single activities, either through optimization or coordination, can be the sources of superior performance (Porter, 1985, p. 48). The business unit is the unit of analysis and competitive advantage can be explained by identifying differing configurations of the *value chain* across competitors.

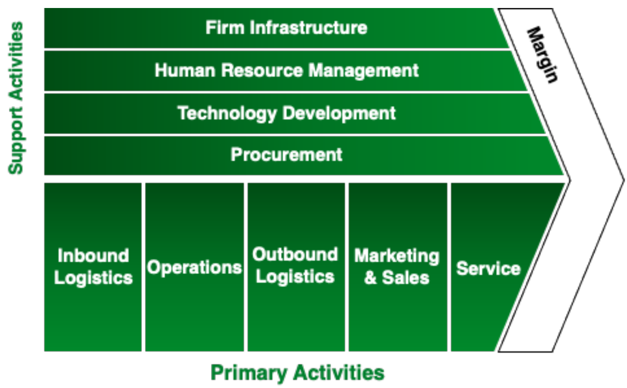


Figure 4: Schematic overview of the value chain

The value chain addresses both *exchange value* (explicitly) and *use value* (implicitly). The *exchange value* represents the unit of measurement of output where the sum of the costs of the *value* activities must be below the *exchange value* to be profitable. However, it is mentioned that the value chain is part of an overall system and the ultimate differentiation is based on how well the final product is suited to the buyer's value chain so that it best addresses his needs (Porter, 1985, p. 34). Therefore, the *use value* is implicitly addressed. Despite the success and wide application of the value chain (Chesbrough, 2011, p. 86), the model has been criticized for its supplier-oriented and product-centered perspective (Chesbrough, 2011, p. 86; Peppard & Rylander, 2006, p. 131; Prajogo et al., 2008, p. 617). Furthermore, the value activities represent the underlying unit of analysis. The activities represent the sequential value creation, where resources run through a defined process, using a long-linked production technology, through which input resources are transformed into outputs, comparable to an assembly line (Stabell & Fjeldstad, 1998, p. 416). Even though a single value chain is embedded in a value system (a chain of linked value chains) (Porter, 1985, p. 34), the value chain analysis does not focus on the analysis of customers or suppliers and does not address a value co-creation perspective. Despite the highlighted distinction between *value creation* and value capture in section 2.1.1, the value chain presents an interesting example of how closely these concepts can be interwoven. On the one hand, the value chain describes value as a result of intervention through value activities (i.e. design, production, marketing, delivery, or support (Porter, 1985, p. 33)). On the other hand, "…value is the amount buyers are willing to pay for what a firm provides them" (Porter, 1985, p. 38), which addresses the concept of exchange value and value capture. Porter explains value capture as the source of superior performance with two isolation mechanisms, or generic strategies: cost advantage (Porter, 1985, p. 62) or differentiation (Porter, 1985, p. 119). Thus, the model looks at both the value creation process as well as value capture. These ideas are summarized in figure 9 in section 2.1.3.5.

2.1.3.2 Value shop

Building on the logic of the value chain as a tool for the analysis of sequential, long-linked production technologies (Thompson, 1967, pp. 15–16), Stabell and Fjeldstad (1998, p. 420) developed the value shop as a tool to describe value creation with intensive production technology. This requires the selection, combination, and order of specific activities in accordance with internal feedback loops (Thompson, 1967, p. 17) to solve a customer or client problem according to the specific circumstances and needs (Stabell & Fjeldstad, 1998, p. 420). However, according to Stabell and Fjeldstad (1998, pp. 421–423), there are some unique characteristics of this value creation process: (1) information asymmetry between company and client, (2) dealing with unique cases, (3) iterative and interruptible *value creation* activities, (4) sequential and reciprocal interdependency between value creation activities, (5) involvement of multiple specialized skills and competencies, (6) problem-independent information acquisition activities for problem framing, (7) building on the experience of professionals, (8) co-performance of primary and support activities, and (9) referrals based on reputation and relationships. The *value shop* shares the same support activities as the *value chain*.

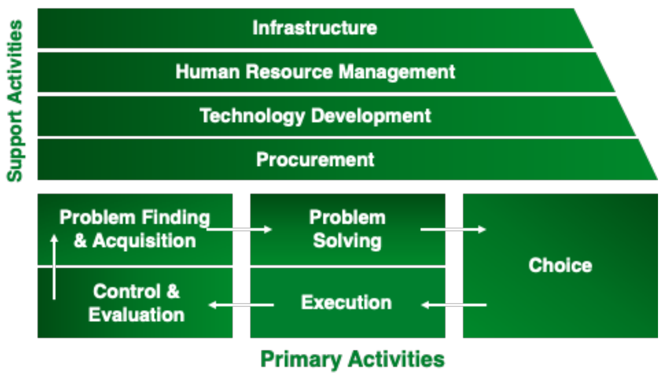


Figure 5: Overview of the value shop

However, it also shows distinct primary activities: problem definition and acquisition, problem solving, choice, execution, control, and evaluation. The activities are performed iteratively, meaning that intermediary outputs, for example from the problem-solving activity, may be used as feedback for later iterations, and thus the value creation process can also identify new or still unsolved problems that were not identified yet. Figure 5 summarizes this value creation process.

The *value shop* generally follows a similar logic as the *value chain*, where primary activities describe the value creation process in combination with the support activities. While the model does not specify whether *value* is conceptualized as *use value* or *exchange value*, Stabell and Fjeldstad (1998, p. 424) described, how the solution of an initial problem represents the starting point for the solution of a follow-up problem. Relative to the solution requirements for the follow-up problem, value can be implicitly defined as *use value*, which determines the success of the subsequent iterations. In contrast to the *value chain*, the *value shop* builds on a service-perspective[13] and tries to solve a customer problem rather than to produce a product. The analytical unit again is the sum of the value activities involved in the development of the solution. They describe a problem-solving process that follows an intensive production logic (Thompson, 1967, p. 17). As the value shop builds on internal feedback loops between the service provider and the client, it could be argued that a *value co-creation* perspective is also addressed. Finally, the value shop addresses value capture, albeit by emphasizing the complexity of measuring the impact of several activities relative to other activities with certain value drivers such as success, managing linkages, learning within the problem context, and finally, knowledge-spillover effects (Stabell & Fjeldstad, 1998, pp. 425–426). Woiceshyn and Falkenberg (2008, p. 86) argued, that despite its usefulness, the model was not widely adopted because it lacks guidance regarding the types of resources involved and because it does not

[13] Service in this context is defined from an SDL perspective, which includes the beneficiary.

clarify, how these resources should be aligned. These ideas are summarized in figure 9 in section 2.1.3.5.

2.1.3.3 Value networks

While the former models describe a more supplier-oriented perspective on *value creation*, a system-perspective has also been introduced as well, for example by Stabell and Fjeldstad (1998, p. 427) or Christiansen and Rosenbloom (2013, p. 238).

Next to the sequential, long-linked technology and the intensive technology, Thompson (1967, pp. 15–17) introduced the mediating production technology. Based on this idea, Stabell and Fjeldstad (1998, p. 427) developed their idea of the *value network*, which links customers with each other and describes the resulting relationships among them. Examples of such networks are telecommunication networks (e.g., phone networks, instant messaging, payments in financial services, etc.). Stabell and Fjeldstad (1998, pp. 427–429) list the following characteristics of this value creation process: ((1) the mediating company manages access, (2) customer contracts steer both customer-to-customer and customer-to-mediator relationships, (3) the sources of value either lie in service, service capacity, or service opportunity, (4) mediating activities are performed on multiple levels, (5) standardization facilitates matching and monitoring, (6) distinct life-cycle phases of rollout and operations, and (7) layered and interconnected industry structure. There are three distinct primary value creation activities in this model (Stabell & Fjeldstad, 1998, p. 429): network promotion and contract management, service provisioning, and network infrastructure operation. While the support activities remain similar to the value chain and the value network, Stabell and Fjeldstad (1998, p. 430) emphasize the importance of network infrastructure development and service development among the technology development activities. Figure 6 shows the *value network* with its distinct value creation activities.

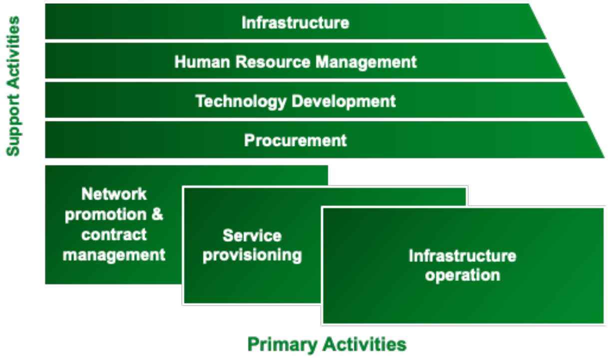


Figure 6: Overview of the value network

Christiansen and Rosenbloom (2013, p. 238) followed a different path with their idea of *value networks*, which they understand as a hierarchical architecture of a nested set of systems or components. In contrast to the *value network* of Stabell and Fjeldstad (1998, p. 430), Christiansen and Rosenbloom (2013, p. 238) understand their idea as a product system, with each product being embedded in other products, components, or whole systems. They clarified that, "… the goods and services which constitute the system of use … may all be made or provided within a single, extensively integrated corporation …" (2013, p. 240). This means that the system perspective focuses on the product instead of a network of actors.

Christiansen and Rosenbloom (2013, p. 240) present their idea of the value network and its distinct network levels with the example of computing applications for a corporate management information system, whereby the top layer describes the corporate management information system with its components (e.g., printers, software, etc.) which builds on the second layer, namely the mainframe computers. This layer also contains distinct components (e.g., the central processing unit, integrated circuit packaging, etc.). This layer builds on a third layer, the disk drivers, which contains its own components (e.g., particulate oxide disks, actuators, etc.). Figure 6 describes this exemplary value network. The concept of the value network resonates with Arthur's (2009, p. 56) idea of recursive systems, where technology is understood as a system of building blocks of sub-technologies.

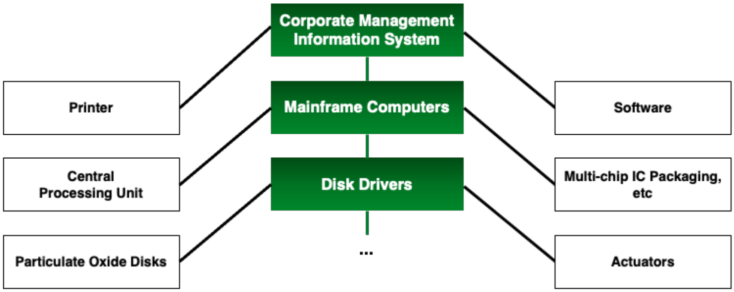


Figure 7: Visual outline of the value network

Both *value network* concepts (Christensen & Rosenbloom, 2013, p. 238; Stabell & Fjeldstad, 1998, p. 420) aim at addressing a system logic of value creation. However, they do so with differing perspectives. Stabell and Fjeldstad define the value as a "…function of positive network demand side externalities" (1998, p. 428), building on Katz and Shapiro (1985, p. 424), who describe the utility of certain products as a function of the demand of other users. Thus, Stabell and Fjeldstad implicitly apply the *use value* concept. From an analytical perspective, they apply a network-of-actors perspective, although they state that the network is established and maintained by a single company (e.g., a telephone network) (Stabell & Fjeldstad, 1998, p. 427). Value activities are analyzed as a unit of analysis. The *value creation* logic builds on Thompson's mediating technology (1967, p. 17), linking various parties with each other. With the value resulting from other parties participating in such a network, one could argue that the model implicitly addresses a value co-creation perspective. Finally, value capture is addressed by specific value drivers, such as scale and composition, capacity utilization, managing linkages, and learning (Stabell & Fjeldstad, 1998, pp. 431–432).

Christensen and Rosenbloom describe value as a function of a specific technological paradigm in the system of use, where each layer depends on the layer in which it is ultimately embedded (or nested hierarchically

(Christensen, 1997, p. 40)). Thus, the product's ultimate use (e.g., a word processing application) stems from the properties of its underlying operating system (e.g., Microsoft Windows), which in turn stems from the properties of its underlying hardware (e.g., the computer as a physical machine), etc. Therefore, it could be argued that the value network applies the *use value* concept. The value net uses a hierarchy of components as analytical perspectives, in which the specific product components (e.g., a word processing application, operating system, etc.) are the unit of analysis which is in contrast to the previously discussed models that so far used value activities. The system perspective rather focuses on the product instead of a system of actors. This value network addresses a mix of different production technologies, where long-linked, intensive, and mediating technologies can be part of the specific components. For interdependent (i.e., hierarchical) systems, Thompson (1967, p. 56) proposes either coordination by standardization through rules or routines, or coordination by planning, which, by definition, restricts the actions of the involved parties. Thus, a value co-creation perspectivegenerally seems widely inappropriate in such value networks. Finally, Christensen and Rosenbloom identify three distinct factors that explain (competitive) advantage in an innovation context, namely (1) the magnitude of technological change, (2) the managerial processes and organizational dynamics with which a company responds, and (3) the context in which the company responds (i.e., the respective value network) (2013, p. 234). These factors are similar to the isolation mechanisms discussed earlier and thus may represent one way to explain value capture in such a context. The ideas of both value network concepts are summarized in figure 9 in section 2.1.3.5.

2.1.3.4 Value creation in e-business

As discussed in section 1.1.1, digitalization and the application of digital technologies have a significant influence on the nature of products and services (Porter & Heppelmann, 2014, p. 66) and therefore on value creation itself (Lenka et al., 2017, p. 93). Research already developed concepts that support the conceptualization of value creation in the digital context, for example, the e3-value ontology[14] (see Gordijn, 2004), the e-business model ontology (see Osterwalder & Pigneur, 2002), or the sources of value creation in e-business (see Amit & Zott, 2001). While Gordijn (2004, p. 99) and Osterwalder and Pigneur (2002, p. 2) used the business model concept, which addresses a broader range of questions on how to conduct business, deliver value, and link product and factor markets (Zott & Amit, 2010, p. 222), Amit and Zott (2001, p. 494) specifically investigated the sources of value creation in e-business, which seems particularly interesting in the context of this dissertation. They introduced four distinct sources of value creation in the context of e-business (Amit & Zott, 2001, pp. 503–509): (1) efficiency, (2) complementarities, (3) lock-in, and (4) novelty.

Efficiency (1) as a source of value results from lower transaction costs of e-business solutions compared to traditional solutions. This could be because of reduced information asymmetry, reduced search costs, enhanced decision-making, greater selection range, simpler transactions, increased transaction speed, and enabling customers to benefit from scale economies (Amit & Zott, 2001, p. 503). Furthermore, e-businesses leverage bundles of complementary (2) products and services for their customers which increase in value if consumed together. Value could be a result of vertical (e.g., after-sales services), or horizontal (e.g., one-stop shopping) complementarities, offline and online complementarities (e.g., browse online, buy offline), complementarities among activities (e.g., supply chain integration), and complementarities between technologies (e.g. weaving together the resources and capabilities of different firms) (Amit & Zott, 2001, p. 505). Lock-in (3) represents another source of value in in e-business, whereby customers engage in repeat transactions. This could be a result of switching costs due to customer loyalty programs (e.g., cashback programs), dominant design

[14] An ontology is an "… explicit specification of a conceptualization" (Gruber, 1993, p. 199) or a "… shared understanding of some domain of interest which may be used as a unifying framework…" (Uschold & Gruninger, 1996, p. 5), and therefore describes a domain's constructs and their relationships.

proprietary standards (e.g., Amazon shopping cart functionality), trustful relationships with customers (e.g., guaranteed transaction safety), customization of products, services, and information, and additionally direct and indirect network externalities (Amit & Zott, 2001, pp. 505–507). Finally, novelty (4) represents the fourth source of value. Novelty, or in other words, innovation, may be a result of structuring transactions differently (e.g., through customer auctions), connecting new parties with the network, or by introducing new content (e.g., customer-generated information) (Amit & Zott, 2001, pp. 508–509). The sources of value are summarized in figure 8.

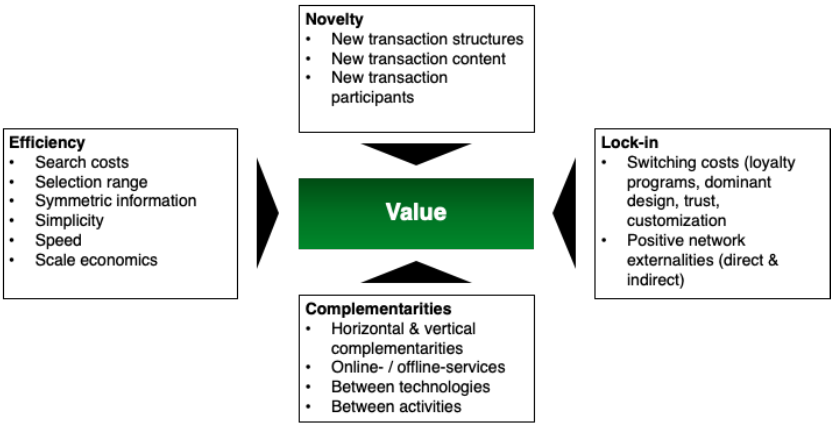


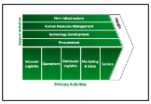
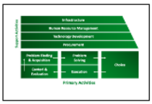
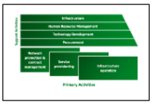
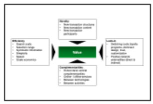
Figure 8: Sources of value creation in e-business

This construct represents a particularly unique example among the previously described models as, despite the name, it focuses on value capture instead of the value creation process, whereby value is explicitly defined as the amount that buyers are willing to pay (Amit & Zott, 2001, p. 496), i.e., the *exchange value*. Amit and Zott (2001, p. 503) build on a network perspective, which means that different parties are connected through digital technologies (i.e., virtual markets) to exchange products or services. However, the actual value creation process is not addressed and the business model is used as an analytical unit (Amit

& Zott, 2001, p. 494). The value creation logic is also not specified, even though it could be assumed that it may combine several different production technologies (i.e., sequential, problem-solving, etc.). Building on this, while a co-creation perspective cannot be observed, it may be an inherent part of the value creation process depending on how, for example, customer interaction is configurated. The focus of this model is therefore on value capture and the value attributes (efficiency, complementarities, lock-in, novelty) and their value sources rather represent isolation mechanisms that help companies to extract exchange value from certain transactions.

2.1.3.5 Summary of the findings

The value chain (Porter, 1985, pp. 33–34), Stabell and Fjeldstad's value shop (1998, p. 420) and value network (1998, p. 427), Christiansen's and Rosenbloom's value network (2013, p. 239), or the sources of value creation in e-business (Amit & Zott, 2001, p. 504) aim to describe the concepts of value, value creation, or value capture in different contexts.

		Value Chain	Value Shop	Value Network (a)	Value Network (b)	Value E-Business
		Porter (1985)	Stabell & Fjeldstad (1998)	Stabell & Fjeldstad (1998)	Christiansen & Rosenbloom (2013)	Amit & Zott (2001)
						
Value Concept	1	Exchange value (explicitly) use value (implicitly)	Use value (implicit)	Use value (implicit)	Use value (implicit)	Exchange value (explicitly)
Value Creation	2	Physical product	Intangible service	Network of actors	Hierarchy of components	Network of actors
	3	Value activities	Value activities	Value activities	Product components	Business model
	4	Sequential (long-linked technology)	Problem solving (intensive technology)	Linking actors (mediating technology)	Mix	-
	5	No	Yes (implicit)	Yes (implicit)	No	-
Value Capture	6	Generic strategies (cost leadership, differentiation), managing linkages	Reputation, managing linkages, learning, learning spillover	Scale & composition, managing linkages, capacity utilization, learning	Technological change, organizational processes & dynamics, techn. context	Value source attributes (efficiency, complementarities, lock-in, novelty)

1) Value concept 2) Analytical perspective 3) Analytical unit 4) Value creation logic 5) Value co-creation 6) Isolation mechanism

Figure 9: Summary and comparison of the value creation concepts

The discussed models show that *value*, *value creation*, and *value capture* can be conceptualized in different ways, depending on the analytical purpose. The analysis of the models revealed various commonalities concerning the analytical unit of value activities (except for the sources of value creation in e-business). Porter's value chain seems to provide an important foundation for the conceptualizations, with some directly building on Porter's ideas, and some referencing the value chain concept on a different level of analysis (see Christensen & Rosenbloom, 2013, p. 240). However, the analysis also revealed that a clear idea of the object of analysis is necessary as it may have implications for how the concept is built and later used. For example, Porter addresses both *use value* and *exchange value* and combines the value creation process with a conceptualization of value capture, which increases the explanatory power of the value chain. Stabell and Fjeldstad focus more on the value creation process while, despite the terminology, Amit and Zott seem to only focus on value capture. Figure 9 summarizes the properties of the value creation concepts discussed.

The analysis shows that, due to the wide combination of different underlying constructs (i.e., value, value creation, value capture), different ideas of the value creation logic (i.e., due to different production technologies), or the (mostly) strong focus on single organizations, the question arises how value creation can be conceptualized in complex network structures such as ecosystems. However, before clarifying what ecosystems are and what makes value creation unique in these structures, the next section first discusses the theoretical foundation on which this dissertation builds its understanding of value creation.

2.1.4 Resource-based view and resource integration as a theoretical foundation for value creation

The concept of value creation is theoretically grounded in the resource-based view (RBV) combined with the resource integration perspective. The RBV represents a theory that views firms as a set of resources that are allocated in such a way to effectively and efficiently create value.

Furthermore, the RBV identifies strategically relevant resources that help to explain the firm's relative performance. Building on this, resource integration describes how actors, firms, and customers leverage their resources and integrate them to (co-)create value.

2.1.4.1 Resource-based view

Already in the late 1950s, Penrose (1959) described a company as a "…collection of productive resources…" (p. 21), which include physical resources such as material, and human resources such as skilled and unskilled labor, that are applied to create value. In addition to these two categories, organizational resources have also been mentioned early on (see Tomer, 1987). The RBV of the firm provides a complementary perspective to the prevailing focus on products to identify new strategic options (Wernerfelt, 1984, p. 179). Barney (1991) describes resources as "…all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm …" (p. 101) that enable the firm to create value.

While strategic perspectives on value creation prevail (see Penrose, 1959; Porter, 1980, 1985), Barney (1991, p. 100) points out that these ideas were built on two simplifying assumptions: (1) firms in an industry are identical in terms of their resources, and (2) any arising resource heterogeneity is only temporary. Therefore, RBV uses specific attributes to explain which resources are strategically relevant: to contribute to a sustainable competitive advantage, resources must be valuable, rare, imperfectly imitable, and without strategically equivalent substitutes (Barney, 1991, pp. 106–111).

However, a sustainable competitive advantage does not necessarily last indefinitely, especially in a dynamically and rapidly changing market, which is one of the major criticisms of RBV (Eisenhardt & Martin, 2000, p. 1106). Such a volatile environment requires another set of resources, termed dynamic capabilities, that enable timely responsiveness, innovation, effective coordination of and redeployment of resources (Teece et al., 1997, p. 515). The concept describes a firm's ability to constantly and purposefully create, extend, or modify its available resources to sustain or renew its competitive advantage (Helfat et al., 2007, p. 1). Teece (2007, p. 1342) describes three fundamental dynamic capabilities: (1) sensing, which refers to the active monitoring of a firm's environment to identify opportunities, (2) seizing, which refers to structures, procedures, and incentives to seize opportunities, and (3) managing threats and transforming, which describes continuous alignment or reconfiguration of the resource base.

With these theoretical ideas in mind, this dissertation understands value creation as the application and combination of resources to create valuable products and services that are perceived as useful by the customer. Furthermore, additional value is created in the context of dynamic capabilities if new opportunities are identified and seized or when available resources are reconfigured in a novel way. Building on the ideas from section 2.1.2, this dissertation extends this supplier-centered perspective with the resource integration perspective.

2.1.4.2 Resource integration

The RBV and dynamic capabilities focus their analysis of value creation on single organizations, which may be particularly useful in various situations, thereby shedding light on the dynamics in a single department or company. With the increasing application of digital technologies and, as a result, the increasing interconnectedness of organizations in networks such as ecosystems, the explanatory power of such a perspective may be limited. Therefore, this dissertation extends its understanding of value creation in the context of RBV with the resource integration perspective, which includes further actors and their individual resources.

The resource integration perspective is rooted in SDL (see Vargo & Lusch, 2004), and states that "all social and economic actors are resource integrators" (Vargo & Lusch, 2008, p. 7), whereby actors are defined as customers, suppliers, and other stakeholders (Kleinaltenkamp et al., 2012, p. 202). The customer follows various roles in this concept, e.g., ,designer, manufacturer, chooser, order processor, negotiator, payer, consumer/user, quality controller, maintainer, repairer, and disposer (Hibbert et al., 2012, p. 248). This perspective views resources as being only potentially valuable until actors make use of them in a value co-creation process (Edvardsson et al., 2014, p. 294). Therefore, resource integration is understood as being collaborative (Kleinaltenkamp et al., 2012, p. 202) and requires shared institutional logics (Edvardsson et al., 2014, p. 299).

In section 2.1.4.1, the categories physical resources, human resources, and organizational resources were introduced. However, SDL proposes a different categorization. SDL leverages the concepts of operand and operant resources (see Constantin & Lusch, 1994). Operand resources are generally physical resources upon which an act or operation is performed to achieve a goal (Vargo & Lusch, 2004, p. 2), whereas operant resources, typically human, organizational, informational, and relational (Hunt, 2004, pp. 21–22), are used to act upon other resources to reach an effect (Vargo & Lusch, 2004, p. 2). Building on this, Madhavaram and Shelby (2008, p. 70) introduced a hierarchy of operant resources, which describes different combinations of operand resources: (1) basic operant resources, (2) composite operant resources, and (3) interconnected operant resources.

(1) Basic operant resources are the general building blocks (i.e., knowledge and skills) that enable value creation. (2) Composite operant resources refer to a combination of two or more distinct basic, operant resources. (3) Interconnected operant resources function similarly to composite resources, although in this case the building blocks interact with and reinforce each other.

Building on the previously discussed ideas, this dissertation understands value creation as the result of various actors (providers, consumers, partners) who apply, make their own resources available, combine, and integrate them into a solution to co-create value. They use both operand and operant resources and may combine them to create higher-order operant resources (Madhavaram & Hunt, 2008, p. 70). This perspective provides a wider analytical lens to include various parties in the value creation process. This seems beneficial since ecosystems consist of various actors who leverage their resources. With the theoretical background of value creation specified, the next section clarifies what ecosystems are and how value creation is unique in these structures.

2.2 Ecosystems

In his article "Predators and Prey: A New Ecology of Competition", Moore (1993) introduced the terminology of business ecosystems, a structure in which "…companies co-evolve capabilities around a new innovation: they work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations" (p. 76). Since then, the idea of ecosystems has gained increasing amounts of attention from both researchers and practitioners (Jacobides et al., 2018, p. 2256). The following sections discuss the concept of ecosystems, develop characteristic elements, and provide a theoretical grounding for the remainder of the dissertation.

2.2.1 Building on a biological metaphor

Moore (1993, p. 76) borrowed the concept of ecosystems from biology, where it was first introduced by Tansley (1935, p. 299) in the search for a suitable analytical perspective on complex systems that consist of various organisms inhabiting a specific region. To him, the "…fundamental conception is … the whole system (in the sense of physics), including not only the organism-complex, but also the whole complex of physical factors…" (Tansley, 1935, p. 299). Therefore, the concept describes the living objects (referred to as the biotic component), their environment (referred to as the abiotic component), and the interactions between them[15] (Jax, 2006, p. 240; Pickett & Cadenasso, 2002, p. 2). Pickett and Cadenasso (2002, p. 240) highlighted two additional interesting properties of this concept. Firstly, the concept is scale-independent, which means that an ecosystem can be either very small or very large given that the organisms, their environment, and their relationships can exist within it. Secondly, the concept does not require narrow assumptions concerning equilibrium, complexity, or stability, and ecosystems must thus be understood as dynamic systems that are subject to constant change regarding their composition or content. Due to the

---

[15] The formal biological definition used is taken from Jax (2006, p. 240): "an assemblage of organisms of different types (species, life forms) together with their abiotic environment in space and time."

broad definition, the concept requires models that specify the components, relationships, and scope in a given context (Pickett & Cadenasso, 2002, p. 2).

Ecosystems can either be well-bounded, for example through physical boundaries, interactions, and processes, or open systems in which organisms can freely migrate to or leave the system (Post et al., 2007, p. 122). However, in general, both well-bounded and fully open ecosystems are considered as being "open" to a certain degree, where possible boundaries can be defined through resource-flows, community[16] membership, or physical forms (Post et al., 2007, p. 115).

2.2.2 Ecosystems in the business context

2.2.2.1 Ecosystems defined

Building on the ideas outlined above, ecosystems describe the assemblage of distinct organizations and their relationships with each other. Building on Moore (1993), Williamson and de Meyer define ecosystems as "a network of organizations and individuals that co-evolve their capabilities and roles and align their investments so as to create additional value and/or improve efficiency" (p 76). This definition implies that ecosystems consist of different types of actors whose activities are somehow coordinated. Adner (2017) defines an ecosystem as an "... alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize" (p.42) emphasizing relationships and the alignment of actions in the network towards a shared goal. Jacobides et al. (2018) focus on the nature of complementarities from various autonomous actors and defined ecosystems as a "…set of actors with varying degrees of multilateral, nongeneric complementarities that are not fully hierarchically controlled" (p. 2264). Despite the focus on complementary products, this definition implies that

[16] Biological community refers to "an assemblage of organisms of different types …" (Jax, 2006, p. 240); population refers to "a group of individual organisms of the same species…" (Jax, 2006, p. 240).

the actors must be considered as being autonomous, as their contributions are not fully hierarchically controlled by a single party.

These and other definitions[17] focus on the network of organizations or individuals and their relationships. However, the biological metaphor implies that the analytical focus should also include the actors' environment. This was implicitly addressed by Burkhalter (2019), who defines ecosystems as "… dynamically evolving communities of interdependent social and economic actors which interact through coordinated technologies, norms and rules to co-create and co-capture value in relation to a shared purpose permitting the alignment of their individual goals" (p.82). On the one hand, this definition addresses shared technologies, such as platforms[18], which have been associated with ecosystems (Adner, 2017, p. 50; Betz et al., 2021, p. 3; Hein et al., 2019, p. 5; Jacobides et al., 2018, p. 2258; Parker et al., 2017, p. 257). On the other hand, this definition mentions shared norms and rules and thereby refers to a shared institutional logic (Autio, 2021, p. 11; Betz et al., 2021, p. 3; Muegge, 2013, p. 13) which can be understood as the environment in which actions are embedded (Autio & Thomas, 2018, p. 10). Thus, both the physical medium of interaction and the shared rules and values should be addressed. Building on these ideas and on Betz and Jung (2021a, p. 6124), this dissertation uses on the following definition of ecosystems:

An ecosystem is a dynamic structure of different interdependent yet autonomous actors and their environment, who coordinate their complementary activities towards a shared value purpose to co-create value.

Before reviewing the value creation characteristics of ecosystems in greater detail, it is important to mention that there are already several

[17] For an extensive list of definitions from academic literature, see Burkhalter (2019, pp. 73–76).
[18] This dissertation defines platforms as "products, services, or technologies that … provide the foundation upon which outside firms (organized as a "business ecosystem") can develop their own complementary products, technologies, or services" (Gawer & Cusumano, 2013, p. 418).

specific types of ecosystems. While most of these concepts refer to similar or even identical concepts of ecosystems (Autio, 2021, p. 2), the next section reviews the most important ones and specifies the terminology used in this work.

2.2.2.2 Ecosystem types

Autio (2021, p. 2) mentions numerous terms in the context of ecosystem literature: e.g. business, platform, innovation, knowledge, entrepreneurial, industry, technology, and sector ecosystems. In the context of SDL, Vargo and Lusch (2011) use the term service ecosystem. In addition to these, Faber et al (2019, p. 7) identified the terms software ecosystem, digital business ecosystem, Internet of Things business ecosystem, internet business ecosystem, mobile internet business ecosystem, customer-centric business ecosystem, and family spin-off ecosystem.

While many of the above-mentioned terms have a common denominator concerning the interactions of interdependent actors, Jacobides et al. (2018, p. 2556) highlight that these concepts use differing perspectives to analyze specific aspects of ecosystems. For example, a business ecosystem puts the community of organizations, institutions, and individuals in the focus of attention, thereby describing value creation as a result of numerous interactions of suppliers, complementors, authorities, customers, etc. (Teece, 2007, p. 1325). Business ecosystems put the relationships and the configuration of activities among their actors – who collaborate and support each other – into the focus (Betz & Jung, 2021a, p. 6123; Iansiti & Levien, 2004, p. 1; Peltoniemi & Vuori, 2008, p. 6).

Innovation ecosystems, on the other hand, focus on the underlying innovation (a new technology, product, or service) and how it is created and commercialized (Jacobides et al., 2018, p. 2257). Even though Moore uses the business ecosystem notion, a focal aspect in his understanding is the innovation, for which actors coordinate complementary contributions (Moore, 1993, p. 76, 2006, p. 32), whereas other scholars focus their attention on the alignment of these actors for an innovation to be implemented (Adner & Kapoor, 2010, p. 9, 2015, pp. 18–19; C. Baldwin, 2012, p. 20). Furthermore, the innovation ecosystem perspective sheds light on possible innovation challenges such as component or complement challenges (Adner & Kapoor, 2010, pp. 12–13) or risks such as co-innovation or adoption risks (Adner, 2006, p. 6, 2013b, p. 89;99), thereby investigating interdependencies.

Digital platforms (see Gawer, 2014, p. 1239; Gawer & Cusumano, 2014, p. 419; Yoffie et al., 2019, p. 2) play an essential role in facilitating transactions or bundling functionalities (Cusumano et al., 2020, p. 48). Jacobides et al. (2018, pp. 2257–2258) identified platform ecosystems as a third important literature stream, with a central hub (i.e., the platform provider) and several complements from partner companies that provide the overall platform offering. Cusumano, Gawer and Yoffie (2019, pp. 48–49) used two distinct platform types in this context: transaction platforms and innovation platforms, which help to govern the ecosystems with adequate rules (Cusumano et al., 2020, p. 48). The digital platform stream focuses on the technical aspects such as the platform, programming interfaces, software development kits, etc. (Jacobides et al., 2018, p. 2558).

Other classification approaches, building on different conceptual ideas, are also available in the literature. Guggenberger et al. (2020, p. 10) propose five ecosystem types: socio-centric, symbiotic collective, centrally balanced, orchestrating actor, and structured resource sharing ecosystems. Knodel and Manikas (2015, p. 63) developed four software ecosystem types, namely cornerstone, standard-based, protocol-based, and infrastructure-based ecosystems. Pidun et al. (2019, p. 3) introduced a similar perspective on ecosystems as described in the platform ecosystem context (Michael Cusumano et al., 2020, p. 48) and developed transaction ecosystems and solution ecosystems.

Despite the variety of classification approaches available, the conceptual ambiguity and overlapping usage of ecosystem types remain an issue (Autio, 2021, p. 2). Therefore, this dissertation uses the broader term *ecosystem* to address the research at hand without specifically addressing any specific type. In this way, it avoids the difficult discussion on how specific ecosystem types can be clearly differentiated. However, when referring to *ecosystems*, this dissertation mainly builds on the insights from the *business ecosystem* and *innovation ecosystem* literature. Although the terms *business ecosystems* and *innovation ecosystems* are closely related, the term innovation ecosystem puts more emphasis on generativity, which means that ecosystems may generate unprompted, unpredictable, and innovative outputs (Autio, 2021, p. 6). Additionally, insights from the platform ecosystem literature are used since the technical aspects in the context of digital technologies play a crucial role when it comes to value creation in ecosystems. Based on this clarification on how the term ecosystem is used, the next section describes the characteristics of ecosystems.

2.2.3 Value creation characteristics of ecosystems

The biological metaphor describes three distinct components of ecosystems: the biotic (organisms of different types), the abiotic (the environment), and the relationship (the interactions among the organisms and their environment) components. Similarly, Betz and Jung (2021b, p. 2) used this idea to specify what ecosystems are, while Betz, Schache and Jung (2021, p. 7) developed ecosystem characteristics that describe the unique organizational context and its value creation characteristics. The following sections combine both approaches to describe the value creation characteristics of ecosystems in each of the three components.

2.2.3.1 The relationship component

The relationship component addresses the interaction among the ecosystem participants and their environment. Similarly, Betz and Jung (2021a, p. 6127) identified a network level of analysis that refers to the interactions among the actors and which corresponds to this idea. Betz, Schache, and Jung (2021, p. 7) identified three ecosystem characteristics for this component: (1) alignment with a shared value purpose, (2) multilateral relationships, and (3) value co-creation.

The term shared value purpose was coined by Burkhalter (2019, p. 2;199) and serves as an overarching vision for the participants (Gawer & Cusumano, 2014, p. 429; Nambisan & Sawhney, 2011, p. 48). Therefore, (1) alignment with a shared value purpose therefore describes how different actors coordinate their activities to contribute individual inputs to this overarching vision (Autio & Thomas, 2018, p. 11). Their activities require coordination efforts (Jacobides et al., 2018, p. 2560), orchestration processes (Nambisan & Sawhney, 2011, p. 40), or alignment (Adner, 2017, pp. 47–48). Furthermore, the shared value purpose is subject to constant change (Betz & Jung, 2021a, p. 6127; Williamson & de Meyer, 2012, p. 39).

Ecosystems are characterized by (2) multilateral relationships among their participants (Adner, 2017, p. 49; Jacobides et al., 2018, p. 2264), which means that ecosystem participants form a complex web of direct and indirect links with other participants that may create high interdependencies (Helfat & Raubitschek, 2018, p. 1392; Kapoor & Lee, 2010, p. 275). This can be regarded as an element that helps to distinguish ecosystems from other concepts. In static supply chains, for example, there are mostly direct links between supplier and customer, where the supplier integrates different components into a product that is desired by a customer, while the customer does not have direct relationships with the supplier's suppliers.

Additionally, the relationships are characterized by (3) value co-creation (see section 2.1.2) with different actors, in addition to the customer, being an integral part of the value creation (Betz et al., 2019, p. 4; Betz & Jung, 2021a, p. 6126). The ecosystem's offering comprises several building blocks from different parties, which ultimately form the overall offering (Betz & Jung, 2021a, p. 6129; Jacobides et al., 2018, p. 2260). According to Jacobides et al. (2018, p. 2260), the fundamental prerequisite is a modular architecture, where modularity refers to systems that are composed of independently designed units that function in a coherent whole (Baldwin & Clark, 1997, p. 86). With modularization, distinct resources can be combined or integrated more easily, whereby modularization promotes the realization of value co-creation (Singaraju et al., 2016, p. 48).

2.2.3.2 The biotic component

The biotic component in the biological metaphor, which corresponds to the actor level according to Betz and Jung (2021a, p. 6127), describes the different participants. Betz, Schache, and Jung (2021, p. 7) identified two specific characteristics that can be assigned to this component: (4) actors in different roles, and (5) non-hierarchical control.

The evidence suggests that ecosystem participants pursue specific roles (4) that can be defined from different perspectives, for example from a behavioral or a company-centered perspective (Betz et al., 2019, p. 2). This dissertation follows Burkhalter (2019, p. 205), who proposes the user, the provider, the orchestrator, and the contributor roles. Each of these roles has individual interests (Jacobides et al., 2018, p. 2260) or needs (Burkhalter, 2019, p. 92) that have to be considered (Adner, 2017, p. 47).

Furthermore, ecosystem participants are characterized by autonomy, or in other words, their actions cannot be (5) fully hierarchically controlled by one party (Autio & Thomas, 2018, p. 24; C. Baldwin, 2012, p. 21; Jacobides et al., 2018, p. 2260). Autonomy can be viewed from two perspectives. On the one hand, no single entity in an ecosystem controls all assets and capabilities within the network (Autio, 2021, p. 1), as even the prominent role of the orchestrator indirectly shapes an ecosystem indirectly, rather than through direct command or control (Williamson & de Meyer, 2012, p. 26). On the other hand, individual actors receive significant freedom in the context of distributed decision making, e.g., production or pricing decisions (Betz & Jung, 2021a, p. 6124; Jacobides et al., 2018, p. 2256; Moore, 1993, p. 85).

2.2.3.3 The abiotic component

While every business, or network of businesses, is embedded in a larger environment or higher-order system such as the economy, this component refers to the particular medium that enables the participants' interactions. Betz, Schache, and Jung (2021, p. 7) identified two characteristics of this component, namely (7) the shared infrastructure and (8) the shared institutional logic.

As discussed earlier, digital technologies have a significant influence on value creation and promote the evolution of ecosystems. Therefore, ecosystems are characterized by a (7) shared infrastructure. For example, digital platforms such as transaction platforms for exchanging goods and services, or innovation platforms for integrating functionalities, may be an integral building block of ecosystems (Betz & Jung, 2021b, p. 2; Iansiti & Levien, 2004, p. 7; Jacobides et al., 2018, p. 2259). However, it is important to note that a platform is not necessary for ecosystems per se (Autio, 2021, p. 5) even though it may promote the interactions of the various parties. Other technologies such as shared interfaces (see Berentzen et al., 2021; Commerzbank, 2020) or programming support such as software development kits (SDK), also refer to this characteristic.

Finally, actors in ecosystems share (8) norms and rules (Anggraeni et al., 2007, p. 16) or shared institutional logics (Autio & Thomas, 2018, p. 11). While shared norms, rules, or institutional logics are sometimes difficult to identify, Betz, Schache and Jung (2021, p. 8), for example, identified ten distinct cultural values (beliefs concerning what is important to the members of the ecosystem): (a) consistency of purpose and goals, (b) innovative adaptability, (c) partnering attitude, (d) collaborative engagement, (e) interorganizational openness, (f) partner supportiveness, (g) identity creation, (h) self-directed and autonomous actions, (i) task orientation, and finally (j) needs and norm orientation. Shared norms, values, and beliefs make it easy for different actors to collaborate and align their activities. This is an important yet under-researched component in the context of ecosystems (Betz et al., 2021, p. 2).

2.2.3.4 Summary of the analysis

Various important characteristics address the unique value creation dynamics in ecosystems, however, without an overarching theory of ecosystems (Jacobides et al., 2018, p. 1), it remains difficult to delaminate the phenomenon from other concepts and to deduct meaningful and actionable conclusions from it.

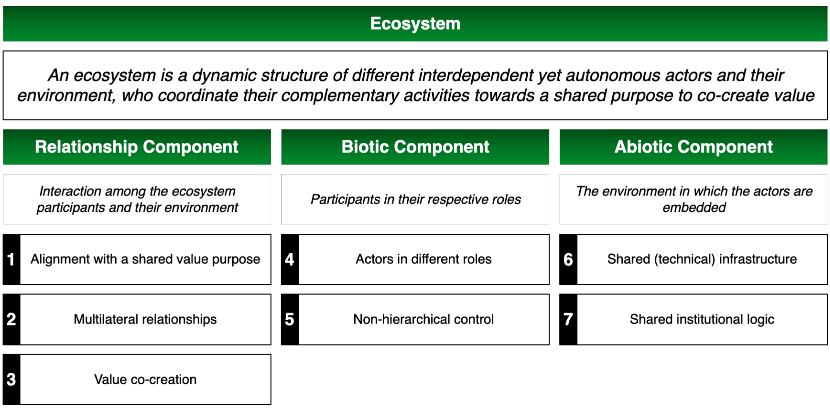


Figure 10: Definition of ecosystems, and their components, and characteristics (based on Betz and Jung (2021b)*; Betz, Schache, and Jung (2021))*

Building on the biological metaphor, seven distinct characteristics were synthesized under three main components, namely relationship, biotic, and abiotic components. For each of these components, building on Betz, Schache, and Jung (2021, p. 7), several characteristics were used. Figure 10 summarizes the proposed ecosystem characteristics.

The next section provides the theoretical grounding for the above-described conceptual ideas.

2.2.4 Transaction cost theory and business networks as a theoretical foundation for ecosystems

There are three fundamental economic functions, namely allocation, monitoring, and coordination, which can be facilitated by three organizational forms: free markets (coordination through the price mechanism), hierarchies (coordination through power structures), and interagency arrangements, e.g., contracts (coordination through formal and informal conventions) (Chandler & Daems, 1979, p. 3). The question concerning which organizational form is used under which conditions was raised by Coase (1937, p. 390), according to whom using the price mechanism (i.e., the market) is said to also come at a cost, namely that of a transaction cost. Thus, allocation, monitoring, and especially coordination can be understood as a problem of efficiency (Williamson, 1981, p. 574), where certain properties will either lead to coordination through free markets or through hierarchies. This can be explained by the transaction cost theory (see Dahlman, 1979; Williamson, 1979, 1981, 2002). This dissertation builds on transaction cost theory to better explain how ecosystems emerge as a unique organizational form between markets and hierarchies (De Meyer & Williamson, 2020, p. 80; Jacobides et al., 2018, p. 2256).

2.2.4.1 Transaction cost theory

Transaction cost theory focuses on the transaction between different parties as being the unit of economic analysis (Williamson, 1981, p. 550). Williamson defines transaction costs as "… the comparative costs of planning, adapting, and monitoring task completion under alternative governance structures" (Williamson, 1981, pp. 552–553). In contrast to other classical theories, Williamson introduces two important assumptions (1981, p. 553): (1) human behavior is subject to bounded rationality, and (2) agents are subject to opportunism. The optimal organizational structure is a result of minimizing transaction costs (Young, 2013, p. 2548), given that contracts are incomplete and due to the assumptions above (Williamson, 2002, p. 188).

Dahlman (1979, p. 148) describes three distinct categories of transaction costs: search and information costs, bargaining and decision costs, and policing and enforcement costs. Such costs arise due to the nature of transactions between different parties (Williamson, 1979, p. 239): they are subject to (1) uncertainty, (2) frequency, and (3) specificity. With these parameters in mind, the most efficient governance structure is chosen that creates order, mitigates conflict, and creates mutual gains (Williamson, 2002, p. 180). Williamson (2002, p. 181) describes the comparative governance costs as a function of asset specificity, with transaction costs increasing as asset specificity increases. Figure 11 summarizes these relationships and shows the cost of market governance (M), the cost of hierarchy governance (H), and a hybrid governance mode (X) in between.

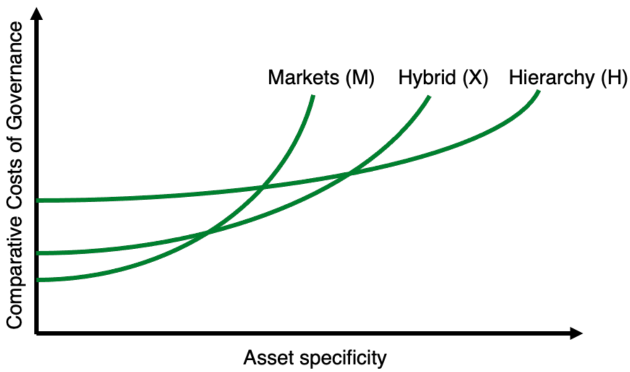


Figure 11: Comparative costs of governance as a function of asset specificity, illustration from (O. E. Williamson, 2002, p. 181)

Various hybrid organizational forms between markets and hierarchies have already been identified. Zenger and Hesterly (1997, p. 209) for example, mention virtual corporations, clusters, organizations, regional networks, hybrid organizations, schamrock organizations, or network organizations. Siebert (2003, p. 9) lists co-operations, relational contracting, clans, federations, or collectives as examples, while strategic alliances are yet another example of this hybrid form (Banalieva & Dhanaraj, 2019, p. 1380; Dyer, 1996, p. 650). However, Powell (1990, p. 298) argued that the spectrum of markets and hierarchies should not be understood as a continuum of transactions, with markets being the starting point and hierarchies being the endpoint as hybrid forms combine different mechanisms, for example, the price mechanism of markets, with trust from hierarchies (Siebert, 2003, p. 11).

By leveraging digital technologies, characteristics from markets and hierarchies can be combined to create an efficient hybrid governance structure, for example through decreasing transaction costs or asset specificity[19] (Autio et al., 2021, p. 7; Banalieva & Dhanaraj, 2019, p. 1372). Through leveraging information technology, transaction costs for collecting information, communication, and controlling activities can be significantly reduced (Loebbecke & Picot, 2015, p. 3), while large decreases may even lead to small activity chunks that other organizations do not integrate anymore (i.e., mass amateurization) (Loebbecke & Picot, 2015, p. 5). Another example targets the decreasing asset specificity (see De Vita et al., 2011) due to digital technologies (Oliveira et al., 2021, p. 8), for example through a modular system or product architectures whereby transaction costs decrease at the module boundaries (Baldwin, 2008, p. 33). Modularity allows the production of independent components that can easily be combined with others (Jacobides et al., 2018, p. 2260) through partitioned design rules (Baldwin & Clark, 1997, p. 86). Another example addresses the decreasing geographical asset specificity of human capital (Banalieva & Dhanaraj, 2019, p. 1379) such as skills across human geographies as people can easily communicate across borders via the internet. Such developments support the formation of hybrid structures that combine the complementary strengths

[19] For more facets of asset specificity, see (De Vita et al., 2011)

of markets with those of hierarchies based on reciprocity and relationships (Powell, 1990, p. 300).

Zenger and Hesterly (1997, p. 210) highlighted this tendency towards hybrid organizational structures due to innovations in measurement, monitoring, organizational design, and information technology. More specifically, they introduced two selective intervention mechanisms, namely the infusion of hierarchy into market governance and the infusion of market governance into the hierarchy, to describe the disaggregation of corporations and thus the formation of hybrid organizational structures (Zenger & Hesterly, 1997, p. 211).

This dissertation understands ecosystems as being a hybrid organizational structure that combines characteristics of markets and hierarchies by leveraging digital technologies. Markets allow for a high degree of specialization while at the same time raising the pressure for improved efficiency (Siebert, 2003, pp. 10–12). Decreasing transaction costs due to digital technologies lead to increasing disaggregation and further specialization and thus promote market-like structures, while at the same time promoting trust (instead of opportunism) (Siebert, 2003, p. 13), for example, due to easy access to and transparency of information (Siebert, 2003, pp. 13–14). This is even further accelerated by modularization as the modules show thin crossing points with low transaction costs at the module boundaries and therefore allow easy interaction (Baldwin, 2007, p. 4). According to Jacobides et al. (2018, p. 2260), modularity is a necessary prerequisite for ecosystems to emerge. The value of these modules reflects the ease with which other actors can interact, use, and combine them with other modules (Autio, 2021, p. 4). Because of these characteristics, actors form principal-principal relationships in ecosystems that are not governed by formal supplier contracts (Autio, 2021, p. 3).

Additionally, Norman and Ramirez (1993, p. 69) describe how products and services are becoming denser, with increasing amounts of information, knowledge, and other resources packed into such modules.

This can be interpreted as a decreasing asset specificity that allows for easy reconfiguration (Normann & Ramirez, 1993, p. 72) or recombination (Baldwin, 2012, p. 22; Parker et al., 2017, p. 1) of modules.

In this way, participants can contribute inputs based on their own judgement, while features of such input are often not defined or constrained in advance, which explains how ecosystems sometimes form unprompted, innovative outputs (Autio, 2021, p. 6). Thus, transaction cost theory with decreasing transaction costs due to digital technologies and decreasing asset specificity as a result of increased asset density leads to efficient market-like governance structures that would otherwise not be beneficial as an organizational structure.

2.2.4.2 Business networks and ecosystems

As described, ecosystems form a unique organizational structure between markets and hierarchies, in which participants create a complex network of relationships. Extensive research on networks of organizations or business networks is already available (see Ahuja, 2000; Alt, R., Legner, 2008; Brandenburger & Nalebuff, 1997; Eckert, 2011; Oesterle et al., 2000; Pagani & Pardo, 2017; Porter, 1990; Sydow, 2003).

Business networking, for example, is defined as "… the management of IT-enabled relationships between internal and external business partners" (Oesterle et al., 2000, p. 2). It describes how digital technologies support organizations in designing and marketing new solutions such as new or improved products, additional sales channels, procurement, collaborative processes, performance management, or new information services (Oesterle et al., 2000, p. 18). With increasing specialization promoted by such digital technologies, and closer collaboration of oftentimes autonomous organizational units (Oesterle et al., 2000, pp. 2; 72), careful management of relationships, coordination of processes, and strategizing about the position in such network structures are necessary (Oesterle et al., 2000, pp. 19–23).

Business network paradigms offer important strategic, process-, and system-oriented tools and approaches to shape and manage networks, for example, strategies for business networks (Oesterle et al., 2000, p. 95), service-oriented architectures for business networks (Löhe & Legner, 2009, p. 315), service orchestration (Alt et al., 2019, p. 1), management of interorganizational networks (Sydow, 2003, p. 312), networkability as a measure for efficiency for joining and switching of networks (Alt & Smits, 2007, p. 120), etc. However, Autio (2021, p. 3) mentions that a coherent system-level output is what sets ecosystems apart from other interorganizational networks, (often) without a central integrator who combines the available complements into a whole (i.e., in supply chains). Ecosystems describe the relationship structure among the specific roles as opposed to focusing on single, dyadic relationships (Banalieva & Dhanaraj, 2019, p. 1380). Jacobides et al. (2018, p. 2261) argue in a similar direction, namely that participants (i.e., customers or complementors) can freely choose with whom to interact while allowing them significant decision autonomy concerning how to contribute to creating value.

This dissertation, therefore, understands ecosystems as unique structures compared to other business networks (Autio, 2021, p. 3; Jacobides et al., 2018, p. 2261), even though it must be acknowledged that several elements from other network paradigms are leveraged, including a shared networking infrastructure (Oesterle et al., 2000, p. 4), collaborative processes (Ahuja, 2000, p. 426), or coordination of such processes across organizations (Kohlmann & Alt, 2007, p. 183). However, ecosystems that leverage such networking mechanisms allow for a higher degree of self-directed action with only a few (if any) direct interventions, e.g., central planning, to allow for emergent system-level outputs.

2.3 Mini case studies: Organizations in ecosystems

With the conceptual and theoretical ideas in mind, this section discusses some practical examples of ecosystems. In doing so, the important conceptual cornerstones are revisited and applied. Five mini case studies were identified and are presented as examples of organizations in ecosystems.

2.3.1 Overview of analysis and approach

Numerous examples of companies that successfully operate in ecosystems are available in the literature. Birkinshaw (2019, p. 3), for example, lists Amazon, Google, Alibaba, Tencent, Uber, and WeWork. Jacobides (2019b, p. 3) mentions Hyundai's BlueLink, PingAn, Babylon Health, or KPN as examples. Adner (2006, p. 2) pointed out that leading examples come from the high-tech industry, for example, Intel, Nokia, SAP, or Cisco (with other industries catching up). However, due to the conceptual ambiguity of the phenomenon (Autio, 2021, p. 2) and the complex nature of such network structures (Fuller et al., 2019, p. 4), it can be difficult to identify and describe examples of ecosystems in real-life contexts.

Therefore, this section identifies five cases (real-life instances), which are qualitatively analyzed based on predefined analytical parameters. The case selection was facilitated purposefully (Seawright & Gerring, 2008, p. 295) instead of randomly, to identify (1) representative instances and (2) useful variations on the dimensions of theoretical interest (Seawright & Gerring, 2008, p. 296). By screening academic- and practice-oriented literature, a total of 10 potential instances were identified. To facilitate the collection of a diverse set of instances, and especially to ensure some level of controversy among the cases, the examples were pre-examined and a decision was made to select five focus cases. The following selection criteria were used for the long-list: (1) instance was mentioned in an ecosystem context in academic- or practice-oriented literature, (2) shared infrastructure observable as a point of orientation, and (3) public information is available. For the final short-list, it was important to ensure (4) diversity in terms of industry and offered services, and (5) potential controversy during the analysis (i.e., likelihood that the instance cannot be clearly assigned to the ecosystem concept). Table 1 shows the 10 long-listed cases and the five selected focus cases.

Cases (long-list)	**Sources (academic- & practice-oriented literature)**	**Short-listed**
Amazon Marketplace	(Birkinshaw, 2019, p. 3; Jacobides et al., 2019, p. 16; Pidun & Reeves, 2020, p. 4)	yes
Alipay (Application)	(R. Johnson et al., 2018, p. 10; Rong et al., 2018, p. 251; Tanguy Catlin et al., 2018, p. 11)	yes
Apple App Store	(De Meyer & Williamson, 2020, p. 103; Jacobides et al., 2018, p. 2269; Pidun et al., 2020, p. 2)	no
better place	(Adner, 2013b, p. 258, 2013a, p. 2; Pidun et al., 2019, p. 8)	no
Google Nest	(Subramaniam et al., 2019, p. 85; Tanguy Catlin et al., 2018, p. 3; Teece, 2018, p. 1380)	yes
Instagram	(Desmet et al., 2019, p. 2; R. Johnson et al., 2018, p. 37; Reeves et al., 2017, p. 2)	no
Nespresso	(Jacobides, 2019a, p. 130; Jacobides et al., 2018, p. 2262; Kiefer et al., 2019, p. 20)	yes
Netflix	(Ansari et al., 2016, p. 1839; Iansiti & Lakhani, 2017, p. 88; Ref et al., 2017, p. 5)	yes
WeChat (Tencent)	(Birkinshaw, 2019, p. 3; Jacobides, 2019b, p. 3; R. Johnson et al., 2018, p. 10)	no
YouTube	(Autio, 2021, p. 5; Burkhalter, 2019, p. 368; Pidun et al., 2019, p. 4)	no

Table 1: Long-list & short-list for mini case studies in alphabetical order

It is important to emphasize that despite the case name (e.g., Instagram or Netflix), the company or platform cannot be equated to the ecosystem. As discussed in section 2.2.4, an ecosystem represents an organizational structure between markets and hierarchies and one company (or platform) does not represent an entire ecosystem. The cases rather analyze how these organizations position themselves in the larger context and if their value-creation follows the previously identified ecosystem characteristics. For simplification purposes, the single organization name is used to identify ecosystems, which for example refers to the Amazon Marketplace case.

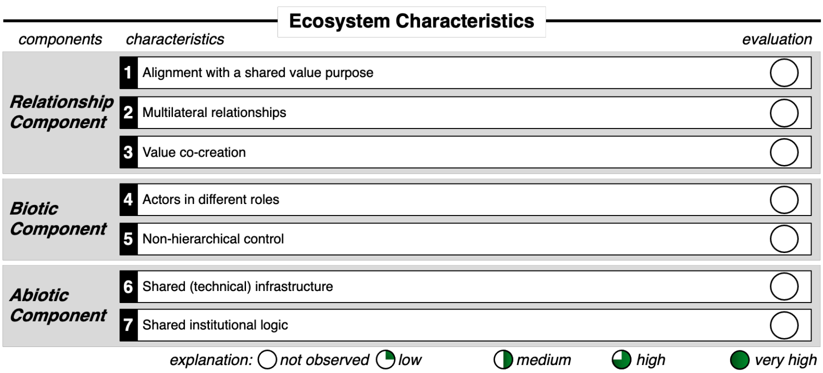


Figure 12: Analytical grid for mini case study analysis

While an extensive case study research requires a dedicated research approach (see Eisenhardt, 1989; Yin, 2009), the cases discussed in this section were analyzed as mini-cases, which means that after a brief introduction only the relevant analytical parameters are discussed. These are facilitated as descriptive case studies (Dul & Hak, 2008, p. 225). For reasons of comparability, the mini cases follow a consistent structure: (1) short introduction, (2) case analysis including the relationship, biotic, and abiotic components, and (3) conclusion. For part (2), the underlying analytical parameters were chosen based on the ecosystem characteristics from section 2.2.3, building on Betz and Jung (2021b) and on Betz, Schache, and Jung (2021). Each of the characteristics was evaluated qualitatively, and the result was visually summarized using Harvey balls. Figure 12 shows the overall analytical grid used.

2.3.2 Case 1: Amazon marketplace

Introduction. The idea behind Amazon was conceived in 1994 (Stone, 2013, p. 30) as an internet-based “everything store” that would connect manufacturers and customers (Stone, 2013, p. 51). After Jeff Bezos, the founder of Amazon, moved to Seattle to work on the business plan, he identified several products that were most promising to sell over the internet and initially focused on books (FundingUniverse, n.d.-a). Through fast-growing sales, Amazon managed to sell books in all US states within months. Although skeptics expected business from incumbents such as Barnes & Noble to push Amazon out of the market soon (Spiro, 2009), Amazon managed to make its first full-year profits by 2003 and reached a revenue of more than 4 billion US dollars by 2008 (Spiro, 2009). To facilitate this, from early on, Amazon designed its web-shop or marketplace to contain important functionalities such as a virtual shopping basket, a safe way to enter credit card data, and a search engine to navigate through the product catalog (Stone, 2013, p. 79). Besides the fast-growing marketplace, Amazon also invested in its technology stack, including open application programming interfaces (APIs) that ultimately led to its Amazon Web Services (AWS) offering, which markets technical infrastructure such as storage, databases, and computing power (Stone, 2013, p. 478). By 2020, Amazon realized an annual revenue of 386 billion US dollars and an operating income of almost 23 billion US dollars (Amazon Inc., 2021b, pp. 25–26). Amazon is now one of the highest valued companies in the world (Murphy et al., 2020).

Before starting the analysis, it is important to specify the object of interest. Amazon as a corporation is not a suitable object of interest for an ecosystem analysis. It operates several platforms and service solutions. A more suitable object of interest is the Amazon marketplace, which is the platform that supports the interaction of network participants. While the Amazon marketplace is coupled with several complementary solutions, for example, movie streaming, music streaming, or the Kindle e-reader, it is important to restrict the analysis to a single functionality to avoid high complexity. The analysis thus focuses on the network structure and its various actors who collaborate via the marketplace.

The relationship component. Firstly, ecosystems evolve around a shared value purpose, which is difficult to observe in practice. One proxy can be the company vision or mission of the orchestrator (Burkhalter et al., 2021, p. 280), which might reveal how the orchestrator perceives the network around it. Amazon, for example, states that its mission is to become the most customer-centric company in the world (Amazon Inc., 2021c). This statement by itself focuses on the organization instead of on a network. However, Amazon adds that it aims to help customers discover products and business and content creators to maximize their success (Amazon Inc., 2021c). This emphasizes that the organization sees itself as part of a larger network that does not only serve a single organization but rather serves a whole community. In addition to Amazon's mission, evidence for a shared value purpose can be found in the organization's actions. From an early stage, Amazon built powerful open APIs that were accessible to external developers who could use these to build their own functionalities or to embed Amazon services on their own websites, which Bezos famously commented with "let them surprise us" (Stone, 2013, p. 478). This, at least implicitly, emphasizes the presence of an overall shared value purpose that is larger than just the Amazon organization.

Secondly, ecosystems are characterized by multilateral relationships, which can be observed in the Amazon marketplace. While Amazon itself is oftentimes positioned as the primary retailer from which customers can buy products, Amazon started to open up its marketplace for numerous independent third-party retailers (Rankin, 2015). Amazon provides different sales options for retailers through which they can choose to use other Amazon services besides the placement on the marketplace (e.g., payment, logistics, etc.), which creates a net of multilateral relationships between Amazon, third party retailers, partners, and customers.

Thirdly, ecosystems are characterized by value co-creation. The combination of complementary services, for example supporting external developers to create additional functionalities or integrating Amazon features into other websites, can be interpreted as co-creation. Additionally, customers are asked to participate by, for example, rating transactions or providing customer evaluations which serves as another piece of evidence for co-creation.

The biotic component. Ecosystems combine various actors in different roles. Apart from the customer or user, several other roles can be observed. Third-party retailers can be understood as providers and even the customer as a product reviewer and content creator can be understood as a provider. Numerous contributors such as third-party developers, logistics, and payment providers support the transactions as contributors. Amazon itself holds several roles, for example, as a provider of retail or even own products (e.g., the e-reader hardware Kindle), as an orchestrator coordinating customers and providers, and as a contributor, for example by providing crucial support activities such as sales support for third party retailers.

Secondly, ecosystems are characterized by non-hierarchical control. Amazon only holds limited directive power over third-party retailers, who set their prices and sometimes even facilitate the transactions themselves, including payments and logistics. However, Amazon is also criticized for its monopoly over third-party retailers, who rely on Amazon as their primary channel and are threatened by potential intervention of Amazon e.g., through rising commissions, limiting price changes, etc. (Kestenbaum, 2021). Despite the relatively low direct hierarchical control, Amazon, therefore, has indirect tools to influence the actors in the network and to ultimately capture value for itself.

The abiotic component. In its orchestration role, Amazon operates a transaction platform that facilitates the marketplace. Additionally, Amazon provides various open APIs that can be used by other external parties to work with Amazon functionalities and embed them in different contexts. Therefore, a shared infrastructure is present, which ranges from Amazon to other websites featuring Amazon content. Finally, a shared institutional logic, with shared values and beliefs, is difficult to observe. However, Amazon provides guidelines concerning which products may or may not be sold on the marketplace (e.g., pornography, illegal products, or learning material for teachers including quit solutions are not allowed) (Amazon Inc., 2021d). Amazon also supports conflict resolution between consumers and traders (Amazon Inc., 2021a).

Conclusion. Amazon significantly shaped e-commerce and how customers and retailers interact with each other. Critical voices emphasize that the Amazon marketplace is rather an online store or a digital channel for products. However, the analysis shows, that Amazon was able to cultivate much more than this. The Amazon marketplace enables a complex web of relationships and supports various (third-party) actors with their individual needs. Figure 13 summarizes the analysis across the seven ecosystem characteristics and concludes, that the Amazon marketplace facilitates a larger ecosystem, with unique actors in different roles, who interact with each other. It is important to emphasize again, that the Amazon marketplace itself is not an ecosystem, but rather that it enables the ecosystem.

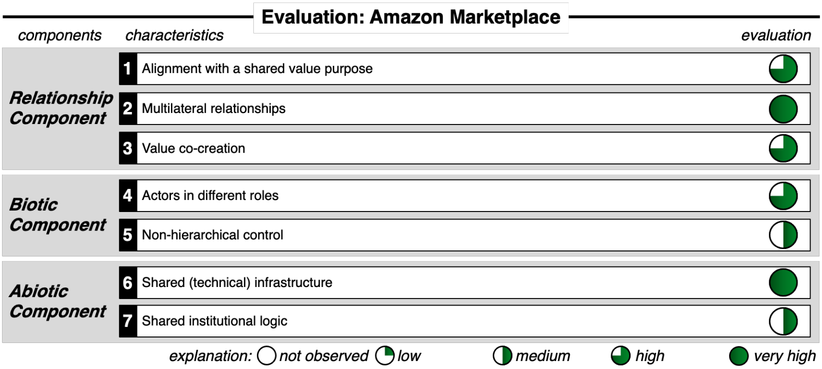


Figure 13: Evaluation of the Amazon marketplace mini case, own evaluation

2.3.3 Case 2: Alipay (Application)

Introduction. The second case concerns the Chinese mobile application Alipay, which is a widely used application that combines a very popular peer-to-peer payment functionality with numerous other functionalities in a so-called “super-app”. It provides access to mobility services, entertainment, and retail all bundled into one mobile application. Alipay was created in 2004 within the Alibaba group and later moved into a newly established corporation: Ant Group (Ant Group, 2020, p. 4). By late 2020, Alipay had more than 1.3 billion active users (Wade & Teracino, 2020) and with over 50% of the market share in mobile payments in China, it is the largest mobile payment solution worldwide (Hirsch, 2019). Alipay started as a simple peer-to-peer payment solution to help buyers and sellers on Taobao (a marketplace for third-party retailers, comparable to the Amazon marketplace) to facilitate their transactions efficiently and securely. It now combines various other third-party functionalities from external partners, ranging from food delivery to garbage collection (Tudor-Ackroyd & Bray, 2020). Ant Group also integrated several other financial services solutions into the Alipay app. For example Yu'e Bao, Ant Group’s cash management platform, Huabei, a consumer credit platform, Xiang Hu Bao, an online mutual aid platform, MyBank, a private online bank, and finally Zhima Credit, Ant Group's credit assessment service (Ant Group, 2021). Alipay facilitated 118 trillion RMB of transactions during July 2019 and June 2020, with more than 80 million active merchants (Ant Group, 2020, p. 9).

The object of analysis is the network that evolved around the Alipay app, rather than the whole Ant Group corporation, or its parent company Alibaba, which is sometimes also compared to an ecosystem (Ant Group, 2020, p. 8). Ant Group can be understood as a corporation that manages a whole portfolio of products and services which are all integrated into the Alipay app.

The relationship component. The shared value purpose can be observed implicitly. Ant Group states that the Alipay platform targets fostering openness, transparency, and trust among its participants (i.e., consumers, merchants, financial institutions, third-party service providers, etc.) (Ant Group, 2020, p. 8). Alipay also runs a catalog of open APIs including documentation and developer support, so that external developers can integrate Alipay functionalities in other contexts (Alipay, 2021a). This underpins a shared value purpose, which is a vision that extends from Alipay towards the larger network. Ant invested early in establishing a large partner network consisting of third-party providers. For example, users can find and rent bikes using Hellobike, collect and redeem rewards on Starbucks products, reserve a table, or order from their preferred hot pot restaurant (e.g., Haidilao) in China. Additionally, users can interact with each other directly, for example by making peer-to-peer payments. This creates a complex web of multilateral relationships among all participants. Additionally, Alipay especially targets merchants, third-party developers, and partners to leverage Alipay functionalities in their specific contexts (e.g., via APIs). Alipay also triggers customer interaction with these partners or among each other, thus integrating the customer into the value creation process. This can be interpreted as a value co-creation setting.

The biotic component. The network around the Alipay app contains various actors in different roles. Alipay itself acts as an orchestrator, bringing together different parties and as a provider, for example with various financial service solutions such as payments, loans, and investments. Additionally, several independent providers (e.g., ride-hailing platforms, restaurants, shops) complement Alipay's overall offering. Furthermore, Alipay cannot exercise full hierarchical control over all these services in its network. For example, while ordering, preparing, and delivering food from restaurants is coordinated via Alipay, the respective actors have to act autonomously for the offering to come into place. Thus, full central hierarchical control is not present in this network structure.

The abiotic component. Alipay offers its users and its third-party providers a platform on which they can integrate individual functionalities. Providers, such as bike-sharing platforms like Hellobike, as well as other third-party developers, can create so-called mini programs, which are applications that are embedded within Alipay so that users do not have to leave the Alipay platform (Alipay, 2021b). Open APIs offer another possibility to embed Alipay functionalities in other contexts. Thus, the network leverages a shared infrastructure that extends beyond a single organization. Furthermore, Alipay does not involve itself in conflicts, for example between merchants and customers, although it offers a member protection program to foster trust among network participants (Chargeback Gurus, 2021).

Conclusion. Alipay operates a platform on which various parties (users, providers, third-party developers) can interact with each other. Alipay understands its role as being to enable interactions among network participants and offers tools and interfaces to support the network. Based on the analysis of the ecosystem characteristics, it can be concluded that Alipay is part of a larger ecosystem that creates benefits for users and various providers. However, similar to the Amazon marketplace case, it is important to focus the analysis on a specific functionality instead of the Ant Group corporation, and not to mistake Ant Group itself for the ecosystem. Figure 14 summarizes the analysis.

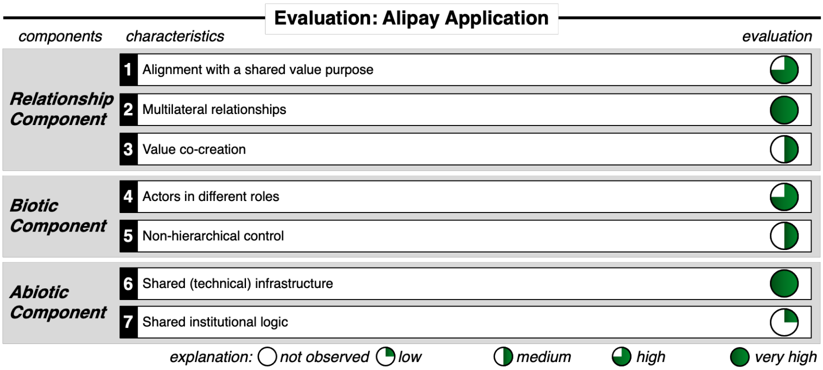


Figure 14: Evaluation of the Alipay application mini case, own evaluation

2.3.4 Case 3: Google Nest

Introduction. Google, with its various solutions, provides another interesting case for an ecosystem analysis. Larry Page and Sergey Brin, the two founders of Google, met in 1995 at Stanford University, where they started collaborating to develop a search engine which aimed at determining the importance of specific web pages on the internet using hyperlinks (Google, 2021a). With an initial angel investment of 100,000 US dollars, Page and Brin established Google in 1998 and by late 1999 its search engine received more than 500,000 queries per day (Long, 2007). In addition to Google's search engine solution, the company invested in several other products and solutions. For example, Google acquired the online video platform YouTube in 2006 for 1.65 billion US dollars, which back then already accumulated 50 million users and reached a market share of 46% (Sorkin & Peters, 2006). Other strategic acquisitions of complementary solutions include DoubleClick for 3.1 billion US dollars to strengthen its online advertising capabilities (Lawsky, 2008), Motorola Mobility for 12.5 billion US dollars to strengthen its mobile phone technology capabilities (Tsukayama, 2011), or Waze for 966 million US dollars to strengthen its real-time traffic update and navigation capabilities under Google Maps (Kerr, 2013). In 2014, Google acquired nest labs, a tech startup working on a smart home device, namely a programmable and self-learning thermostat for 3.2 billion US dollars (Constine, 2014). Google was reorganized in 2015 and became, among others, a subsidiary of the newly founded parent company Alphabet Inc (Kelly, 2015). By the end of the fiscal year 2020, Alphabet realized 182 billion US dollars in revenues and 40 billion US dollars net income (Alphabet Inc., 2021).

While Alphabet provides several solutions that might be interesting in the context of an ecosystems analysis, the following analysis focuses on the smart home solutions around Google Nest. This domain comprises various hardware and software products, for example, audio speakers, displays, cameras, thermostats, streaming devices, and doorbells, that can all be connected and remote-controlled using Google's Home app (Google, 2021f). While Google markets a large variety of hardware products by itself, Google Nest shows high interoperability with other hard- and software providers outside of Google, for example, smart light bulbs (e.g., Lifx smart light bulbs), Dimmer plugs (e.g., Lutron dimmer plugs), smart door locks (e.g., August Wifi Smart Lock), or even Amazon's Echo (Amazon Echo display Show 8) (Prospero, 2021).

The relationship component. Google does not state an overall vision for its Google Nest line except to create a holistic ambient computing future, with easy-to-use smart home devices (Statt & Bohn, 2019). Nevertheless, Rishi Chandra, Google's vice president of products and responsible for Google Nest, states that each piece of hardware and software is understood as a part of a larger system, instead of doing everything on its own (Statt & Bohn, 2019). This provides implicit evidence of a shared value purpose. Building on this understanding, the actors in the network are subject to multilateral relationships, where Google's devices, third-party devices, and even software from third-party developers must interact with each other and, ultimately, with the users. To support these interactions, Google Nest provides several APIs and Software Development Kits (SDK) to support developers and to increase interoperability (Google, 2021c). Furthermore, co-creation elements can also be observed, for example, with Google's Nest learning thermostat, which analyzes heating and cooling activities and adjusts these according to the individual user preferences, thereby deeply integrating the user into the value creation process (Google, 2021e). As some of the products require technical expertise for setting up, Google also connects homeowners with independent professionals for installation support and thereby complements the overall experience with other professional services (Google, 2021b), which implies a co-creation approach.

The biotic component. Google itself is present in various roles in this ecosystem. It orchestrates the value creation activities, for example, by connecting independent parties, or by setting technical standards that ensure interoperability. Furthermore, it acts as a provider with its hardware product line, which includes such items as speakers, displays, etc. Google also acts as a contributor and enables other parties such as third-party software developers to create functionalities for the network. Furthermore, various other providers contribute hardware devices such as light bulbs, speakers, etc., even including Google's competitor Amazon, whose Echo devices can also be connected with the system (Google, 2019). Despite the provision of technical standards or interfaces (Google, 2021c), Google only has limited control over partner devices, for example, it cannot control the functionalities or user experience of Amazon Echo. When it comes to professional installation support, Google states that it partners with Handy cleaning and professional services or OnTech smart device installation services, but does not take any responsibility or liability for their activities (Google, 2021b).

The abiotic component. Google operates several infrastructural components in this system. While Google provides hardware, such as speakers or displays, it also runs software to coordinate all smart home devices. It is important to mention that these components span over other organizations as well. Third-party developers create additional functionalities, and other software components can also be integrated, for example, Netflix can be watched directly on the Google Nest Hub Max (Google, 2021d). In addition to these hard- and software components, open APIs provide additional elements, thereby helping others to connect their own devices to the system (e.g., Amazon Echo). Despite the defined technical standards laid down, it is difficult to identify shared institutional logics such as shared values or rules.

Conclusion. Google Nest is a product line that combines hardware products, such as speakers, displays, thermostats, etc. which are used to control activities around the home. These smart home devices work together with other devices beyond Google's own product range. Additionally, third-party developers can create functionalities using Google's infrastructure. The whole smart home experience is complemented by connecting homeowners with professional service providers that help with the product installation. Homeowners are also encouraged to leverage third-party complementary products within the Google Nest system, such as Netflix, which provides additional content for the system. Figure 15 summarizes the analysis of the Google Nest mini case.

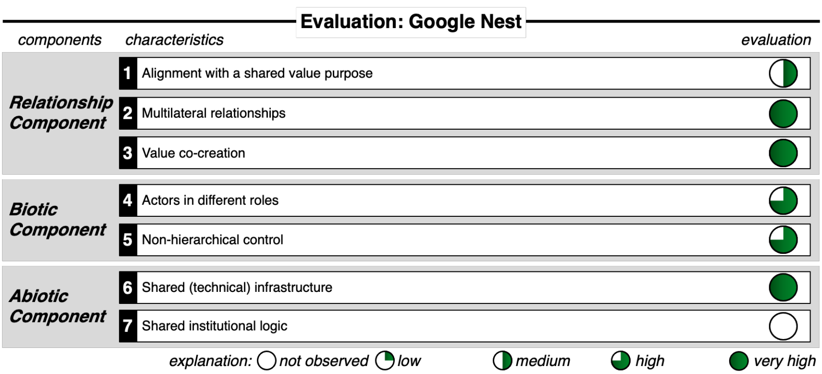


Figure 15: Evaluation of the Google Nest mini case, own evaluation

2.3.5 Case 4: Nespresso

Introduction. Nespresso started in 1986 with the idea of enabling anybody to brew the perfect cup of coffee, for which they developed a portioned coffee system (Nespresso, 2021c). The system uses pre-packaged coffee portions, or capsules, which are used with specific coffee machines (Nespresso, 2021b). By calibrating the capsules and the machines, Nespresso ensured that customers get a cup of coffee with the same quality and taste over time. Although Nespresso sources its coffee beans from more than 11,000 farmers around the globe, the company produces every capsule itself in one of its three productions sites: Orbe, Romont, or Avanches in Switzerland (Nespresso, 2016). To market its capsules, Nespresso leverages its flagship stores and has also built a direct-to-customer e-commerce solution that supports customers with individual payment options (i.e., subscription models) or software-based customer services (Nestlé, 2021, p. 19). Besides the sale of its coffee capsules, the company also rigorously protected its coffee machine technology with 1,700 patents concerning its portioned coffee system filed to date (Alderman, 2010). However, it licensed several companies to produce Nespresso compatible coffee machines, for example Jura, Braun, Krups (Jacobides et al., 2018, p. 2262). The production company Eugster Frismag alone produced 95% of Nespresso machines in 2005 (red, 2005). Nespresso is part of the Nestlé group, which operates the powdered products division with other brands like Nescafé, Starbucks, Dolce Gusto, or Milo (Nestlé, 2021, p. 20). In 2020, the group division realized 22 billion Swiss Francs of revenues, of which 5.9 billion came from Nespresso sales alone (Nestlé, 2021, pp. 54, 58).

According to Jacobides (Jacobides, 2019a, p. 130), Nespresso was able to design and orchestrate an ecosystem spanning multiple sectors. Nevertheless, the tight control structures (patents), production configuration (capsule production solely by Nespresso in Switzerland), and the strict direct-to-customer marketing (through Nespresso stores or the

Nespresso website) make an ecosystem context less likely, wherefore a detailed analysis is necessary.

The relationship component. Nespresso states its purpose as “cultivating coffee as an art to grow the best in each of us” (Nespresso, 2021e) and thus solely focuses its attention on the product itself. Nespresso selects its coffee beans (Nespresso, 2021e) and ensures high quality and state-of-the-art agricultural practices by sending professionals from its team of 400 agronomists to the farmers that supply it with coffee beans (Nespresso, 2021b). The actual coffee production at any one of Nespresso’s three production sites is solely controlled by Nespresso, although the coffee machine technology is licensed to other providers, whereby Nespresso provides technical specifications for its license holders. The product-centered purpose, as well as its operating model, indicate the absence of an overarching shared value purpose. Furthermore, there are only a few multilateral relationships within the coffee distribution and consumption process. While the coffee is sourced, processed, and encapsulated by Nespresso, the distribution of coffee capsules is also carefully controlled by Nespresso, either with its online presence and distribution solutions or through its online sales, exclusive retail boutiques, and flagship stores (Matzler et al., 2013). Thus, Nespresso follows a strict direct-to-customer marketing strategy. Customers can choose to buy non-Nespresso branded coffee machines directly from Nespresso or at other retail stores, which creates the only other touchpoints for customers and other providers. Therefore, there are no distinctive multilateral relationships present in this case. As both coffee production and distribution are controlled by Nespresso, there are only two areas that allow for a co-creation approach. This could involve the coffee machine producers, although the technology is highly protected by Nespresso and third-party providers must follow the technical specifications laid down, wherefore this does not qualify as a co-creation approach. The second area refers to the customer interaction, for which Nespresso offers specialists (e.g., customer service) to assist its customers with issues around capsules, coffee machines, accessories, or capsule recycling, etc. (Nespresso, 2021d). However, this also does not quality as a co-creation approach.

The biotic component. Nespresso aims at carefully controlling each step in its supply chain and especially focuses on its brand image during customer interactions. Most of these interactions focus on traditional supplier relations, e.g., sourcing raw coffee or for the production of Nespresso coffee machines. The only additional providers in this scenario are the coffee machine license holders such as Jura, Braun, Krups, or Eugster Frismag. Thus, there is only a limited number of different roles in this case. Furthermore, their supply chain is strictly hierarchically controlled, both in the direction of the coffee suppliers, where quality is carefully controlled by Nespresso itself or towards its licensed coffee machine producers. The limited number of distribution channels for Nespresso capsule sales is another sign of strict hierarchical control.

The abiotic component. Nespresso does not rely on complex technical infrastructure, such as digital platforms, for its business. While sales are partly facilitated through its online shop, this infrastructure is strictly used by Nespresso only. On the other hand, the coffee machines could act as an infrastructure for other participants. However, this component is also strictly controlled by Nespresso, despite licensing the technology to some selected manufacturers. When it comes to a shared institutional logic, Nespresso shows a rather organization-centered approach, in which the company itself defines and ensures quality. Nespresso is, however, engaged in various alliances in the context of sustainability, thus, one can conclude that it is also part of a community with shared values (Nespresso, 2021a).

Conclusion. Nespresso established a very strong brand for coffee through its portioned coffee system. The company achieved this by building and carefully controlling a supply chain that starts at the farmers who produce the raw coffee. Nespresso processes and markets the coffee under its brand in a direct-to-consumer approach. Furthermore, it established a carefully protected coffee machine system, which it licenses to selected partners.

While the case has been mentioned as a successful case for ecosystem design and orchestration (Jacobides, 2019a, p. 130), the analysis reveals a rather linear, product-centered supply chain, which is carefully controlled by a single company. According to the analysis, the license model alone provides a weak argument for an ecosystem and the case rather emphasizes that despite the increasing attention concerning ecosystems, successful business models can still thrive outside of the ecosystem domain. Figure 16 summarizes the analysis.

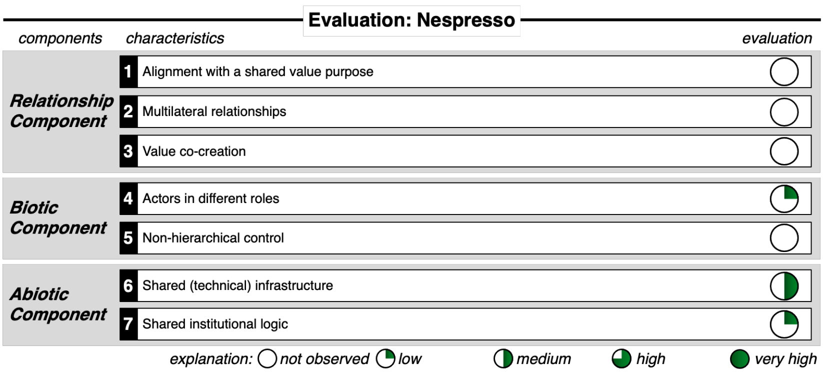


Figure 16: Evaluation of the Nespresso mini case, own evaluation

2.3.6 Case 5: Netflix

Introduction. Netflix is an American content streaming and production company, founded in 1998 by Reed Hastings and Marc Randolph as an online DVD rental store (Hastings & Meyer, 2020, p. 35). Similar to the incumbent company Blockbuster, which mostly relied on physical stores where customers could find and rent videos (VHS, DVD), Netflix started to offer DVDs for a rental fee and sent them to its customers via US postal mailings (FundingUniverse, n.d.-b). In May 1998 they had 30 employees and 925 DVDs in their portfolio (Hastings & Meyer, 2020, p. 35). Soon, Netflix introduced a monthly subscription model, where customers were able to select as many DVDs to rent as they wanted, without any additional fees, which is a model that was strongly growing in 2002 (Hastings & Meyer, 2020, p. 38). In late 2002, when Netflix initiated its IPO, where it sold 5.5 million shares at 15 US dollars per share (Netflix, 2002), it had already mailed about 190,000 DVDs per day to its 670,000 subscribers (Wayner, 2002). Since Netflix aimed at delivering video content in high quality, in the early 2000s the company worked on the "Netflix box", its own broadcasting hardware, which could be used to broadcast content in higher quality (Kyncl, 2017). However, it decided against implementing the physical hardware after observing the success of YouTube and its content streaming and in 2007 it started focusing on online content streaming instead (Kyncl, 2017). Next to the distributing or streaming content from other providers, which fell under licensing agreements between Netflix and the content owners (Beers, 2020), Netflix started to invest heavily in the production of its own high-quality content in 2013, with the TV show "House of Cards" as its first original content (Lovely, 2020). Netflix believes that original content is crucial for differentiating it from other video streaming platforms (Netflix, 2021b, p. 5). By 2021, Netflix is said to spend around 17 billion US dollars annually on content (Low, 2021). By the end of 2020, paid subscriptions at Netflix exceeded 200 million (Dean, 2021) and the company realized revenues of 25 billion US dollars and a net income of 2.7 billion US dollars in 2020 (Netflix, 2021b, p. 20). With Netflix's success in defining the delivery of video content for its large customer network, the question arises if the company itself is orchestrating a large video streaming ecosystem.

The relationship component. Netflix states that it aims to entertain the world and provide access to best-in-class TV shows (Netflix, 2021a). This perspective reveals a focus on the customer and less so on other network members. Netflix rather acts as a redistributor of either licensed movies or shows or its own originally produced content. Furthermore, its corporate vision states that Netflix wants "to continue being one of the leading firms of the internet entertainment era" (Rivera, 2019), which is a rather company-centered vision instead of one that addresses the larger network. However, Netflix implicitly leverages a larger network, for example by making its streaming platform available for other partners (e.g., on Google Nest). When it comes to multilateral relationships, Netflix solely acts as an interface between content and its customers, thereby carefully controlling the relationship between the platform and its users. Furthermore, there is no interaction between the users and the content owners. However, Netflix does follow a multi-device strategy, with the platform being integrated on streaming players (e.g., Apple TV, Google Chromecast), smart TVs (e.g., Samsung, Grundig, LG, Philips), gaming consoles (e.g., Xbox One, Playstation 5) as well as blue-ray players or home cinema systems (e.g., Samsung, Sony, Toshiba), which creates a web of relationships among different devices (Netflix, 2021d). Netflix is also well known for its personalization efforts and supports users to discover content that best fits their needs. Netflix uses several mechanisms to achieve this: suggested videos and their ranking, the way videos are organized into rows and pages, and the artwork displayed (Netflix, 2021c). This can be interpreted as a co-creation approach in which Netflix uses user data such as previously watched movies to adapt the platform to customer needs.

The biotic component. Although Netflix manages a portfolio of licensed video content in addition to its own video content it interacts with its users as a sole provider, which does not qualify for a complex web of roles. However, Netflix can be understood as a provider in other contexts, for example with its integration in Google Nest or Xbox One consoles. However, the content is strictly hierarchically controlled. Either Netflix acts as the producer of video content, or it uses license models for other available content, therefore the network around Netflix's platform follows a hierarchical control structure.

The abiotic component. While Netflix provides a web-based platform to create access to its video content, no other content (e.g., advertisement, non-Netflix video content) is integrated on the platform. However, Netflix published open APIs so that others can integrate functionalities and content in their own specific context (Netflix, 2016). Netflix was also recognized for its unique organizational culture (Hastings & Meyer, 2020, p. 12) of which one of the fundamental elements is radical transparency (Ramachandran & Flint, 2018). However, Netflix has repeatedly been criticized for a lack of transparency outside of its organization (Hersko, 2019), which can be interpreted as Netflix distinguishing its company values from its environment, and therefore, not promoting shared values or beliefs outside of its organization.

Conclusion. Netflix significantly contributed to developing a novel approach for how a broad audience can receive access to video content. The company first used mailings to send DVDs to its customers, introduced a convenient subscription model, and finally made the fundamental shift towards video streaming. Netflix mainly uses license models and by now produces its own high-quality content, and thereby tightly controls the available content. While Netflix well understood how to connect to partners to offer its content in other contexts (e.g., on Google Nest, or gaming consoles), it does not allow any partners on its streaming platform. Although its video streaming platform does not promote the evolution of an ecosystem around it, Netflix acts as a provider in various other ecosystems where it is able to integrate access to the video content. Figure 17 summarizes the findings.

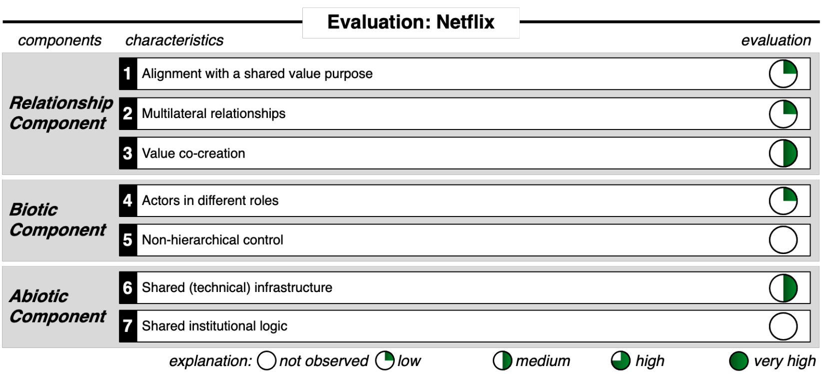


Figure 17: Evaluation of Netflix mini case, own evaluation

2.3.7 Summary of the analysis

The mini case studies addressed distinct configurations of how organizations position themselves in a wider network. Furthermore, differing service contexts or industries were addressed, including retail business, smart home services, communication, consumer goods, and entertainment.

Amazon, for example, operates a platform that facilitates interactions among different actors (third-party retailers, logistics companies, etc.), without being required to offer all products and services by itself. The application Alipay established a platform for other providers of software functionalities (e.g., mini programs) and acts as a mediator for interaction, for example by establishing trust mechanisms for online shopping through its payment solution. Google developed its Nest product line and made it accessible to other actors such as hardware providers, software providers, or even competitors (e.g., Amazon Alexa). Nespresso, on the other hand, established a unique coffee machine system and offers high-quality products with a recognized brand in a direct-to-consumer approach. However, this example revealed the tight control the company exercises over its suppliers (the coffee bean farmers) or its partners (through licensing agreements for coffee machines). Netflix nicely demonstrated a fundamental operating model shift, from a DVD mail concept towards a content streaming approach, with licensed content and, by now, a great deal of self-produced content. Despite Netflix's efforts to integrate their offering into other solutions (e.g. Google Nest), Netflix displays a rather linear, tightly controlled operating model that does not promote the development of an ecosystem around the Netflix platform. It rather acts as a provider in the context of other ecosystems, where users can access Netflix. Figure 19 summarizes the findings of the analysis and compares the seven ecosystem characteristics across the mini case studies.

Summary of mini case studies

components	*characteristics*	amazon	Alipay	Google Nest	Nespresso	Netflix
Relationship Component	1 Alignment with a shared value purpose	◕	◕	◑	○	◔
	2 Multilateral relationships	●	●	●	○	◔
	3 Value co-creation	◕	◑	●	○	◑
Biotic Component	4 Actors in different roles	◕	◕	◕	◔	◔
	5 Non-hierarchical control	◑	◑	◕	○	○
Abiotic Component	6 Shared (technical) infrastructure	●	●	●	◑	◑
	7 Shared institutional logic	◑	◔	○	◑	○

explanation: ○ *not observed* ◔ *low* ◑ *medium* ◕ *high* ● *very high*

Figure 18: Summary of the mini case study analysis, own evaluation

The analysis revealed how the companies with their unique solutions and their technical infrastructure are either promoting the formation of ecosystems or rather still operating in a traditional, supplier-customer relationship. While Nespresso and Netflix do not seem to promote the formation of ecosystems, the case study nevertheless revealed that ecosystems are not necessarily a source of high company performance but rather represent distinct organizational configurations. Product- and organizational-centric configurations, as shown by Nespresso, may reveal advantages, since image and brand are an important element of their success – which is more difficult when tight control of suppliers and partners is not possible. However, networks and ecosystems might promote other outcomes. For example, a wide product portfolio could be favored by configurations such as the Amazon marketplace, while interoperability and a deep integration of services and functionalities may be favored in configurations such as Google Nest. This is interesting insofar as it leads to the question of whether there are specific ecosystem configurations that can be differentiated. This question is addressed under RQ1 later in this dissertation.

2.4 Current state of research

This section presents a structured literature review that aims at presenting the current research in the context of value creation in ecosystems, upon which this dissertation subsequently builds its findings. The literature review is facilitated based on the research process of vom Brocke et al. (2009).

Figure 19: Literature research process according to vom Brocke et al. (2009, p. 2213)

Vom Brocke et al. (2009, p. 2213) describe five steps for the process of the literature review. Step (1) defines the review scope, step (2) conceptualizes the research topic, step (3) conducts the literature research, step (4) analyzes the literature and synthesizes the findings, and step (5) outlines the research agenda. Furthermore, the process is complemented with taxonomies from Cooper (1988, p. 109) and techniques from Webster and Watson (2002, p. xvii). Figure 19 summarizes the literature research process.

2.4.1 Definition of review scope

Due to the high level of interest in the ecosystem phenomenon, there are already various literature streams investigating ecosystems, for example, innovation literature (Adner & Kapoor, 2015; Autio & Thomas, 2014), strategy literature (see Adner, 2017; Moore, 1993), organizational theory literature (see Autio, 2021; C. Baldwin, 2012), or information systems literature (Betz & Jung, 2021a; Biedebach & Hanelt, 2020). As this represents a very broad research field, it is necessary to clearly position the research within the literature, hence a structured literature review will outline the relevant conceptual foundation.

As described in section 1.2, this research endeavor is positioned at the intersection of (1) design-oriented information systems, (2) ecosystems, and (3) organization theory. In accordance with the research objective defined earlier, this dissertation aims to support researchers and practitioners by developing (1) research artifacts to better understand how to participate in and how to conceptualize value creation in (2) ecosystems as a unique (3) organizational form. More specifically, the literature review focuses on the shared vision or purpose of ecosystems and value creation in ecosystems. The research scope is defined based on Cooper (1988, p. 109) and is summarized in figure 20.

The literature review focuses on the identification of research outcomes in the context of the shared vision or purpose and concepts to describe value creation in ecosystems. Furthermore, the analysis focuses on the application of such concepts. The goal of the review is to synthesize and critically reflect on existing literature. Furthermore, the literature review aims at identifying the current research to underpin the research need, and thus the review reflects a neutral representation of the literature. The literature review also aims to representatively cover the literature, wherefore it focuses on both information systems and organization theory. The review is organized conceptually, based on abstract ideas. Finally, the target audience is represented by specialized scholars and practitioners, who are interested in how to participate in ecosystems and how to conceptualize value creation in ecosystems.

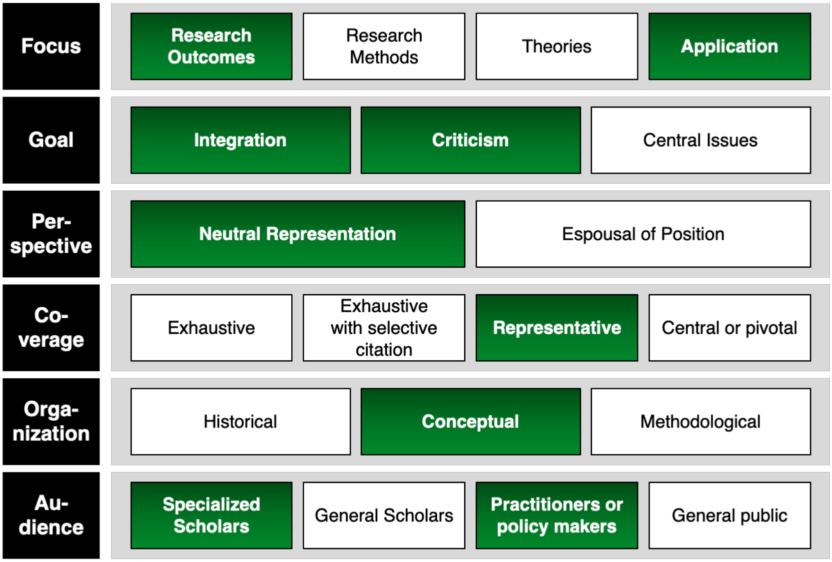


Figure 20: Description of the research scope based on Cooper (1988, p. 109)*, with the focus indicated in green*

2.4.2 Conceptualization of the research topic

The literature review aims to identify and synthesize information that is relevant to the solution of a problem (Baker, 2000, p. 219). Thus, the literature review is conceptualized based on RQ1, which aims to develop a classification of the shared value purpose, and RQ2, which aims to develop a framework for value creation in ecosystems.

Since the literature review represents a starting point for the subsequent research activities that follow on from it, it has two key objectives. Firstly, it represents the starting point and validates the research need for this research endeavor. Secondly, it provides a preliminary overview of important conceptual and theoretical ideas that can be used for the design of the artifacts. Therefore, the literature search is conceptualized based on the two research goals, as is summarized in figure 21.

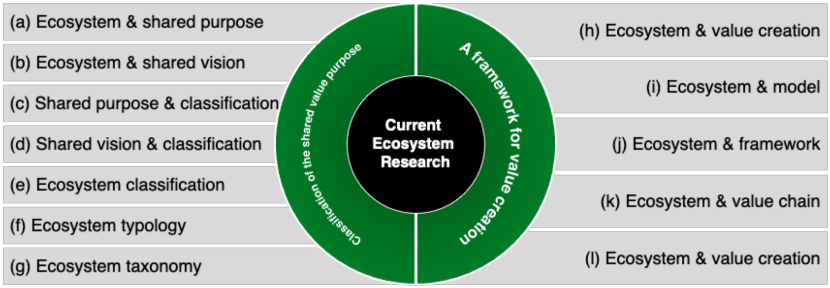


Figure 21: Conceptualization of the literature search

For RQ1, the goal was to identify available classification approaches in combination with the shared value purpose around which the ecosystem evolves. Therefore, the combination of ecosystems and the shared purpose or shared vision has been used together with a search for classifications. In addition, a general search for ecosystem classifications, such as typologies and taxonomies, was undertaken. Furthermore, forward and backward and forward research (see Webster & Watson, 2002, p. xvi) was conducted to identify additional aspects of interest that were not part of the original literature basis.

For RQ2, the goal was to identify conceptualizations of value creation in ecosystems. After a general search for ecosystem and value creation concepts, the search aimed at identifying papers that use models or frameworks for ecosystems. In addition, a search for ecosystem and value chain and ecosystem and value network was conducted, since these terms represent widely used ideas concerning how value creation can be conceptualized[20]. Again, forward and backward (Webster & Watson, 2002, p. xvi) was also conducted in this case.

[20] The terms were used based on the analysis in chapter 2.1.3, however, the search was restricted to value chain and value network, as value shop and value creation in e-business are too specific and not widely used in an ecosystem context.

2.4.3 Literature search

Before the literature search, specific search terms were defined. Table 2 summarizes the search terms and the specific strings that were used in the databases based on the conceptualization from figure 21.

#	Database: Search Strings
	Search for classification approaches (RQ1)
a	(Ecosystem) AND (shared purpose)
b	(Ecosystem) AND (shared vision)
c	(Shared purpose) AND (classification)
d	(Shared vision) AND (classification)
e	(Ecosystem) AND (classification)
f	(Ecosystem) AND (typology)
g	(Ecosystem) AND (taxonomy)
	Search for value creation models and frameworks (RQ2)
h	(Ecosystem) AND (value creation)
i	(Ecosystem) AND (model)
j	(Ecosystem) AND (framework)
k	(Ecosystem) AND (value chain)
l	(Ecosystem) AND (value network)

Table 2: Search concepts and strings applied for the literature search

The literature search was conducted in four databases: EBSCO BUSINESS SOURCE ULTIMATE, ABI/Inform, AISEL und IEEE Xplore. EBSCO and ABI/Inform are extensive databases with journals, magazine articles, conference papers, etc. in various research domains such as those of business and business information systems.

#	Concept	EBSCO	ABI	AISeL	IEEE
	Search for classification approaches (RQ1)				
a	Ecosystem & Shared purpose	3 (0)	17 (2)	1 (0)	43 (1)
b	Ecosystem & shared vision	8 (1)	64 (4)	1 (0)	23 (0)
c	Shared purpose & classification	7 (0)	26 (0)	1 (0)	59 (0)
d	Shared vision & classification	7 (0)	2 (0)	0 (0)	33 (0)
e	Ecosystem & classification	37 (3)	43 (1)	2 (0)	61 (1)
f	Ecosystem & typology	60 (4)	35 (2)	2 (0)	37 (0)
g	Ecosystem & taxonomy	31 (2)	24 (0)	7 (1)	13 (0)
	Search for value creation models and frameworks (RQ2)				
h	Ecosystem & value creation	55 (6)	96 (3)	7 (1)	47 (4)
i	Ecosystem & model	65 (1)	84 (1)	11 (0)	49 (5)
j	Ecosystem & framework	31 (3)	72 (1)	19 (1)	74 (2)
k	Ecosystem & value chain	17 (1)	57 (5)	50 (1)	34 (0)
l	Ecosystem & value network	27 (2)	41 (2)	10 (0)	26 (0)
Total (after title / abstract screening)		**348 (23)**	**561 (21)**	**111 (4)**	**499 (13)**
Total analyzed articles (after full-text check, elimination of duplicates, forward & backward research):					**87**

Table 3: Results of the literature review

The results from the literature review are summarized in table 4, and the respective sources are also shown. To provide a concise overview of the conceptual ideas from the literature, the ideas were summarized according to five key areas: 1) the shared purpose or shared vision in the context of ecosystems, 2) classifications of the shared purpose and shared vision, 3) classifications of ecosystems, 4) value creation in ecosystems and 5) conceptualizations of value creation in ecosystems.

The search was restricted to a time horizon between 1993 and 2021 since the first relevant publication about ecosystems dates back to 1993 (Moore, 1993). Furthermore, only peer-revied scholarly papers such as journal articles and conference papers were considered. In addition, only English papers were considered as well as entries, which were accessible as full text. In general, an abstract search was conducted with the previously defined search strings in order to identify a comprehensive number of relevant papers. However, some searches revealed a very high number of results, therefore some searchers were restricted to title and abstract searchers so that the results could still be analyzed properly. All articles have been screened following vom Brocke et al. (2009, p. 2215), starting with a title screening, followed by an abstract screening. Table 3 summarizes the search results, while the full list of data bases and the respective search strings is included in Appendix B.

2.4.4 Literature analysis and synthesis

The results from the literature review are summarized in table 4. To provide a concise overview about the conceptual ideas from the literature, the ideas have been summarized in 5 key areas: 1) The shared purpose or shared vision in the context of ecosystems, 2) classifications of the shared purpose and shared vision, 3) classifications of ecosystems, 4) value creation in ecosystems, and 5) conceptualizations of value creation in ecosystems. Table 4 shows the respective sources.

Concept	Sources
Shared purpose and shared vision in ecosystems	(Betz et al., 2019, 2021; Frenkel et al., 2015; Ketonen-Oksi & Valkokari, 2019; Moore, 1993; Mukhopadhyay & Bouwman, 2019; Olsson & Bosch, 2015; Polese et al., 2017; Russell et al., 2015; Valkokari et al., 2017; Valkokari, 2015)
Classifications of shared purpose and shared vision	(Cloutier & Langley, 2017; Korn & Pine II, 2011; Petrini et al., 2017)
Classifications of ecosystems	**General classificatory approaches**: (Baskent, 2020; Berger et al., 2021; Brown & Mawson, 2019; Czakon, 2016; Ghazawneh & Henfridsson, 2015; Hayter, 2016; Helkkula et al., 2018; Jütting, 2020; Li et al., 2008; Luo et al., 2013; Nielsen, 1988; Sarker & Sarker, 2015; Secundo et al., 2019; Wang, 2021; Wood & Lenzen, 2009) **Platform classifications**: (Michael Cusumano et al., 2020; Staub et al., 2021) **Ecosystem classifications**: (Andresen et al., 2013; Faber et al., 2019; Guggenberger et al., 2020; Knodel & Manikas, 2015; Pidun et al., 2021; Thomas & Autio, 2020; Urmetzer et al., 2017)
Value creation in ecosystems	**General value creation conceptualizations and perspective shift**:

	(Barile et al., 2016; Eisenmann et al., 2006; Letaifa, 2014; Normann & Ramirez, 1993; Peppard & Rylander, 2006; Randhawa et al., 2021; Rong et al., 2010; Sanz et al., 2006; Townsend, 2013; Weber et al., 2018) **Value creation conceptualizations in ecosystems**: (Adner, 2017; Autio & Thomas, 2018; Davidson et al., 2015; Dunn et al., 2020; Grilo et al., 2008; Huet & Tcheng, 2018; Iansiti & Levien, 2004; Jacobides et al., 2018; Quero et al., 2017; Subramaniam, 2020; Tutuba, 2019; Van der Borgh et al., 2012; P. Williamson & de Meyer, 2012) **Orchestration conceptualizations**: (Autio, 2021; Giudici et al., 2018; Lingens et al., 2021; Nambisan & Sawhney, 2011) **Platform-based value creation conceptualizations**: (Ceccagnoli et al., 2012; Cennamo & Santaló, 2019; Dondofema & Grobbelaar, 2019; Hein et al., 2019, 2020; Parker et al., 2017)
Conceptualizations of value creation in ecosystems	**Research frameworks**: (Desai et al., 2007; Dong et al., 2001; Khadka et al., 2011; Liu et al., 2020; Peltoniemi, 2006;

	Pitelis, 2012; Rong et al., 2014; Senyo et al., 2019; Xue et al., 2020) **Tools for ecosystem design**: (Betz & Jung, 2021b, 2021a; Engelhardt & Badde, 2021; Hamer, 2010; Valdez-De-Leon, 2019; Vaz et al., 2013; J. Wang & De Wilde, 2008; Wieringa et al., 2019)

Table 4: Overview of the literature review results and sources

2.4.4.1 Shared purpose and shared vision in ecosystems

As described in section 2.2, ecosystems evolve around a shared purpose and a common goal. Hence, the concept of a shared purpose or a shared vision provides a compelling reference point for the evolution of network structures.

With the introduction of the concept of ecosystems, Moore (1993, p. 76) presents a life-cycle approach including four development phases (Moore, 1993, p. 77): birth, expansion, leadership, and self-renewal. One of the key tasks in the leadership phase is to provide a compelling vision for the future, thereby mobilizing others to join such an ecosystem. Frenkel et al. (2015) analyzed the evolution of a network of startups in Israel that evolved based on the ideological concept of a high-tech entrepreneur and his ability to communicate a compelling vision (Frenkel et al., 2015, p. 5). Olsson and Bosch (2015, p. 401) identified different challenges for companies to participate in ecosystems, while they use the overarching purpose and the possible stakeholders to differentiate between different scenarios. Russel et al. (2015, p. 29) applied an innovation ecosystem transformation model to the prevailing business relationships to understand the network dynamics and how the shared vision of such a network will evolve. Valkokari (2015, p. 22) explored and delaminated different ecosystem types, i.e., business, innovation, and knowledge ecosystems, and concluded that these organizational designs are held together by formal and informal agreements about a shared purpose and specific operating modes. Building on SDL and a viable system analysis approach, Polese et al. (2017, p. 794) aimed to study ecosystems as a system of systems of interacting entities. By focusing on the respective relationships and how these evolve, they attempted to identify those actors who conceive of, modify, and communicate a common purpose, which lays the foundation for the compatibility between the systems elements (Polese et al., 2017, p. 787). Valkokari et al. (2017, p. 13) emphasize that, while (innovation) ecosystems are characterized by a lack of clear power hierarchy or formal control, balancing a shared vision and the actors' self-interests is a crucial management issue. They developed a research framework for ecosystem orchestration strategies to discuss this issue (Valkokari et al., 2017, p. 15). Betz and Jung (2019, p. 3) developed design requirements (DR) for ecosystem design, where the shared purpose is understood as the central reference point which is materialized through specific services rendered by the ecosystem's actors. Based on a case study, Ketonen-Oksi and Valkokari (2019, p. 33) emphasized that significant efforts must be made to communicate a shared vision and shared values in order to encourage others to participate in value cocreation activities. Mukhopadhyay and Bouwman (2019, p. 337) identified five aspects of governance design, among which coordination mechanisms such as shared institutional logics or a shared vision function as important building blocks for ecosystems to evolve. Betz, Schache and Jung (2021, p. 7) developed a set of six ecosystem characteristics, of which the alignment with a shared value purpose is one crucial aspect in ecosystems.

2.4.4.2 Classifications of the shared purpose and shared vision

A shared vision or a shared purpose seem to require significant attention when participating in ecosystems. However, the literature on a shared purpose is scarce and only provides limited insights about network organizations. Korn and Pine (2011, p. 36) developed a typology of human capability that uses the dimension “means to purpose”, with its categories *connecting* and *doing*, and the dimension “humanity” with its categories *individual* and *group*. This yields four quadrants with *sensing*, *performing*, *linking*, and *organizing*. The typology serves as an innovation framework to develop new business models leveraging digital technologies (Korn & Pine II, 2011, p. 39). Cloutier and Langley (2017, p. 121) identified 21 relationships that underpin assumptions about the overarching purpose of collaborative activities. By doing so, this study provides a taxonomy of potential misalignments of beliefs between partners. Petrini et al. (2017, p. 52) developed a typology of the sharing economy that characterizes three main forms of an otherwise conceptually ambiguous research domain. Their types include *sharing by ideal*, *new business models*, and *redesigning businesses*.

2.4.4.3 Classifications of ecosystems

General classificatory approaches. Nielsen (1988, p. 479) presented a taxonomy of cooperative strategies among organizations, in which he identified a pooling strategy, an exchange strategy, a de-escalation strategy, and a contingency strategy. The strategies are grounded in strategic management literature, evolutionary biology, game theory, and ecosystems (Nielsen, 1988, p. 476). Luo et al. (2013, p. 772) described how the service-oriented architecture and thought encapsulate businesses into services within service ecosystems. They analyzed how business correlations can be formalized, and classified business services based on two types, namely quality-of-service and path-of-composition, and show how they can be graphically modeled and optimized (Luo et al., 2013, pp. 783–784). Li et al. (2008, p. 756) describe how service components from different organizations form an integrated service offering in a value network model. They investigated different classifications and characteristics of service components and illustrate their relationships in a value network. To better understand complex systems, Wood and Lenzen (2009, p. 265) analyzed existing analytical approaches for inter-industry networks and also applied these concepts to a case study. Sarker and Sarker (2015, p. 11) developed a classificatory framework for crowdfunding activities with the types: private equity, royalty, peer-to-peer, microfinance, rewards, and donation. Ghazawneh and Henfridsson (2015, p. 201) presented a systematic analysis of digital marketplaces and developed a typology with the types closed marketplace, focused marketplace, censored marketplace, and open marketplace. Czakon (2016, p. 21) followed an SDL perspective to develop a typology of network strategies across three different strategy types. Hayter (2016, p. 647) developed a conceptual structure to analyze the composition, contributions, and evolution of social networks, i.e., entrepreneurial university ecosystems. Helkkula et al. (2018, p. 290) develop a typology of service innovation and their contributions to value creation with the four types of outbound-based, process-based, experiential, and systemic. Brown and Mawson (2019, p. 360) analyzed entrepreneurial policy approaches and developed a typology of entrepreneurial ecosystems with the types emergent, developing, and advanced ecosystems. Secundo et al. (2019, p. 154) proposed a classification framework to better understand knowledge transfers in a health care ecosystem with the categories identity-based social networks, technology sector networks, government-led networks, and civic and philanthropically enabled networks. To explore the characterization and integration of ecosystem services in management, Baskent (2020, p. 4) proposed a framework that combines ecological services, economic services, socio-cultural services regulations, policy formulation, and interventions to describe the integration towards an ecosystem management plan. Jütting (2020, p. 12) explores a literature-based typology of innovation ecosystems, with the types of social innovation, regional development, green transaction, sustainable transformation, green innovation, and sustainable innovation ecosystems. Berger et al. (2021, p. 10) described a taxonomy of resilience for the internet of things ecosystems and their fundamental attributes. To answer the question of how the individual efforts of autonomous actors are integrated into a whole, Wang (2021, pp. 401 & 416) discussed several innovation ecosystem types (i.e., intra-organizational ecosystem, product ecosystem, etc.) and presented six key functions of digital technology in innovation ecosystems: programming, sensing, communication, memory, tracing, and association.

Platform classifications. Digital technologies and especially digital platforms are often associated with the ecosystem concept. Based on an analysis of a platform's principal activity, Cusumano et al. (2020, p. 49) distinguished between transaction and innovation platforms. Staub et al. (2021, p. 6168) followed a similar path and derived four platform archetypes: business innovation, consumer innovation, business exchange, and consumer exchange platforms.

Ecosystem classifications. To investigate partnerships between software vendors and their stakeholders, Andresen et al. (2013, p. 4040) structured their research around five types of ecosystems: micro-enterprise system provider, large organization with extensive partner network, main part of ERP system that is developed externally, complementary software partner, and service-oriented system provider ecosystems. Knodel and Manikas (2015, p. 61) investigated a similar domain, where they analyzed software ecosystems and their participative engineering activities. They proposed a classificatory framework for software ecosystems that comprises cornerstone, standard, protocol, and infrastructure-based ecosystems (Knodel & Manikas, 2015, p. 63). Urmetzer et al. (2017, p. 6) analyzed connections and value flows between different actors in ecosystems and presented five ecosystem types: commodity supply, bi-directional, multi-directional, new entity, and new legal entity. Faber et al. (2019, pp. 4–5) developed a literature-based mapping study and summarized these according to the following 12 business ecosystem types: platform business, innovation, software, knowledge, digital business, mobility business, internet-of-things business, entrepreneurial, internet business, mobile internet business, customer centric business, and family spin-off business ecosystems. Thomas and Autio (2020, p. 2) argue that due to the wide application of the ecosystem concept, a stronger focus on the conceptual similarities is necessary for ecosystem research. For this purpose, they introduced an ecosystem typology with five types: business, modular, platform, entrepreneurial, and knowledge (Thomas & Autio, 2020, p. 38). Based on a literature review, Guggenberger et al. (2020, p. 9) introduced five generic types of ecosystems: socio-centric, symbiotic collective, centrally balanced, orchestrating actor, and structured resource sharing ecosystems. Pidun[21] et al. (2021, p. 9) studied unsuccessful instances of ecosystems and developed a taxonomy of success metrics of successful ecosystems among four ecosystem life cycles.

2.4.4.4 Value creation in ecosystems

General value creation conceptualizations and perspective shift. In the early 1990s, Normann and Ramirez (1993, p. 65) already postulated the necessity of a paradigm shift from an industrial value creation logic towards a system perspective where different actors co-create value. They used the term "value constellation" to describe a complex web of activities that are performed by autonomous organizations (Normann & Ramirez, 1993, p. 68). Following a similar approach, Peppard and Rylander (2006, p. 131) argued that with the increasing dematerialization of goods and services, traditional concepts like the value chain become inappropriate devices to analyze value creation in complex networks. They proposed a value network analysis which analyzes value creation by following five steps: 1) define the network, 2) identify and define network entities, 3) define the value each entity perceives from being a network member, 4) identify and map network influences, and 5) analyze and shape (Peppard & Rylander, 2006, p. 134). Eisenmann et al. (2006, p. 8) argued in a similar direction, namely that value flows from the left to the right in traditional value chains, while costs and revenues are on both sides in two-sided markets, thereby promoting a perspective shift. Additionally, they described value creation challenges for two-sided markets, such as pricing decisions or winner-take-all dynamics (Eisenmann et al., 2006, p. 3;7). In the context of increasing

[21] Related publications from Pidun, Reeves, and Schüssler (2019, p. 3) introduces the two ecosystem types "transaction ecosystems" and "solution ecosystems", however, the publication was not peer-reviewed and is thus not included in the literature review.

openness and interoperability of business processes, Sanz et al. (2006, pp. 1, 3) built on the service-oriented architecture approach and service standardization and presented a service-based modeling approach for companies and related ecosystems. Rong et al. (2010, p. 2177) proposed the 6C research framework for business ecosystems which covers: 1) constructs, 2) configurations, 3) capabilities, 4) cooperation, 5) change, and 6) context. The framework is used with four complementary research perspectives: community, platform, cooperation and competition, and co-evolution (Rong et al., 2010, p. 2177). Townsend (2013, p. 10) described the combination of ecosystem mapping and value network analysis as an approach to cope with the complexity of network structures and to analyze the contribution in the value creation process. Letaifa (2014, p. 282) built on a multidimensional definition of value, value creation, and value capture to analyze value creation processes in ecosystems. She introduced a life-cycle analysis approach using a typology with the four quadrants: 1) high-value co-creation, low-value capture, 2) high-value co-creation, high-value capture, 3) low-value creation, high-value capture, and 4) low-value creation, low-value capture (Letaifa, 2014, p. 289). Barile et al. (2016, p. 654) proposed a tri-level perspective on value co-creation, which focuses on systems, networks, and ecosystems. This approach aims at using complementary analytical lenses to value co-creation to help decision-makers analyze ecosystems from various aggregation levels with differing degrees of complexity (Barile et al., 2016, p. 666). Weber et al. (2018, p. 1) attempted to answer the question of how traditional value-adding chains can be transformed into ecosystems. They introduced a six-step capability-based procedure, representing a company on a high abstraction level, with the ultimate goal of developing a cooperative value proposition (Weber et al., 2018, p. 7). Randhawa et al. (2021, p. 102) analyzed how companies that wish to leverage innovation ecosystems cope with constraints (i.e., interdependencies) and how they shift their perspectives from a value chain towards an ecosystem perspective.

Value creation conceptualizations in ecosystems. Iansiti and Levien (2004, p. 2) emphasized how value creation in ecosystems must be understood as a complex web of interdependencies, where the health of the whole depends on the health of each component. They proposed four ecosystem strategies: niche, keystone (value dominator), physical dominator, and commodity (Iansiti & Levien, 2004, p. 7). Grilo et al. (2008, p. 4) proposed an enterprise interoperability value proposition framework, which identifies sources of value on the individual, enterprise-community, and the economy-societal level. Van der Borgh et al. (2012, p. 26) described how companies that are driven by research and development are often part of knowledge ecosystems. They identified two value creation patterns, namely the facilitation of innovation processes of individual companies and the creation of innovation communities (Van der Borgh et al., 2012, p. 14). Williamson and de Meyer (2012, p. 26) described ecosystems as a unique organizational form between markets and hierarchies. They identified six crucial points to take advantage of ecosystems: 1) pinpointing the added value, 2) structuring differentiated partner roles, 3) stimulating complementary partner investments, 4) reducing transaction costs, 5) enabling flexibility and co-learning, and 6) engineering value capture mechanisms (Williamson & de Meyer, 2012, p. 33). Davidson et al. (2015, pp. 2–3) argued that the value creation and value capture logic within ecosystems arise through innovating customer experience and close cooperation with partners. Furthermore, they described ecosystems with the two dimensions orchestration and complexity and developed four value creation archetypes (Davidson et al., 2015, p. 5). To better understand value creation in crowdfunding ecosystems, Quero et al. (2017, p. 417) identified seven co-creation forms in the crowdfunding space: 1) co-ideation, 2) co-design, 3) co-evaluation of ideas, 4) co-financing, 5) co-testing, 6) co-launch, and 7) co-consumption. Adner (2017, p. 43) defined ecosystems as the alignment structure of a set of partners with multilateral relationships for a focal value proposition to materialize. He (Adner, 2017, p. 44) described the structure with the activities of the elements (discrete actions), actors (entities that undertake activities), position (location in the flow of activities), and links (transfers across positions). Autio and Thomas (2018, p. 14) identified specific ecosystem value co-creation mechanisms on a dyad-level (pairs of actors) and thus merge a generativity perspective on the network level with SDL. Tutuba (2019, p. 101) combined a value chain perspective with the ecosystem concept to describe value creation and value appropriation by assigning value creation activities along the value chain to various actors. Acknowledging that digital technologies will lead to significant changes along the value chain, Huet and Tcheng (2018, p. 195) found that ecosystem management will play a crucial role for companies in the future. They identified five ecosystem management challenges: 1) shift to offering services, 2) fostering different business models, 3) shifting to cloud services, 4) ability to grasp cost saving opportunities, and 5) ability to reach all customer touch points. Jacobides et al. (2018, p. 2261) defined ecosystems as a unique organizational structure between markets and hierarchies and identified important value creation characteristics. Firstly, they identified modularity as a necessary condition for ecosystems and secondly, they pointed out that there is an overall orchestration need as a result of the different complementary modules as a sufficient condition (Jacobides et al., 2018, p. 2260). Dunn et al. (2020, p. 3) indicated that the technical architecture and the design of the input-output flows have a significant impact on ecosystem value creation, and as a result, the actors' roles and their interdependencies. Subramaniam (2020, p. 5) discussed the value creation logic of ecosystems and identified three main implications from a strategic perspective: the scope of value creation, the scope of competition, and the digital monopoly power.

Orchestration conceptualizations. The review of the literature also revealed the importance of orchestration activities in the context of value creation in ecosystems. Nambisan and Sawhney (2011, p. 45) developed orchestration processes, which include 1) managing innovation coherence, 2) managing innovation leverage, and 3) managing innovation appropriability. In addition, they described specific design elements, namely modularity as an innovative design element, and network openness together with network embeddedness as network design elements (Nambisan & Sawhney, 2011, p. 45). Giudici et al. (2018, pp. 1377–1379) investigated open system orchestration, and identified orchestration activities based on an empirical study, e.g., recognition of new entrepreneurial opportunities, formation of new business relationships, building collaborative engagement, facilitating members' introspection, encouraging members' exploration of complementarities, etc. Lingens et al. (2021, p. 22) developed a typology based on the dimensions sources of value creation and type of ecosystem. They provided strategic recommendations and concluded that startups can also be successful ecosystem orchestrators (Lingens et al., 2021, p. 21). Autio (2021, p. 9) proposed an ecosystem orchestration framework since ecosystems do not rely on traditional command-and-control governance but on more indirect orchestration mechanisms. He proposed different orchestration activities in three domains: ecosystem initiation, ecosystem momentum, and ecosystem control. Each domain includes technological, economic, institutional, and behavioral orchestration activities (Autio, 2021, p. 9).

Platform-based value creation conceptualizations. Ceccagnoli et al. (2012, p. 284) investigated the co-created value on platforms from the perspective of small, complementary solution providers. They identified boundary conditions and the amount of value that can be captured by small individual software vendors (Ceccagnoli et al., 2012, p. 285). Parker et al. (2017, p. 1) investigated platforms as subsystems with loose boundaries, where the attention of platform providers increasingly shifts to external resources such as developers. They developed a theory for the optimization of intellectual property mechanisms and showed that permissionless innovation can dominate vertical integration and that developing a platform model has a longer-term likelihood of success compared to other sourcing strategies (Parker et al., 2017, p. 22). Dondofema and Grobbelaar (2019, p. 7) combined a platform and an ecosystem perspective and developed, based on a literature review, a conceptual view on ecosystem development phases with distinct value creation activities: 1) product development 2) product manufacturing 3) market formation and management, 4) value appropriation, and 5) feedback generation activities. Cennamo and Santaló (2019, p. 618) investigated the generativity impact on user satisfaction. They concluded that orchestrating platform ecosystems with enhanced generativity leads to tensions in the value creation process and that the way in which companies manage these tensions will dictate their platform's system configuration (Cennamo & Santaló, 2019, p. 636). In the platform context, Hein et al. (2019, p. 12) investigated value co-creation practices by combining the SDL perspective with the dynamic process of boundary objects, which promotes standardization processes. In another article, Hein et al. (2020, p. 90) provided a conceptual framework combining platform literature and ecosystem literature findings. They identified three fundamental building blocks that characterize digital platform ecosystems: status of platform ownership; value-creating mechanisms in the ecosystem; and autonomy (Hein et al., 2020, pp. 90–92).

2.4.4.5 Conceptualizations of value creation in ecosystems

Research frameworks. To conceptualize the ecosystem, Dong et al. (2001, pp. 2–6) proposed an ecosystem ontology to explain the business ecosystem concept and its sub-concepts (e.g., species, environment, or technology). Rong et al. (2014, p. 26) applied their 6C framework (see section 2.4.4.4) in several case studies and identified three ecosystem value creation patterns: highly open and high data transparency, semi-open with direct product changes through customer feedback, and less-open with indirect customer feedback. To study the concept of business ecosystems, Peltoniemi (2006, p. 17) developed an ecosystem research framework that identifies the underlying concepts (e.g., interconnectedness, co-evolution, emergence, self-organization, etc.) and provided logical links between these concepts. Desai et al. (2007, p. 126) elaborated how service-oriented computing technologies combined with the ecosystem value creation perspective require new structuring mechanisms. Specifically, they analyzed relationships among communities, community-based services composition, and middleware and value-add services (Desai et al., 2007, p. 127). Khadka et al. (2011, p. 7) presented an evaluation framework for the management of service ecosystems in the context of software development, with evaluation domains including publication and discovery, deployment, composition, service monitoring, service versioning, service-level agreement management, metering, and billing (Khadka et al., 2011, p. 8). Pitelis (2012, p. 1360) analyzed entrepreneurial ecosystem value co-creation and the development of clusters using a conceptual framework and developed a comparative governance perspective, thereby showing the cluster-building as a result of value appropriation, and finally describing how strategic choices about location can trigger an ecosystem and cluster co-creation processes. Senyo et al. (2019, p. 60) developed a research framework for ecosystems that comprises business issues, technical issues, conceptualizations, artifacts, quantitative methods, qualitative methods, conceptual orientations, underlying theories, and the identification of research gaps for future research. To model ecosystems, Liu et al. (2020, p. 26) presented a multi-layer network service ecosystem model that conceptualizes ecosystems on an event-layer, a stakeholder-layer, a service-feature-layer, and a domain layer. To clarify the performance of service ecosystems, Xue et al. (2020, pp. 12–13) developed a value entropy model that links the operating state of the system with the value creation output, which is later verified through a computer simulation.

Tools for ecosystem design. To model complex, evolving systems, Wang and de Wilde (2008, p. 604), differentiated between a network-layer and a peer-to-peer communication layer to support the evolution and composition of services. Hamer (2010, p. 250) developed a knowledge transfer framework, including context barriers and support, interventions, utilization, problem, and knowledge and research. The framework aims to determine the nature of innovation processes and their organizational context. Vaz et al. (2013, p. 12) proposed a visualization technique for ecosystems that includes their underlying platforms and integrates network externalities. Wieringa et al. (2019, p.

152) developed the business ecosystem architecture modeling framework, which comprises strategic, value model, and technology perspectives and also includes strategic, tactical, and technological coordination. Valdez-De Leon (2019, p. 48) identifies key elements and enablers for the development of digital ecosystems: APIs, spearhead-products, revenue model, ecosystem support functions, ecosystem governance, market expectations, network effects, and the platform. Engelhardt and Badde (2021, p. 60) proposed an ecosystem growth and collaboration model to address strategic issues into corporate strategy. The model describes network effects, value creation, and value capture in ecosystems with a focus on where to participate, how to participate, and which role to pursue (Engelhardt & Badde, 2021, p. 65). Betz and Jung (2021a, p. 6128) developed a model that describes service building blocks and which of these can be combined in order to model complementary building blocks. They described the service building blocks using six activities: need finding, service assembly, marketing and sales, service provision, use, and servicing. Furthermore, Betz and Jung (2021b, p. 6) proposed a reference model that describes three fundamental value creation components on a network level: offering assembly, orchestration, and change activities.

2.4.5 Outline of research agenda

The literature search and the analysis of the prioritized articles underpin the wide range of research topics in the domain of ecosystems. However, the literature review also reveals important research gaps that either have not – or have not fully – been addressed yet.

The review supports the initial hypothesis that a stronger focus on an overarching purpose of the vision of an ecosystem might be beneficial since the shared purpose has been identified as a central reference point for ecosystems to evolve. Despite multiple platforms or ecosystem classifications, the ambiguity of terminology used remains, as is implied by the wide range of different typologies or taxonomies. While the terms “business ecosystem” or “innovation ecosystem”, as well as other identified types, are hard to distinguish, it seems reasonable to direct the research activities towards the overarching purpose, for which no classificatory efforts have yet been identified. With this in mind, a better understanding of the purpose of such network structures, namely, what problems network structures solve, appears to be an interesting research path as suggested by the literature review.

Furthermore, the analyzed papers revealed an ongoing paradigm shift from a sequential value creation logic towards a system perspective of value creation. On the one hand, this was explained by an ongoing digitalization and the increased application of digital technologies. On the other hand, a system perspective was identified as a beneficial, complementary strategic perspective. Furthermore, value creation in complex systems and ecosystems has already been discussed in the literature. Several authors indicated that a discussion of value creation in ecosystems requires considering several levels (i.e., an actor level or a network level). While some authors try to address this idea by leveraging existing models (i.e., the value chain) and an ecosystem perspective, no article synthesized these ideas and discussed value creation in ecosystems on an aggregation level that combines both the actors and the network level. Although several ecosystem models and frameworks are available to better understand value creation or orchestration and to design and visualize the findings, a unique value creation perspective that identifies value creation activities on an ecosystem level is still unavailable.

Based on the findings from the literature review, the research activities for RQ1 and RQ2 seem to be promising areas of investigation for this dissertation project.

3 Research Methodology

With the overall research goal of supporting practitioners to participate in ecosystems and to better understand value creation in ecosystems, this dissertation aims to develop research artifacts that can be applied to organizational tasks (March & Smith, 1995, p. 252). Thus, the dissertation addresses both problems from academic research and practice. To bridge these distinct perspectives, DSR was selected as it combines a behavioral science paradigm with a problem-solving paradigm (Hevner et al., 2004, p. 76). The research methodology was operationalized based on the consortia research approach (Oesterle & Otto, 2010). The following section elaborates the research methodology and explains the detailed steps for the development of the research artifacts.

3.1 Design science research (DSR)

A fundamental property of the DSR paradigm lies in understanding and solving a problem (Hevner et al., 2004, p. 76) with the help of implements or artifacts rather than on a mere conceptual basis (March & Smith, 1995, p. 251). As this dissertation aims to support practitioners with a real-world problem on the one hand, and derive prescriptive knowledge (Gregor & Jones, 2007, p. 313) on the other hand, DSR was selected as the overarching research paradigm.

Building IT artifacts, which are the phenomena studied in information systems research (March & Smith, 1995, pp. 262–263), is the crucial activity for which Hevner (2007, p. 88) proposes three basic research cycles to ensure high-quality DSR: the relevance cycle, the rigor cycle, and the design cycle.

In the relevance cycle, the application domain and the problem space are defined together with practitioners. Furthermore, by building on the experience of practitioners, solution requirements are identified. This ensures the relevance of the studied phenomenon. The rigor cycle ensures that the researchers build on past knowledge and experience and that the solution is both innovative and yields real research contributions instead of routine designs (Hevner, 2007, p. 90). In the design cycle, the artifact is constructed, evaluated, and constantly refined according to feedback from the practitioners until an adequate solution is reached. The requirements from the relevance cycle and theories and methods from the rigor cycle act as input.

DSR is a suitable research paradigm for the objective of interest since on the one hand, it provides guidance and structure for the artifact design by bridging expertise from practice with a theoretical foundation. On the other hand, it also supports researchers to extract prescriptive guidelines about the artifact design (Gregor & Jones, 2007, p. 322) where problems might not have only one single, optimal solution (Baskerville et al., 2016, p. 5). Figure 22 summarizes the three cycles in DSR.

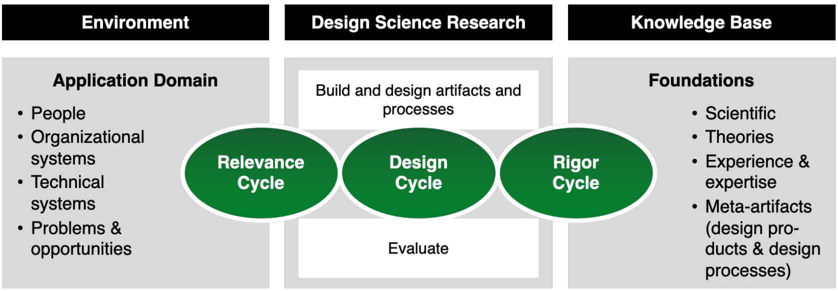


Figure 22: DSR cycles adapted from Hevner (2007, p. 88)

3.2 Overall research process

With DSR as the overarching research paradigm as described above, the following section specifies the specific research approach that was applied in this dissertation. To ensure close and continuous interaction between the researcher and practitioners, the consortia research approach (see Oesterle & Otto, 2010; Otto & Oesterle, 2010) was used. Furthermore, the approach was combined with specific elements from ADR according to Sein et al. (2011), while the process for developing requirements and design principles (DP) was supported by the research approach of Meth et al. (2015).

3.2.1 Consortium research

DSR combines practical relevance (i.e., expertise or feedback of practitioners (Hevner et al., 2004, p. 90)) and the current basis of theory and methods (Hevner, 2007, p. 89). However, Hevner's three-cycle view of DSR or other methodologies such as Peffer's DSRM[22] process model (2007, p. 54) only provides little guidance and support for gaining access to practical expertise (Oesterle & Otto, 2010, p. 283). Against this background, Oesterle and Otto (2010, pp. 284; 287) developed the consortium research method, which enables the continuous transfer of knowledge between research and practice.

Building on the DSR guidelines proposed by Hevner et al. (2004, p. 83), consortium research follows the following goals (Oesterle & Otto, 2010, p. 286): 1) joint definition, assessment of, and evaluation of objectives by researchers and practitioners, 2) contribution of expertise by practitioners, 3) the design of artifacts as a means to solve a problem, 4) iterative design cycles across four phases, 5) test of artifacts by partner companies, 6) commitment to partner companies for a significant duration (typically 2 years), and 7) establishing public access to research results.

[22] DSRM: abbreviation of *design science research methodology*.

The consortium research approach follows four distinct phases (Oesterle & Otto, 2010, pp. 287–289). During the analysis phase, the research outline, needs, objectives, approach, etc. are specified together with the practitioners. During the design phase, the artifact is developed and continuously checked for relevance in multiple iterations, whereby feedback from practitioners is integrated. During the evaluation phase, the artifacts are evaluated against the research objectives as they must be applicable and deliver the expected benefits. On the one hand, the artifacts are discussed in focus groups (see Morgan, 1996) with the practitioners, while on the other hand, the artifacts must be tested. In the last phase, the diffusion phase, the results are communicated in that they are published in research papers or shared in presentations. Figure 23 summarizes the consortium research phases.

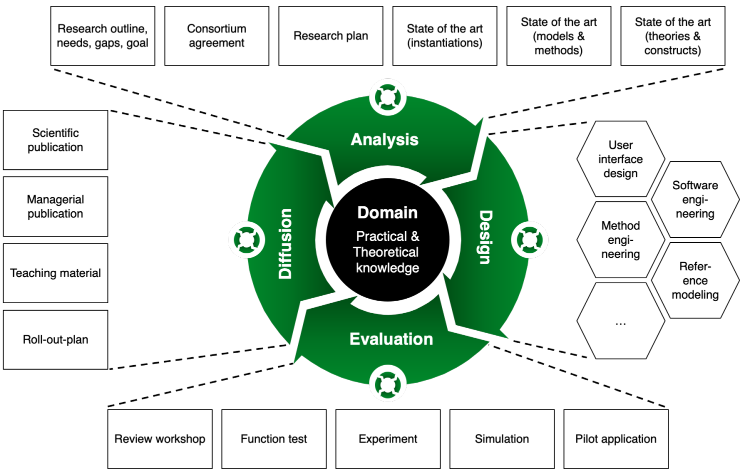


Figure 23: Consortium research phases, adapted from Oesterle & Otto (2010, p. 287)

Figures 26, 27, and 28 in section 3.2.3 briefly summarize the meetings in the integrated research process used for this dissertation based on the consortium research process and certain elements from ADR.

3.2.2 Action design research (ADR)

Similar to Oesterle and Otto (2010), Sein et al. (2011, p. 38) argued that existing approaches in the DSR context do not sufficiently specify that artifacts emerge from the interaction of researchers and practitioners. Against this background, Sein et al. (2011, p. 38) advocated for a combination of action research (AR) and design research (DR), whereby artifacts are the product of organizational interventions and the learnings from these interventions.

This ADR approach, similar to the other DSR views, targets the development of so-called ensemble artifacts that combine both material aspects (e.g., hardware) and immaterial aspects (e.g., software) together with organizational features (Sein et al., 2011, p. 38).

ADR is operationalized in four stages (Sein et al., 2011, pp. 40–45): 1) problem formulation, 2) building, intervention, and evaluation (BIE), 3) reflection and learning, and 4) formalization of learning.

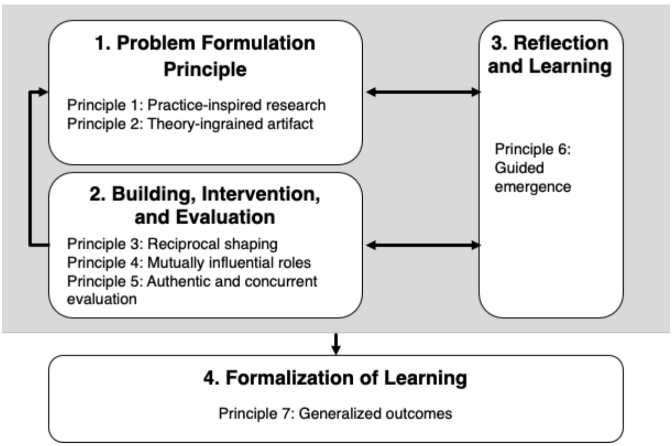


Figure 24: The ADR approach, adapted from Sein et al. (2011, p. 41)

Stage 1) describes and conceptualizes the research problem at hand, whereby input is gathered from practitioners, end-users, the researchers, or prior research. Stage 2) describes the development and improvement of ensemble artifacts, the intervention within the organization, and the evaluation of the artifact. Sein et al. (2011, p. 42) proposed two specifications for this stage, namely an IT-dominant and an organization-dominant specification. The former supports the development of innovative technological designs while the latter focuses on organizational intervention. As specified above, this research project is located at the intersection of ecosystems, design-oriented information systems, and organizational theory, and thus the organization-dominant specification is leveraged. Stage 3) shifts the focus from the artifact design to extracting insights from the process. This is a continuous process and is facilitated in parallel to stages 1) and 2). Stage 3) focuses on the formalization of insights by outlining the accomplishments and outcomes (e.g., by presenting formal DP). Figure 24 summarizes the stages including their inherent research principles.

While the four stages in ADR are similar to the consortium research phases, ADR provides two distinct complementary benefits for this research project. Firstly, ADR specifies that researchers and practitioners are working closely together and integrates a continuous evaluation into the actual artifact design. Feedback is constantly shared and integrated into further design iterations. Secondly, ADR, and more specifically the organization-dominant build, intervention, and evaluation stages, supported this research by assigning specific roles to the members of the consortium and specifying the interaction cycle among the different roles. Figure 25 presents the generic schema for the organization-dominant build, intervention, and evaluation stage.

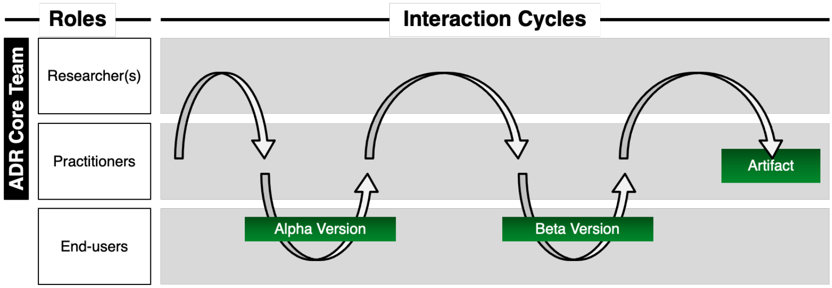


Figure 25: Overview of the roles and interactions of the ADR approach, adapted from Sein et al. (2011, p. 43)

To answer the research questions, this dissertation combined features from the consortium research approach and ADR. This integrated research approach is described in the next section.

3.2.3 Integrated research process

This dissertation project is, next to other research areas[23], embedded in the "Competence Center Ecosystems 8" (CCE 8). The consortium consists of a total of 16 partner companies, including financial services providers such as regional or universal banks, financial services software providers, and consulting companies from Austria, Switzerland, and Germany. Over the course of 3 years, the consortium hosted approximately 40 representatives from these partner companies.

The practitioners and the researcher met regularly between February 2019 and May 2021. Firstly, CCE workshops (CCEW) were conducted, which comprised 3 days of research presentations, focus group interviews and, and guest keynotes from other companies. Although the CCEW mostly took place as live gatherings, three CCEW (May 2020, February 2021, May 2021) were conducted virtually via Microsoft

[23] Other research areas in the CCE: DLT and Blockchain, Artificial Intelligence, Agile Transformation

Teams due to the SARS-CoV-2 pandemic. The CCEW hosted the whole consortium with all companies and representatives.

Secondly, virtual ecosystems working group (EWG) meetings were conducted between the CCE workshops. The EWG consisted of 10 company representatives from eight companies and conducted in-depth sessions to discuss research activities, intermediary results, and feedback from practitioners. The EWG meetings were organized as 1-hour virtual meetings via Microsoft Teams. The detailed documentation of the dates and times, as well as topics of the CCEW and the EWG including the attendance at all meetings, can be found in Appendix A.

Figures 26, 27, and 28 show the detailed meeting schedule for addressing each of the research questions. The figures also describe the participant roles based on the consortium research approach and ADR. RQ2a and RQ2b were addressed between February 2019 and May 2020 while RQ1 was introduced after gathering insights from the previous research activities. RQ1 was addressed between May 2020 and May 2021 as the practitioners wished to better understand if there are different classes of ecosystems before analyzing value creation in ecosystems. Since RQ1 aims to provide a better understanding of what ecosystems are and RQ2 aims at providing an in-depth understanding of value creation in ecosystems, the presented order of the RQs was chosen to support a logical flow of the dissertation.

For the interaction model between the researcher and the practitioners, three distinct roles were defined: the researcher and author of this dissertation, the EWG participants (which is a sub-group of the consortium), and the whole consortium. The researcher and the EWG represent the core team according to ADR, while the CCEW group that consists of all consortium participants is equivalent to the end-users. The analysis, development, and evaluation activities were distributed across several meetings and the intermediary results were shared and iteratively refined between the different roles.

In September 2020, RQ1 was approached analogously to the process used for RQ2a and RQ2b. The analysis started with CCEW 6 and was continued in CCEW 7 in February 2021, before ultimately being finalized in CCEW 8 in May 2021. Two ecosystem working group meetings took place in January 2021 and April 2021. During these meetings, the intermediary results were shared and iteratively refined until the artifact reached sufficient maturity. The process is summarized in figure 26.

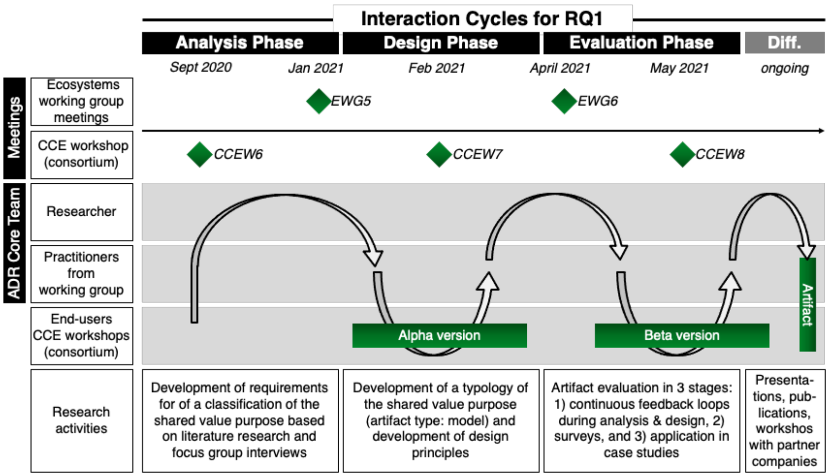


Figure 26: Overview of the integrated research approach for RQ1 based on consortium research (Oesterle & Otto, 2010) and ADR (Sein et al., 2011)

RQ2 was split into two distinct sub-RQs. RQ2a was addressed during three consortium workshops (CCEW1–CCEW3) between February 2019 and September 2019. In April 2019 and August 2019, two EWGs took place (EWG1–EWG2), where the intermediary results were discussed and refined. The artifact was continuously improved by integrating the practitioners' feedback and using surveys. In CCEW3, the results were evaluated using a survey and were considered to be sufficiently mature. Figure 27 summarizes the research approach for RQ2a.

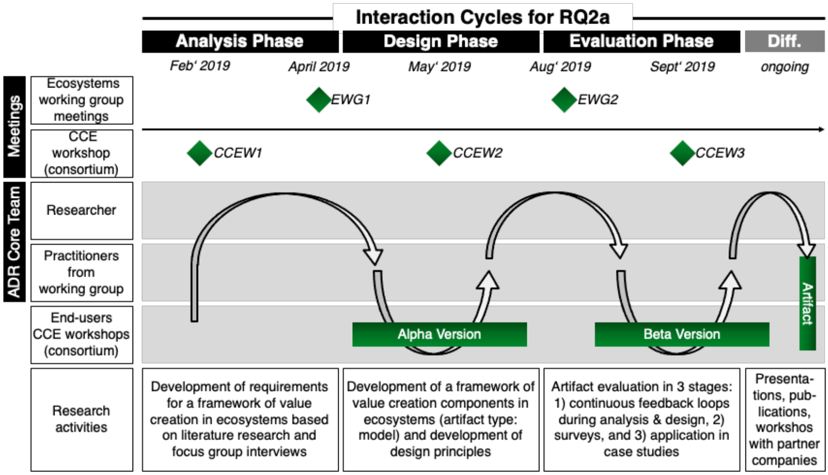


Figure 27: Overview of the integrated research approach for RQ2a based on consortium research (Oesterle & Otto, 2010) and ADR (Sein et al., 2011)

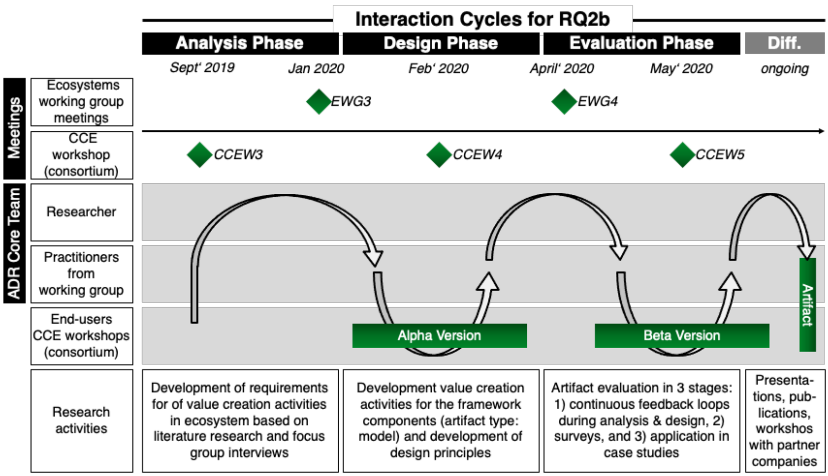


Figure 28: Overview of the integrated research approach for RQ2b based on consortium research (Oesterle & Otto, 2010) and ADR (Sein et al., 2011)

The development of the artifact from RQ2a was completed in CCEW3 in September 2019 and the research activities for RQ2b were initiated during the same workshop. During an analysis, design, and evaluation phase that took place between September 2019 and May 2020[24], the artifact was developed, feedback continuously integrated (e.g., during EWG in January 2020 and April 2020), and a final evaluation took place by using a survey among practitioners. The intermediary results were shared and iteratively refined until the artifact reached sufficient maturity in May 2020. This process is shown in figure 28.

The integrated research process for RQ1, RQ2a, and RQ2b defines the overall research activities. However, for each research phase, the analysis, design, and evaluation were supported by additional methods to ensure a consistent approach. The detailed methodological components are described in sections 3.3, 3.4, and 3.5.

[24] While there were no more formal interactions between the researcher and the consortium for RQ2a and RQ2b after May 2020, feedback has been integrated over the past year and a final evaluation survey for RQ2b was distributed in November 2021.

3.3 Approach for research step 1: Analysis

The first research phase included the assessment of an overarching research need, which was addressed by the respective RQs. The process for RQ2a started with CCEW1 in February 2019 and laid the foundation for RQ2b, which was initiated in CCEW3 in September 2019. Nevertheless, in light of insights from the previous research activities the research goal and the research need for RQ2b were critically reflected in CCEW3. Finally, the process for RQ1 started with CCEW6 in September 2020.

3.3.1 Assessment of overarching research need

In the initial workshops, the researcher held a 1-hour input presentation for the practitioners of the consortium that summarized the preliminary ideas and areas of interest. During the presentation, the practitioners asked questions and provided ideas and feedback. After the presentation, the group was divided into three subgroups to conduct focus group interviews (see Morgan, 1996). These sessions were conducted as semi-structured interviews, with open questions that allowed the practitioners to discuss their ideas in the group. Each session was moderated, and notes were taken that were later consolidated and functioned as a basis for deriving the research need and design requirements. To underpin the overarching research need, specific statements from practitioners were selected and discussed in the subsequent EWG (e.g., in the EWG1 after CCEW1, in EWG3 after CCEW3, and in EWG5 after CCEW5). If the practitioners highlighted further aspects in addition to the discussed statements, these were integrated into the consolidated list of statements that underpin the research need. The result of this process is summarized in section 4.1.1. These activities were conducted analogously for all artifacts.

3.3.2 Development of design requirements

In addition to the activities described above, the analysis phase was used to develop DR for each of the artifacts. Design (meta) requirements articulate a class of goals (Walls et al., 1992, p. 42) since artifacts must be designed purposefully so that organizational problems can be solved (Hevner et al., 2004, p. 82). These DR guide the design process and are also used to evaluate whether the designed artifact fulfills its purpose, i.e., if the artifact provides useful means-ends relations (Winter, 2008, p. 470).

The development of requirements greatly depends on the accuracy of inputs from users and other stakeholders during the requirement development process (Appan & Browne, 2012, p. 86). To ensure that various sources and perspectives were taken into consideration, the DR were developed according to the processes of Betz & Jung (2021a, pp. 6126–6127, 2021b, p. 5).

Firstly, practical requirements (PR) were gathered through interaction with practitioners. This happened in the analysis phase for each RQ, e.g., at CCEW1 in February 2019 for RQ2a. At the subsequent working group meeting (e.g., EWG1 for RQ2a), the practical requirements were reflected on and jointly revised. Secondly, theoretical requirements (TR) were gathered to serve as a theoretical grounding. The TR are the result of a search in academic, peer-reviewed literature since general knowledge and theories can be used to address the original problems at hand (Meth et al., 2015, p. 806).Thirdly, the PR and TR were combined to derive DR, which present meta requirements in the context of Walls, Widmeyer and Sawy (1992, p. 42). These three steps ensure that the DR reflect (1) practical knowledge and are therefore relevant and (2) that the ideas are grounded in multiple sources (including the available knowledge base). These steps were followed for all the above-described research questions in the respective analysis phase of the research process. Building on these intermediary results, the design phase was conducted.

3.4 Approach for research step 2: Design

The next research phase for the respective RQs was the design phase, in which the artifact was developed according to proven techniques (Oesterle & Otto, 2010, p. 289). The artifact can either be constructs, models, methods, or instantiations (Peffers et al., 2007, p. 55). In addition to the methodology involving the previously described roles (e.g., researcher, ecosystem working group, CCEW), the artifact design was also supported by additional methods. The design phase included two distinct activities: the development of DP and the design process of the artifact. These activities are described in more detail in the following sections.

3.4.1 Development of design principles

This dissertation aimed to extract prescriptive knowledge from the research activities in terms of a design theory, thereby dealing with the goals as the object of study (Walls et al., 1992, pp. 40–41). To support with capturing, formalizing, and communicating knowledge in terms of a theory, Gregor and Jones (2007, p. 313) developed the anatomy for a design theory that describes the necessary components (Gregor & Jones, 2007, p. 324) as follows: 1) purpose and scope, 2) constructs, 3) principles of form and function, 4) artifact mutability, 5) testable propositions, 6) justificatory knowledge, 7) principles of implementation and 8) expository instantiation.

The most distinctive part of these components are 3) principles of form and function that describe prescriptive knowledge, which is the know-how of the artifact design (Gregor et al., 2020, p. 1623). Thus, the development of DP is considered an important aspect of the research activities in this dissertation.

Gregor, Chandra Kruse, and Seidel (2020, p. 1644) described four distinct components of DP that were used as guidance later when the respective DP were formulated in section 4.2: 1) aim, implementor, and user, 2) context, 3) mechanisms, and 4) rationale.

The DP in this dissertation were derived based on the DR in a similar fashion to the process of Meth et al. (Meth et al., 2015, p. 814). This ensured that all requirements were taken into consideration and that they are both relevant from a practitioner's perspective and well-grounded from a theoretical perspective.

While ADR suggests that the development of DP is part of the formalization and learning stage, it was decided to develop the DP earlier, namely together with the DR, since this ensured that feedback from practitioners could be adequately collected and integrated into the development process.

The artifacts were designed after the development of the DR and DP. This process and the supporting techniques are described in the next sections.

3.4.2 Design approach for RQ 1

The design phase represents the heart of the DSR project and iterates between construction, evaluation, and subsequent feedback loops (Hevner, 2007, p. 90). To provide additional guidance during the design activities, further proven construction techniques were used (Oesterle & Otto, 2010, p. 289).

RQ1 aims at developing a classification of the shared value purpose, whereby a classification describes how entities are ordered into groups or classes based on their similarity (Bailey, 1994, p. 1). Two main forms of classifications are commonly used to describe the process and result of ordering entities (oftentimes interchangeably) (Bailey, 1994, p. 6): taxonomies and typologies. While a taxonomy is rather empirical, a typology is conceptual (Bailey, 1994, p. 6) as the researchers begin to conceptualize the dimensions rather than examine actual objects

(Nickerson et al., 2013, p. 346). The development process of the classification was supported by the seven steps of taxonomy development from Nickerson et al. (2013, p. 345) and the conceptual approach was selected to build a typology (conceptual-to-empirical approach). These steps are summarized in figure 29.

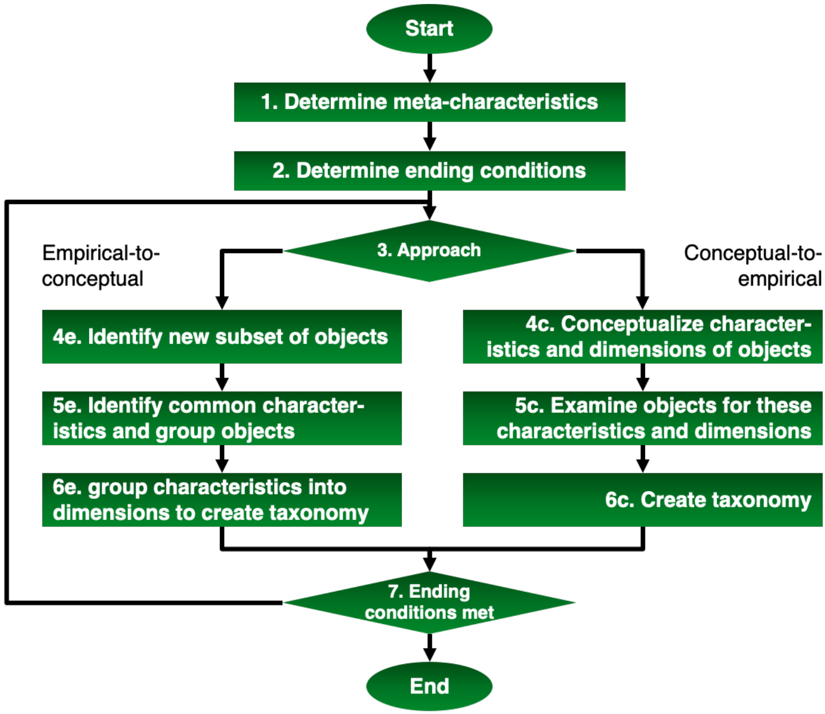


Figure 29: A taxonomy development method adapted from Nickerson et al. (2013, p. 345)

According to DSR, it is important to specify the relationship between the nature of the artifact, the object of interest, and the problem space studied (Gregor & Hevner, 2013, pp. 40–41). It is thus important to specify the type of artifact that will be developed. March and Smith (1995, p. 256) list four generic artifacts within DSR: constructs, models, processes, and instantiations.

With Bailey's (1994, p. 4) definition of a typology in mind, the artifact type is defined as a model that can be understood as "… a set of propositions or statements expressing relationships among constructs" (March & Smith, 1995, p. 256).

In step one, the meta-characteristics of the typology were defined. The typology aims at classifying the central reference point (shared value purpose), in contrast to classifying the ecosystem itself. Furthermore, it builds on the hybrid nature ecosystems on the organizational spectrum and the source of value from the beneficiary perspective. Thus, it represents a network perspective on value co-creation. In step two, the ending conditions were defined. On the one hand, objective ending conditions were used (Nickerson et al., 2013, p. 344), for example, that all objects or a representative sample have been examined, or that no object was merged. On the other hand, subjective ending conditions were also used (Nickerson et al., 2013, p. 344), for example, that the available dimensions are concise, useful, and support the distinction of the different types. In step three, the decision for the conceptual-to-empirical approach was taken. In step four, the two dimensions were conceptualized, building on the ideas and theories described in section 2.2 and section 2.3. In step five, objects of interest were classified and described with the derived types and their respective characteristics, while in step six, the typology was reviewed and applied during CCEW8 where it was evaluated whether the ending conditions were met. A final evaluation of the typology was also conducted among the company representatives. The intermediary results were shared with the consortium, for example at CCEW7 and in the EWG5 and EWG6.

3.4.3 Design approach for RQ2

RQ2 aims at developing a framework with the fundamental value creation components in ecosystems and at identifying relevant value creation activities within these components. A framework can be defined as a set of classes that describe a solution to a problem (Johnson & Foote, 1988, p. 23) or a "…a set of assumptions, concepts, values, and practices that constitutes a way of understanding the research within a body of knowledge" (Schwarz et al., 2007, p. 43). Building on these definitions, the overall artifact of RQ2 constitutes an abstract description of the fundamental value creation activities in ecosystems where autonomous organizations collaborate to co-create value. To better focus on the research activities, this RQ was divided into two sub-RQs. RQ2a aims at developing a taxonomic system with value creation components. A taxonomic system (Nickerson et al., 2013, p. 338) describes the development of a conceptual grid (taxa), in which specific entities can be placed. RQ2b aims at identifying the objects of interest and places these entities (i.e., the value creation activities) within the taxa of the taxonomic system.

For RQ2a, the taxonomy development method (Nickerson et al., 2013, p. 345) from section 3.4.2 was applied and hence the first step for RQ2a involved describing the definition of the meta-characteristics of the classification. Building on the ideas of sections 2.1 and 2.2, the taxonomic system must describe value creation that is distributed across several autonomous organizational entities. Other concepts such as the value chain use the organization itself as a unit of value creation, which is not a suitable analytical lens for ecosystems. Therefore, the taxonomic system seeks to develop the fundamental components of value creation that must be analyzed from an ecosystem perspective. In the second step, the ending conditions were defined. On the one hand, objective ending conditions were used (Nickerson et al., 2013, p. 344), i.e., that all objects or a representative sample have been examined, or that no object was merged. On the other hand, subjective ending conditions were used (Nickerson et al., 2013, p. 344), for example, that the available dimensions are concise, useful, and support the distinction of the different types. In the third step, the decision for the empirical-to-conceptual approach was taken. This represents the development of a taxonomic system with an inductive approach based on empirical obversions. In the fourth step, a subset of objects was identified. Building on Nickerson et al. (2013, p. 345), the objects of interest were derived from the literature review in section 2.4 and from prior conceptual work based on Betz and Jung (2021b, p. 6, 2021a, p. 6127). In step five, the common characteristics of the objects were identified. Some objects described the actual service assembly activities, some objects described coordination activities, and some activities described the maintenance of shared institutional logics and infrastructure. Step seven described the grouping of the objects based on their characteristics. Since RQ2a only addresses the development of the single taxa of the taxonomic system, this step was skipped. In step eight, the taxonomy was checked against the ending conditions in discussions with the practitioners at CCEW3 and the development process was stopped. The intermediary results were shared with the consortium, for example, at CCEW2 and in the EWG1 and EWG2.

The approach taken for RQ2b, namely the identification and grouping of relevant value creation activities, was to build on the development process for taxonomies (Nickerson et al., 2013, p. 345), however, with a focus on grouping value creation activities from the literature review[25] to the components. As the literature revealed several value creation activities at different abstraction levels and granularity, several objects were summarized or grouped based on similarity. For this purpose, the characteristics of the taxonomic system from RQ2a were treated as meta characteristics (e.g., orchestration activities) and value creation activities were grouped to these components. Every value creation activity was critically reflected to ensure that it provides additional explanatory value to the model. If this was not the case, the value creation activity was either dropped or merged with another.

This iterative process started with CCEW3 in September 2019, where initial ideas were already presented to the consortium members. Based on the discussion regarding the requirements for the final artifact and the insights from previous research activities, feedback was gathered

[25] Literature review using the following databases: EBSCO BUSINESS SOURCE ULTIMATE, ABI/Inform, AISeL, and IEEE Explore

and integrated into the subsequent activities. The intermediary results were shared at CCEW4 and in EWG3 and EWG4. After these iterations, the final artifact was presented at CCEW5 for discussion and evaluation.

3.5 Approach for research step 3: Evaluation

To ensure that the artifacts are applicable and that they yield the expected benefits (Oesterle & Otto, 2010, p. 289), they must be carefully evaluated. Such an evaluation can either be facilitated through direct application, e.g., in a simulation or case study (Peffers et al., 2007, p. 55) or through a formal evaluation based on expert opinions, as the benefits sometimes cannot be objectively measured (Oesterle & Otto, 2010, p. 289). To ensure that the artifacts derived in this dissertation were sufficiently evaluated, several evaluation stages were incorporated that were applied to all artifacts: continuous feedback-loops based on ADR (Sein et al., 2011, p. 43), formal evaluation criteria based on Sonnenberg & vom Brocke (2012, p. 390), and a case-study based demonstration (Peffers et al., 2007, p. 55). Although Peffers (2007, p. 54) suggested that the demonstration of the artifact be followed by the final evaluation, in this work, these activities were interchanged. Evaluation stage 1 based on formal evaluation criteria was used as a final quality gate before the artifacts were applied in practical case studies to support the possible extraction of additional insights. The approach for the evaluation stages for both RQ1 and RQ2 are described in the following sections.

3.5.1 Stage 1 evaluation: Continuous feedback-loops

Sein et al. (2011, p. 38) pointed out that other existing DR methods explicitly separate the design and evaluation activities, which does not account for the fact that artifacts are developed in and shaped by the interaction between researchers and practitioners. Thus, Sein et al. (2011, p. 43) suggested that a continuous and ongoing evaluation of the artifacts should be interwoven with the design activities. As described in section 3.2.3, this dissertation applies the organization-dominant-BIE approach in which the artifact is iterated between three roles: the researcher, the working group members (EWG), and the whole consortium (CCEW, which are understood as the end-users). This approach had two advantages. Firstly, it ensured that feedback was collected continuously in all research phases. In addition, the definition of roles in these phases enabled different groups (e.g., the researcher or the researcher and the EWG) to build on inputs from the previous groups instead of just discussing a single feedback stage. In the end, the different inputs from the respective groups across the phases triggered new thoughts and ideas in another group which led to fruitful discussions about the artifact development from various sources.

3.5.2 Stage 2 evaluation: Surveys

The second evaluation stage used a formal evaluation approach based on evaluation criteria which are used to systematically demonstrate the research progress (Sonnenberg & vom Brocke, 2012, p. 390). Depending on the specific research artifact type, Sonnenberg and vom Brocke (2012, p. 391) proposed several formal evaluation criteria. As described above, both artifacts from RQ1 and RQ2 were considered as type models, for which the following evaluation criteria were used: (a) completeness, (b) fidelity with real-world phenomena, (c) internal consistency, (d) level of detail, and (e) robustness (Sonnenberg & vom Brocke, 2012, p. 391).

For each artifact, an online survey was prepared with questions based on the above-mentioned evaluation criteria. For example, completeness was addressed as "The model for value creation in ecosystems is complete; all relevant components are present". To collect the answers to the questions, a 7-point Likert scale was used, ranging from 1 (strongly disagree) to 7 (strongly agree). A 7-point scale was used to better understand the different opinions and its nuances. Furthermore, the respondents were allowed to add comments and further remarks.

In total, three surveys were distributed for RQ1, RQ2a, and RQ2b, respectively. The survey for RQ1 was distributed during the CCEW8 in May 2021, and the survey for RQ2a was distributed during the CCEW3 in September 2019. For RQ2b, the practitioners provided profound feedback, which was implemented by the researcher in the months following the workshop. A final survey for the evaluation of RQ2b was distributed after all changes were implemented in November 2021.

While the consortium participants answered the survey, the practitioners also supported by distributing the survey further into their organizations to gather the views of others who were not originally part of the consortium but have knowledge of the field. This has the advantage that additional expert opinions were collected from persons who were not originally involved in the artifact development. A minimum of 30 responses were collected per questionnaire. The survey participants comprised experts from business development, product management, innovation management, corporate strategy, and other business experts with both business as well as technical knowledge.

The survey results, including the descriptive statistics and selected comments from the survey respondents, are shown in section 4.3.1.

3.5.3 Stage 3 evaluation: Case studies

The final evaluation stage aims at applying the artifacts to demonstrate their value (Peffers et al., 2007, p. 55). A case study can be understood as a research strategy that attempts to understand the dynamics of a specific setting (Eisenhardt, 1989, p. 534). Especially for “grand challenges”, i.e., complex problems that often involve multiple actors and unknown solutions, case studies can represent insightful approaches (Eisenhardt et al., 2016, p. 1113). As this dissertation specifically aims at developing artifacts that solve complex problems at the intersection of information technology and organization, a case study approach appears to be a suitable complementary research technique as it would allow for the respective problem settings to be presented, analyzed, and a solution to be discussed. This is in line with Yin’s (2009, p. 6) ideas, which indicate that case studies provide a suitable research perspective on questions of “how” and “why”, especially in settings, where no (full) control over the behavioral events are given.

Similar to the mini case studies in section 2.3, the case selection was done purposefully (Seawright & Gerring, 2008, p. 295), although the case studies in the evaluation section provide deeper analysis to demonstrate the value of the artifacts and to potentially generate additional insights (Peffers et al., 2007, p. 131). Thus, only a few suitable case study opportunities were discussed in the context of the CCE consortium, and three descriptive case studies were selected.

To ensure the rigor of the case study-based evaluation, several attributes for positivist case research proposed by Dubé and Paré (2003, p. 606) for descriptive case studies were used. The selected cases represent a broad range of services and industries (i.e., recruiting and human resources, real estate services, and mortgages, loans and investments from financial services) and thus demonstrate the applicability of the research artifacts.

The analysis was again performed in four steps, building on the guidelines of Senger and Oesterle (2004, p. 17). Firstly, a short case introduction was presented to outline the setting. Secondly, the analysis section applied the artifacts from RQ1 and RQ2 and described the situation. Thirdly, a discussion section outlined the generalizable insights and discussed the implications concerning the problem at hand—namely how to participate in ecosystems. A brief conclusion section summarized the findings.

The data collection for the case studies took place between July 2019 and November 2021, while the final preparation and presentation of the cases were finalized in December 2021. The data collection included desk research on the respective market environment, interviews with representatives from the respective companies, and the analysis of relevant documents. The data was structured and analyzed using the final research artifacts from RQ1 and RQ2.

4 Results

This section presents the results of the research activities, based on the previously discussed methodological approach. Section 4.1 presents the overarching research need from a practitioner's perspective and develops DR for RQ1 and RQ2 based on this need. The design results, starting with the development of DP and the design of the artifacts are presented in section 4.2, while in section 4.3 the artifacts are evaluated based on the three evaluation stages.

4.1 Results for research step 1: Analysis

4.1.1 Overarching research need from practice

From a theoretical perspective, the overarching research needs were already validated by the literature review in section 2.4. However, the research activities must also be validated from a practical perspective and thus the research need for each research question was validated with the practitioners at the CCEW and in the EWG. From the discussions with the practitioners, various statements were extracted that underpin the challenges and the research need from the practitioners' perspectives (Siggelkow, 2007, p. 21).

The participants of the CCE consortium acknowledged[26] that digital technologies, especially those that promote communication among providers and customers, have had a significant impact on how companies conduct business. Customers are used to having access to information about products and services and can easily choose what they prefer. One practitioner stated: "*There are various sources of information, and the customer can easily choose what he wants to do and where he wants to do it*". In addition, as there is increasing transparency about products and services (e.g., prices), companies must be present at very specific and relevant points, namely wherever the customer is, and this is not necessarily a physical location but rather a digital one. As a result,

[26] Quote have been translated from German to English

this requires the ability to partner with others and to effectively communicate with these partners, thereby ultimately creating complex network structures, such as ecosystems.

Therefore, the practitioners validated that ecosystems are, among others, an important and “central” topic on their agendas and that it raises several challenges, which must be addressed. One practitioner mentioned:

> *On the strategic level, we ask ourselves, what kind of actor or role would fit to us in an ecosystem? Do we want to develop and operate such an ecosystem by ourselves, or do we want to play a relevant role in different ecosystems? On operative level, the challenge is to provide the technical prerequisites to participate in such ecosystems.*

In addition to the two levels, another practitioner mentioned additional challenges that are connected to the topic of ecosystems. First, a mindset shift is necessary, and uncertainty must be embraced, as not everything can be planned upfront due to an increasing number of interdependencies. Second, technology plays a much more crucial role, and a deep understanding of the technological possibilities is necessary. Third, traditional business analysis, for example with upfront business cases, provides only limited guidance, which thus requires courage and a degree of risk appetite, as there is a possibility that such a business idea might fail. Fourth, adequate processes are not present yet, including innovation processes and sales processes that account for such network structures. Fifth, companies must learn how to better manage their partners and how to address others’ needs. Sixth, companies must better understand the legal and compliance implications that are a result of such complex networks.

The practitioners mentioned, however, that besides the “*why and how of ecosystems*”, as one practitioner put it, it is very difficult to get a clear understanding of what ecosystems are and what their practical implications are. Another practitioner stated:

> *There is, at least to my understanding, not one definition of an ecosystem. In fact, everybody has something else in mind. That makes it very difficult for us to discuss the topic and to reach conclusions about what we need to do next.*

While different ecosystem concepts from academic literature were discussed, for example, the terms business ecosystem, innovation ecosystem, knowledge ecosystem, etc. it became clear that the definitions overlap and are not precise enough to inform managerial action. In fact, it might be interesting to pay more attention to the problem that such an ecosystem solves, as one practitioner indicated:

> *For me, the term business ecosystem and other terms remain a buzzword. I ask myself, how I can characterize something, for example, to better understand something or to inform future action. For me, the question is rather, what kind of problem does such an ecosystem solve*?

This last statement is interesting, as it suggests shifting the focus from specific ecosystem types towards what such a network structure is aiming for. Another practitioner made a similar statement: "*there is no one ecosystem, the concept never fully fits. Why not rather take a look at the purpose?*" Thus, it seems worthwhile to better understand what kind of problem an ecosystem solves to help determine what an ecosystem is and if there are different nuances of ecosystems. Or, put differently, it might be possible to better understand ecosystems as a concept if we try to understand their purpose first.

Additionally, the practitioners mentioned that they are not aware of any adequate tools that help to describe the fundamental structure of an ecosystem. Although they are familiar with the ecosystem tool kit[27], the platform design tool kit (Cicero, 2017), and the ecosystem strategy map (Kawohl, 2021), the practitioners indicated that "*a value-based model might be helpful, which specifies the architecture upon which an ecosystem could evolve*". While Porter's (1985) value chain describes such a model for a sequential production process, it simultaneously implies a central planning or coordination authority that does not seem to fit an ecosystem as these are characterized by unpredictability. One practitioner emphasized this as follows: "*We need a framework that accounts for a continuous evolution, which describes a basic collaborative structure, but which does not specify the ending state*". Another practitioner made a similar statement: "[*the traditional pipeline thinking] assumes a fixed starting and a fixed ending state*". Thus, it seems that a shift from a process view on value creation towards a system perspective of value creation is appropriate.

In conclusion, the practitioners confirmed that ecosystems represent a phenomenon that is both a part of their current agenda and which creates several challenges that need to be addressed. One of the challenges is the conceptual ambiguity, which is not appropriately addressed by the available terminology such as business ecosystems, innovation ecosystems, etc., that do not shed light on the concept and which do not sufficiently inform managerial action. In addition, value creation in ecosystems, which requires their attention to shift from a process towards a system perspective, is not sufficiently understood. A framework that presents a fundamental value creation architecture, but which accounts for (1) a system consisting of interconnected, autonomous actors, and (2) which evolves continuously without an ex-ante plan (i.e., a fixed ending state) might be necessary. Therefore, from a practitioner's perspective, the proposed research need seems to be supported.

[27] The ecosystem tool kit was developed by Burkhalter (2019) in the CCE.

Building on the discussions with the practitioners, the next section introduces the DR that were derived from the practitioners' contributions and grounded in theory.

4.1.2 Development of design requirements for RQ1

Building on the requirement development process of Betz and Jung (2021b, 2021a), the following section develops the DR through a combination of PR that were derived from the practitioners of the CCE consortium and TR that were gathered from theory.

For the practitioners, one of the fundamental questions was how they can participate in an ecosystem. The discussions at CCEW6 and CCEW7 and in EWG5 and EWG6 revealed that the hybrid nature of ecosystems on the organizational spectrum should be addressed. One participant mentioned:

> *The ecosystem forms as a solution to an organizational problem, where autonomous participants are connected to each other. They form a governance structure that is neither a free market nor an integrated hierarchy*.

Additionally, the customer must be considered as being an integral part of the organizational structure. In fact, the customer should be considered as a co-creator, who also contributes individual capabilities. In this context, a practitioner made the following statement:

> *Not only is the customer constantly providing information, for example, about his preferences, but he is actively making choices among all the different possibilities in the ecosystem. Only with these active choices will his preferred solution come into place*.

These two perspectives are also supported from a theoretical perspective. The first one addresses the distinct governance characteristics, that is, an ecosystem as a means to create order among autonomous parties without full hierarchical control (Jacobides et al., 2018, p. 2264) and not as a mere free market (Fuller et al., 2019, p. 2). While hierarchies have the advantage of lower transaction costs, easier alignment of specialist activities, and the reduction of uncertainty and risk, open markets have the advantage of flexibility, with adjusting prices that facilitate efficient exchange given that a product or service is easy to price (Adler, 2001, p. 215; De Meyer & Williamson, 2020, p. 80).

The statement above, which describes the customer as being an active part of value creation, is also supported by academic literature (Autio & Thomas, 2018, p. 9; Betz et al., 2019, p. 4).

Autio and Thomas (2018, p. 10) stress the importance of value co-creation from a beneficiary perspective, building on service-dominant logic (SDL) (see Vargo & Lusch, 2004, 2008, 2011). SDL views the beneficiary (or customer) as an active part of value creation, where he applies his own resources, such as knowledge and skills, to use or consume the resources made available by the network. Building on the resource integration approach introduced in section 2.1.4.2, value originates from the integration of the provider and the beneficiary's resources as an active part of value creation: the beneficiary chooses single resources and assembles resources for the final offering or as a source of input (Autio, 2021, p. 4). Thus, providers and beneficiaries actively integrate their resources to take part in an ecosystem.

Building on the discussion with the practitioners and the theoretical ideas presented above, table 4 summarizes the PR and the TR, which are combined to form DR.

Practical requirements (PR)	**Theoretical requirements (TR)**
PR1: The classification must help to describe how to participate and develop ecosystems.	**TR1**: The purpose describes how multiple parties are brought together (Gawer & Cusumano, 2013, p. 420) and this purpose is essential for decision-making (Guggenberger et al., 2020, p. 8).
	TR2: The overall purpose evolves and influences the ecosystem offering (Betz & Jung, 2021a, p. 6127).

DR1: The shared value purpose must be the object of classification to support decision-making.

PR2: The classification must reflect the exchange of services similar to markets.	**TR3**: An ecosystem uses both characteristics of markets and hierarchies (De Meyer & Williamson, 2020, p. 80; Jacobides et al., 2018, p. 2264).
	TR4: Market-oriented purposes require the efficient distribution of information across organizational units (Nambisan & Sawhney, 2011, p. 54; Zenger & Hesterly, 1997, p. 217).
PR3: The classification must describe the creation of integrated offerings.	**TR5**: Hierarchy-oriented ecosystems require structured units, inventive mechanisms, and rewards (Nambisan & Sawhney, 2011, p. 43; Zenger & Hesterly, 1997, p. 214).

DR2: The classification must build on the hybrid nature of ecosystems on the organizational spectrum.	
PR4: The classification must describe the source of value from the use or consumption of services.	**TR6**: The beneficiary is an active part of the ecosystem: he uses or consumes services with his knowledge and skills (Autio & Thomas, 2018, p. 9; Vargo & Lusch, 2004, pp. 10–11).
PR5: The classification must describe the source of value from interaction with other participants.	**TR7**: The combination of operant resources from the provider and beneficiary leads to a greater involvement of the latter (Autio & Thomas, 2018, p. 9; Madhavaram & Hunt, 2008, p. 75).
DR3: The classification must build on the source of value from the beneficiary perspective.	

Table 5: Design requirements for RQ1

4.1.3 Development of design requirements for RQ2

Similar to section 4.1.2, the following section develops the DR through a combination of PR and TR, building on the requirement development process of Betz and Jung (2021b, 2021a).

Early on in the research process, the practitioners mentioned that it is difficult to understand the behavior of large ecosystem orchestrators, and what kind of activities they focus their energy on. One practitioner raised the following question:

> *Companies as organizational units focus on their core competencies and expand their activities with these core competencies in*

> *mind. But what we see in ecosystems is orchestrators, for example, Amazon, integrating services that have nothing to do with their original core competency. In fact, why is Amazon for example heavily investing in [physical] logistic capabilities, when their core competency is being a technology provider?*

This question summarizes an important observation, as ecosystem actors sometimes invest in specific activities that are not closely related to their core competencies. These actors thus choose to invest in activities that are not related to their core business model, but which are crucial from a network perspective. This suggests that the value creation logic from the perspective of a single company may in fact differ from the value creation logic on a network level. One practitioner mentioned:

> *For a value creation system to evolve, I [as a company] need to think differently and consider not only my own interests but what's important for others as well. I need to shift my attention from the inside towards my environment. I must look at the whole network offering and consider how these building blocks come together*

These ideas are also supported by academic literature. Betz and Jung (2021a, p. 6127) distinguished between an actor-level perspective, which focuses on single organizational units and their contribution, and a network-level perspective, which focuses on the system as a whole. According to this approach, a purpose on the network level functions as a reference point towards which all activities are directed. This purpose is dynamic and constantly evolving, for example through new activities (bottom-up) or purposeful orchestration activities (network-level-down) (Betz & Jung, 2021a, p. 6130). Peppard and Rylander support this perspective shift towards a network view of value creation (2006, p. 133). Eisenmann et al. (2006, p. 2) stated that, in contrast to traditional value chains, value does not flow from left to right but cost and revenue are on several sides.

Betz and Jung (2021b, p. 3) developed a preliminary idea of value creation in ecosystems. They based their approach on Mintzberg's (1983, p. 2) definition of an organization, which is the sum of the tasks and the required coordination efforts, and combined it with the ecosystem environment (or abiotic component, see section 2.2.3.3). The conceptualization of RQ2a, the taxonomic system, was performed based on these ideas[28]. Table 5 summarizes the PR, TR, and the resulting DR.

Practical requirements (PR)	Theoretical requirements (TR)
PR6: "The model should depict distinct value creation components and subcomponents" (Betz & Jung, 2021b, p. 5).	**TR8**: "Distinct levels of analysis must be considered for value creation in business ecosystems: a network level and a task or service level" (Betz & Jung, 2021b, p. 5). (based on Betz & Jung, 2021a, p. 6128; Nambisan & Sawhney, 2011)
DR4: "The model must differentiate distinct value creation components" (Betz & Jung, 2021b, p. 5).	
PR7: "A model must include a dimension that describes the service provision since an ecosystem consists of different	**TR9**: "There are complementary services that are linked together in an ecosystem and form the overall offering" (Betz & Jung, 2021b, p. 5). (based on Autio, 2021, p. 4; Jacobides et al., 2018, p. 2260)

[28] This research builds on the practical and theoretical requirements developed by Betz and Jung (2021b, p. 5) as part of the CCE research activities.

service building blocks" (Betz & Jung, 2021b, p. 5).	**TR10**: "The consumer is considered an active part of value creation" (Betz & Jung, 2021b, p. 5) (based on Autio & Thomas, 2018, p. 4; Vargo & Lusch, 2004, p. 10)
DR5: "The model must show a service component with the customer as an active part" (Betz & Jung, 2021b, p. 5).	
PR8: "Orchestration is an important aspect of value creation in ecosystems" (Betz & Jung, 2021b, p. 5).	**TR11**: "A focal actor coordinates, influences and directs other organizations" (Betz & Jung, 2021b, p. 5). (based on Dhanaraj & Parkhe, 2006, p. 659; Nambisan & Sawhney, 2011, p. 40)
PR9: "A set of rules and a governance structure are needed to align the actors" (Betz & Jung, 2021b, p. 5).	**TR12**: "Alignment towards a common goal is necessary" (Betz & Jung, 2021b, p. 5). (based on Adner, 2017, p. 42; Jacobides et al., 2018, p. 2260)
DR6: "The model must describe orchestration and coordination" (Betz & Jung, 2021b, p. 5).	
PR10: Value creation in ecosystems must consider the environment in which the actors are embedded[29].	**TR13:** Actors must consider the environment or the periphery of their business ecosystem (Teece, 2007, p. 1324).

[29] PR10 and TR13 were not published in Betz and Jung (2021b, p. 5) but added later after several iterations with the practitioners in the CCEW and EWG.

DR7: The model must consider the ecosystem environment.	
PR11: “An ecosystem perspective that is independent of one organization is necessary” (Betz & Jung, 2021b, p. 5).	**TR14:** The shared value purpose represents the joint reference point, which addresses all actors beyond the boundaries of a single industry (adapted from Betz & Jung, 2021b, p. 5). (based on Betz et al., 2019, p. 3; Jacobides et al., 2018, p. 2257)
DR8: The model must be used independently of a single organization together with the shared value purpose as a common reference (adapted from Betz & Jung, 2021b, p. 5).	

Table 6: Design requirements for RQ2a

Building on the requirement development process from RQ2a, DR were developed similarly for RQ2b by combining both practical inputs and theoretical ideas.

The researcher and the practitioners initiated this research phase by discussing the desired granularity of the value creation activities. One practitioner mentioned:

> *From my personal taste, a value creation model should offer the basic categories and provide examples for [sic] these categories. Personally, I don’t want too many details, as it rather provides guidance and at the same time is flexible enough to cope with an organic development.*

Therefore, the model to be developed must provide high-level value creation components and describe the sub-activities rather than issue a highly detailed and extensive list of activities. To identify relevant value creation activities, the practitioners suggested analyzing existing models and reusing as much as possible from these. One practitioner mentioned, that "*There are already so many models with value creation activities available, we should be comparing what they offer and what is missing for ecosystems*". This was subsequently done for the value creation components.

One practitioner emphasized the importance of orchestration and clarified how it differs from other coordination activities:

> *Orchestration means setting incentives and leading indirectly without dictating what to do. This is a completely different approach to what we see, for example in supply chains, where the rules specify the outcome.*

In addition, the practitioners agreed that the environment is an important component to consider. One practitioner stressed how digital platforms oftentimes play an important role in ecosystems:

> *Even though we always differentiate between platforms and the ecosystem, I see platforms playing a crucial role when it comes to value creation. I understand a platform as a medium, which enables others to do something together.*

The literature seems to support these statements and guides the identification of value creation activities. For example, Betz and Jung (2021a, p. 6127) developed a model that describes such service creation activities and uses Porter's (1985, p. 37) value chain and Stabell and Fjeldstad's (1998, p. 424) value shop to describe value creation in ecosystems. In addition, Betz and Jung (2021b, p. 6) used orchestration activities based on Nambisan and Sawhney (2011, p. 45) and Dhanaraj and Parkhe (2006, p. 661). Finally, Betz, Schache and Jung (2021, p. 3) mentioned the need to consider a shared infrastructure (e.g., platforms) and a shared institutional logic (e.g., shared rules). Table 7 summarizes the PR, TR, and DR.

<table>
<tr><th>Practical requirements (PR)</th><th>Theoretical requirements (TR)</th></tr>
<tr><td>PR12: The model must describe the service creation with high-level activities.</td><td>TR15: Ecosystems consist of a core product or component and complementary components that are created by other providers (Betz & Jung, 2021a, p. 6127; Jacobides et al., 2018, p. 2257).</td></tr>
<tr><td>PR13: Existing value creation models must be considered.</td><td>TR16: Service assembly must be conceptualized in the dimensions provisioning, exchange, and usage (Betz & Jung, 2021b, p. 6; see Burkhalter, 2019, p. 230).</td></tr>
<tr><td colspan="2">DR9: The model must define generic service assembly activities considering existing models.</td></tr>
<tr><td rowspan="2">PR14: Orchestration activities must leverage indirect mechanisms to influence others.</td><td>TR17: Orchestration activities embrace decisional openness for individual actors instead of a central planning approach (Autio, 2021, p. 11; Nambisan & Sawhney, 2011, p. 45).</td></tr>
<tr><td>TR18: Knowledge mobility, innovation appropriability, and network stability are crucial orchestration processes (Betz & Jung, 2021b, p. 6; Dhanaraj & Parkhe, 2006, p. 661; Nambisan & Sawhney, 2011, p. 45).</td></tr>
<tr><td colspan="2">DR10: The model must define generic orchestration activities.</td></tr>
</table>

PR15: The shared technical infrastructure is a crucial component and must be considered in the value creation activities.	**TR19**: The technical infrastructure (or set of standards) defines the value architecture of ecosystems (Autio, 2021, p. 8; Betz et al., 2021, p. 3; Jacobides et al., 2018, p. 2258).
	TR20: A set of shared rules and values defines how the actors collaborate (Autio & Thomas, 2018, p. 10; Betz et al., 2021, p. 3; Jacobides et al., 2018, p. 2264).
DR11: The model must define generic value creation activities around the shared infrastructure and shared rules and values.	

Table 7: Design requirements for RQ2b

Figure 30 summarizes all DR and their underlying PR and TR, which formed the starting point for the artifact development. The next section describes the conceptualization and design of the artifacts.

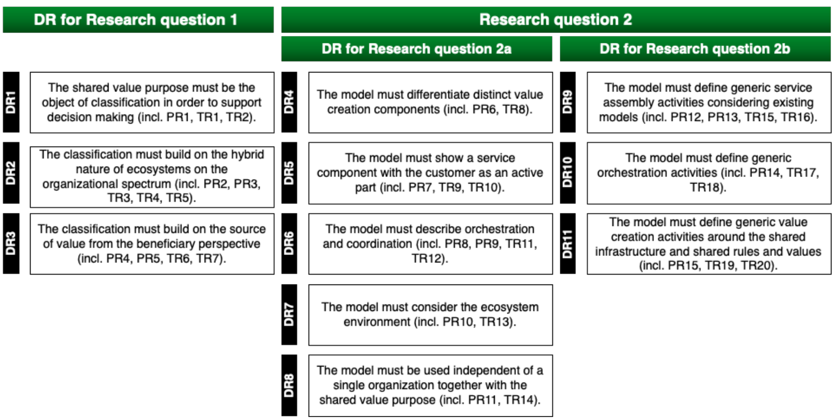


Figure 30: Summary of DR and underlying PR and TR

4.2 Results for research step 2: Design

This section describes the design process of the artifacts from RQ1 and RQ2. In the first step, the DP were developed based on the DR from the previous section as part of the prescriptive knowledge (Gregor & Jones, 2007, p. 322). The artifact was conceptualized in the second step and the final artifact design resulting from this approach is presented.

4.2.1 Conceptualization and design of artifact 1: Typology of the shared value purpose in ecosystems

4.2.1.1 Development of design principles

The DP were developed building on Gregor et al. (2020, p. 23), who developed four fundamental building blocks for DP: a) aim, implementor, and user, b) context, c) mechanisms involving enactors, and d) rationale. Table 7 shows the DP as well as the underlying DR.

Design principles (DP)
DP1: To participate in and develop ecosystems, organizations must specify the shared value purpose because it provides implications about decision making and the possible development of an ecosystem.
Addressed by DR1
DP2: To participate in and develop ecosystems, organizations must specify, where to locate their activities on the organizational spectrum (between market and hierarchy) because it implies differing participation and management capabilities.
Addressed by DR1 and DR2
DP3: To participate in and develop ecosystems, organizations must specify the degree of beneficiary involvement, because from the

organizational perspective it implies providing either operand or operant re- sources to the beneficiary.
Addressed by DR1 and DR3

Table 8: Design principles for RQ1

4.2.1.2 Design of the artifact

Concerning the previously described methodological steps for the artifact design (see section 3.4.2), meaningful dimensions must be developed for the typology. These dimensions build on the conceptual ideas from sections 2.1.4 and 2.2.4, namely, they address the hybrid nature of ecosystems on the organizational spectrum and the source of value from a customer or beneficiary perspective.

The first dimension (x-axis of the typology) reflects the hybrid nature of ecosystems. Various unique forms of business networks have already been identified, for example, joint ventures, licensing agreements, contractual cooperations such as alliances, etc. (Siebert, 2003, p. 9). Such business networks have unique characteristics compared to extreme forms. Markets, for example, are characterized by a) functional specialization, b) market efficiency pressure, c) opportunism, and d) information silos[30] (Siebert, 2003, p. 11), whereas hierarchies, on the other hand, are characterized by e) functional integration, f) protection against market pressure, g) trust, and h) information integration[31] (Siebert, 2003, p. 11). These characteristics describe the specific configuration of the four dimensions, for example a) functional specialization versus e) functional integration.

[30] The terms a–d were translated from German, the original terms are: a) Funktionsspezialisierung, b) marktlicher Effizienzdruck, c) Opportunismus, and d) Informationsinseln.
[31] The terms e-h were translated from German, the original terms are: e) “Funktionsintegration”, f) “Schutz vor Marktdruck”, g) “Vertrauen”, and h) “Informationsintegration”.

Networks are characterized by an intensive a) specialization and division of labor (Siebert, 2003, p. 10). This concurs with the literature on ecosystems, which describes networks of specialized autonomous entities with complementary offerings (Jacobides et al., 2018, p. 2257) or with Moore's (1993, p. 76) definition of ecosystems, which addresses the co-evolution of capabilities and to cooperatively and competitively support new products. Secondly, networks are characterized by b) market efficiency pressure since actors can leave networks, and providers, for example, could decide not to deliver products (Siebert, 2003, pp. 11–12). This also concurs with the ecosystem literature, which is characterized by a unique incentive organizational structure (Jacobides et al., 2018, p. 2276) or the specific economic incentive targeted at one side (Autio, 2021, p. 8). The third characteristic is g) trust, which means that one party can expect other parties to perform their assigned tasks as if these were their own tasks (Siebert, 2003, p. 12). This also agrees with the ecosystem literature, where trust seems to be an important cultural factor (Betz et al., 2021, p. 9) or the presence of legitimacy-enhancing and social trust-building mechanisms (e.g., referrals, product reviews, etc.) (Autio & Thomas, 2018, p. 15). The fourth characteristic of networks, according to Siebert (2003, p. 13) is h) information integration, due to the electronic data and information connections between the organizations. This aspect, however, must be investigated critically. Modularization, a key characteristic of ecosystems, can be understood as the partitioning of information into visible and hidden parameters (Baldwin & Clark, 1997, p. 86), and thus only a subset of information is openly shared, which is a characteristic of markets. According to Jacobides et al. (2018, p. 2260), this is the unique parameter which sets ecosystems apart from other organizational structures: the reduction of frictional transaction costs due to modularity, which normally leads to the formation of markets, requiring additional coordination in ecosystems (Jacobides et al., 2018, p. 2260). In contrast to Siebert's (2003, p. 11) characterization of business networks, ecosystems show a distinct mix of characteristics d) and h), with a tendency towards the market side of the organizational spectrum. Figure 31 summarizes this idea, where the location of the black sphere depicts the location of other network structures (according to the definition of Siebert) on the organizational spectrum, and the purple sphere depicts the location of ecosystems on the organizational spectrum. It is important to note that ecosystems tend to show characteristics of both markets and hierarchies (d and h) and cannot be clearly assigned to a specific end, although they do have a tendency towards markets.

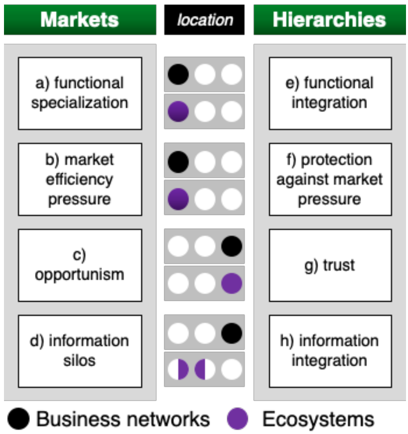


Figure 31: Location of ecosystems on the organizational spectrum, own evaluation

Zenger and Hesterly (1997, pp. 211–218) described simple mechanisms that lead to the infusion of either hierarchy into markets or the infusion of markets into a hierarchy, thereby undermining the traditional dichotomous governance choice due to advances in technology and organization. On the one hand, the infusion of markets into hierarchies is a result of advances in measuring outputs of single molecular units, organizational reconfiguration, and rewarding molecular units (Zenger & Hesterly, 1997, p. 214). On the other hand, the infusion of hierarchies into markets is a result of the advances of linking molecular units through governing exchanges (Zenger & Hesterly, 1997, p. 216). According to Sydow (2003, p. 295), these are two diametrically opposing, yet complementary ways how such networks evolve. Figure 32 summarizes these mechanisms.

For the typology, these ideas were used for the first dimension, which is referred to as “organizational purpose”. It describes the ultimate purpose of the formation of the network, i.e., whether the exchange between actors should be facilitated or the actors’ activities should form a more integrated solution. Building on this, and in accordance with the findings from above, two configurations were defined for this dimension. “Exchange” addresses a more market-located configuration while “Integration” addresses a tendency to the hierarchy-location. This is also depicted in figure 32, which shows the first dimension for the typology.

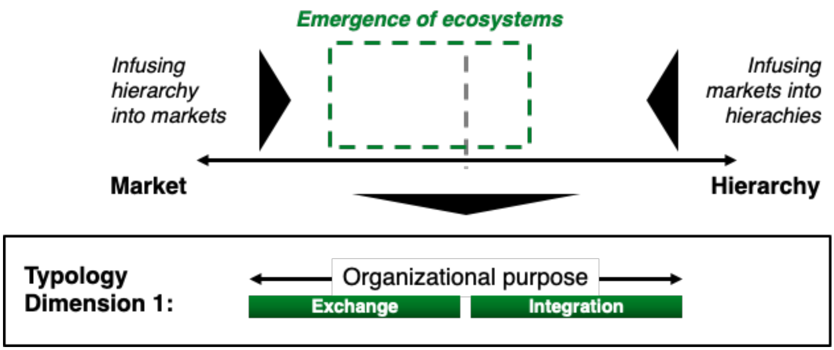


Figure 32: Hybrid structures on the organizational spectrum and deduction of dimension 1

The second dimension addresses value from the perspective of the user or beneficiary. This has the advantage of combining both the purpose of such a network with the beneficiary, as stated by SDL (Vargo & Lusch, 2004, p. 10). Additionally, value-in-context (see section 2.1.1) was used as the underlying concept for this dimension, as it frames the exchange of services (Chandler & Vargo, 2011, p. 36).

Chandler and Vargo (2011, pp. 41–44) used context, actors, and their direct and indirect relationships with each other as a means to distinguish different contextual settings. On the micro level, dyadic relationships are the subject of analysis, focusing on the pair of actors and their exclusive relationship with each other (Wassermann & Faust, 1994, p. 18). On the meso level, triadic relationships are the subject of analysis, namely a set of three actors and their direct and indirect relationships with each other (Wassermann & Faust, 1994, p. 19). On the macro level, complex network structures among many actors and their relationships are the subject of analysis (Wassermann & Faust, 1994, p. 19). Here it is important to consider that single actors can simultaneously be part of various contexts, for example, a person, who is attending a music concert with his friend: while there is certainly a dyadic relationship where the two enjoy each other's company, both of them are simultaneously part of the whole audience, thus, value is derived from multiple contextual layers.

For the subsequent analysis, the meso and macro levels were considered as analytical layers for value-in-context, since, per definition, ecosystems comprise more than two actors, e.g., a user, provider, orchestrator (and contributors) (Burkhalter, 2019, p. 205). It is important to note that this does not mean that ecosystems do not comprise dyadic relationships, as Autio and Thomas (2018, pp. 2–3) elaborated.

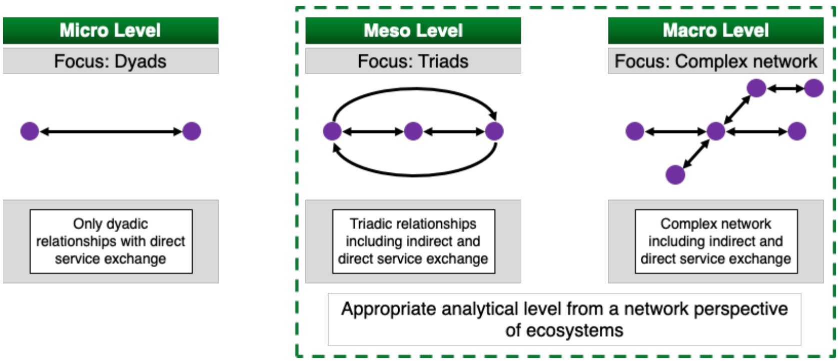


Figure 33: The analytical levels of value-in-context

However, as described above, actors can be part of several contexts where dyadic relationships are an inherent part of the triads (Chandler

& Vargo, 2011, p. 42). The analytical focus of triadic and network relationships, therefore, seems suitable from an ecosystem perspective. Figure 33 summarizes these ideas.

These ideas, namely the meso level with its triadic relationships and the macro level with its complex network relationships, were used for the typology. Thus, the second dimension of the typology addresses contextual value from the beneficiary perspective (which integrates the customer into the conceptualization) and differentiates between the self-oriented category, which includes only dyadic and triadic contexts, and other-oriented, which includes complex network structures with several other actors. Put differently, the dimension differentiates between simple 1:2 relationships, where one party is likely to play a mediating role, and 1:n relationships, where the party is directly or indirectly part of a larger network context such as an audience. The dimension of the typology is deducted from this concept, which describes the contextual value from the beneficiary perspective. The first category is called "actor-oriented", where the contextual value is a result of direct (dyadic) and indirect (triadic) relationships among actors. The second category is called "network-oriented", where the contextual value is a result of embedding the actors within a complex network, which consists of many complex relationships. Figure 34 summarizes the idea for the second dimension of the typology.

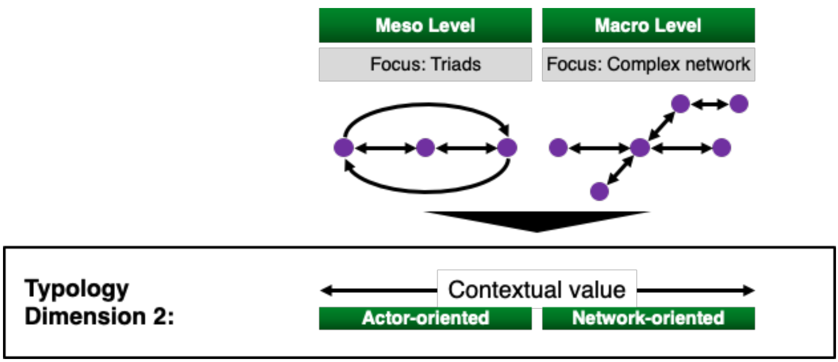


Figure 34: Contextual value levels and deduction of dimension 2

Combining the two dimensions leads to a 2x2 conceptual matrix with four distinct ideal types. The organizational purpose describes the overall means for which such a network forms, while the contextual value describes from what context value may be derived. The purpose may either be to facilitate the flexible exchange of goods and services or the integration of distinct modules into an integrated whole. The contextual value may either be derived from a direct or indirect exchange between actors, or from the embeddedness of the actors in a complex network. As a result, the matrix can be understood as a typology of the shared value purpose, with four distinct types. The result of the combination of the conceptual ideas is summarized in figure 35.

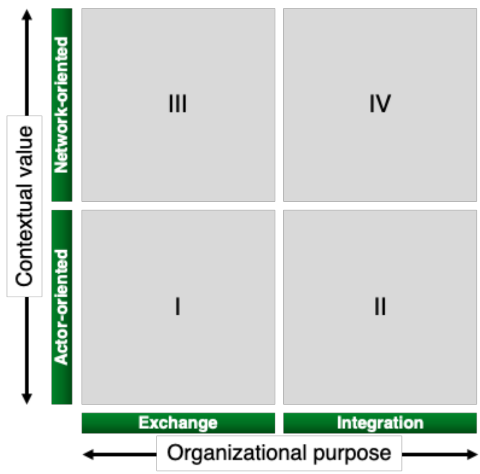


Figure 35: A typology of the shared value purpose

The four distinct types can be understood as ideal types that describe an extreme representation of all dimensions (Bailey, 1994, p. 10) and can be described as outlined below:

I) The first ideal type can be found in the exchange and actor-oriented quadrant of the typology (lower left). It describes how the different actors in an ecosystem come together to perform transactions with each other, i.e., to exchange goods and services. The source of value in this quadrant is rather transaction-oriented, in that it results from the exchange of these goods and services between the actors. As the contextual value addresses the meso level, which is the triadic relationships between three actors, this quadrant describes how the actors come together to facilitate the transaction. In terms of ecosystem roles (Burkhalter, 2019, p. 205) this may be the case when an orchestrator facilitates a transaction between a provider and a user. It may also be the case when a contributor supports the provider to perform a service for the user. Autio and Thomas (2018, p. 28) identified several mechanisms, which form such triadic relationships. Since the focus here is the exchange of goods and services and the contextual value is a result of the triadic relationships, this quadrant is referred to as "**Transaction**".

II) The second ideal type can be found in the integration and actor-oriented quadrant of the typology (lower right). It describes how the different actors of an ecosystem come together to create an integrated solution consisting of several modular building blocks. Since such complementary building blocks require coordination efforts (Jacobides et al., 2018, p. 2260), this ideal type is located more towards the hierarchy side of the organizational spectrum. This makes sense since an orchestrator performs specific tasks and activities to align the activities of other actors. An orchestrator, for example, might integrate different services (e.g., software fragments) from other actors into their own application, which is a result of the orchestration of several triadic (user-orchestrator-provider) relationships. Since the focus here is, again, the exchange of goods and services, albeit with the purpose of combining these to develop a more holistic solution, this quadrant is referred to as "**Solution**".

III) The third ideal type can be found in the exchange and network-oriented quadrant of the typology (upper left). This type describes how different actors come together in a network context to exchange services, for example, information. From an organizational purpose perspective, the actors are loosely coupled, with only a few hierarchical interventions. In contrast to quadrant 1, however, contextual value is the result of the actor embedded in a network context, which may for example be coordinated by the orchestrator. This quadrant strongly promotes generativity (Autio & Thomas, 2018, p. 2) in the context of information or image by leveraging the network context as a source of value. Such complex networks may include various providers or users, who interact with each other in a specific context. Since this quadrant describes the exchange of services with a network-oriented focus, it is referred to as "**Interaction**".

IV) The fourth ideal type can be found in the integration and network-oriented quadrant of the typology (upper right).

This type describes how different actors become involved in value creation activities. In contrast to the organizational purpose *exchange*, this area uses more hierarchical mechanisms to align the various actors with each other while at the same time involving them more deeply. This quadrant strongly promotes generativity (Autio & Thomas, 2018, p. 2) in the context of additional modular components, such as the integration of crowd-intelligence by leveraging the network context as a source of value. Since this quadrant describes the deep involvement of the individual actors and their alignment to form an integrated whole, this quadrant is referred to as "**Involvement**".

Figure 36 summarizes the typology including the criteria for the four ideal types.

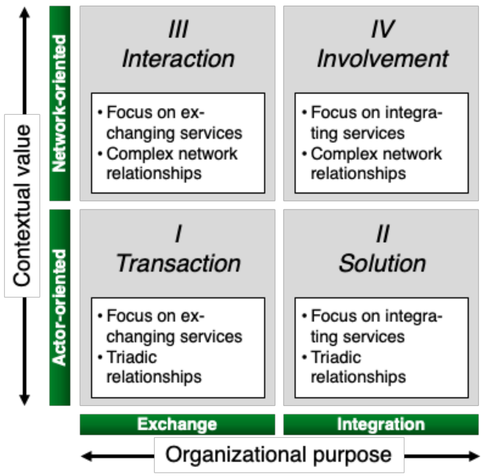


Figure 36: Final typology of the shared value purpose including the criteria for ideal types

It is important to note that the typology does not classify different ecosystems per se, but rather identifies interaction mechanisms: the ideal types describe the different *shared value purposes*, namely the overarching goal of the actors' interaction within the ecosystem. Additionally, ecosystems evolve through a combination of different ideal types. For example, a type II (*solution)* can easily be combined with a type I (*transaction)*. Type II, which describes an integrated service bundle consisting of different (modular) building blocks from autonomous actors, benefits from market-like structures such as a type I (*transaction)* which grants access to different modules from which customers can choose their preferred pieces. On the other hand, a market (i.e., type I: *transaction*), which brings together several autonomous retailers and customers might be combined with type III (*interaction)*, where customers use information about products from the crowd to guide their buying decisions. Examples of this include the (5-star) rating system or social media groups, where the users can interact with each other to exchange thoughts on specific products or services. Therefore, it is important not to look at the ideal types in isolation but to reflect on how they can be used in combination to promote the evolution of ecosystems, as the types represent a means to evolve ecosystems. Figure 37 summarizes some examples from practice and illustrates how the typology should be used. It is important to note that the company logo does not imply that the company (e.g., Facebook[32]) represents the ecosystem or shared value purpose, but rather that the organization adopts such a purpose to leverage the ecosystem.

[32] Facebook was rebranded in October 2021 under the new brand name „Meta". Facebook remains the social network brand.

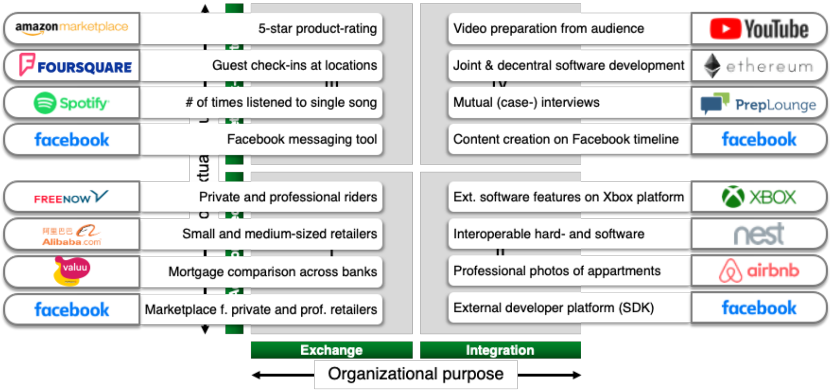


Figure 37: Examples of ideal types of the shared value purpose

Quadrant I (transaction): Freenow, a German ride-hailing platform, provides a market-like structure to connect private and professional taxi drivers with customers, whereby the location of both customer and driver represents an important matching criterium. Alibaba, another online marketplace, created a market for small and large retailers to support their e-commerce activities. The Swiss company valuu, a daughter of the Bern-based PostFinance, created a comparison tool for mortgages from other financial institutes, thereby creating transparency about mortgage conditions or consumer loans. Facebook integrated a marketplace for both private and business users where they can offer products and services to the community.

Quadrant II (solution): In contrast to the mere exchange of services, Microsoft's Xbox represents an example of a deep integration of value creation. On the Xbox entertainment platform, several other third-party features are included to enrich functionalities and customer experience. For example, besides video games, users can use the console as an entertainment hub, with direct access to Youtube, Netflix, or Spotify within the Xbox platform. As described in section 2.3.4, Google Nest is another example of a well-integrated, interoperable solution that connects hard- and software beyond organizational borders: e.g., thermostats, displays, and even Google's competitor Amazon Alexa, in the smart-home domain. Airbnb famously supported its hosts by sending professional photographers to the landlords to create more professional apartment listings. As a result, Airbnb's intervention increased booking numbers on the platform. Another example is Facebook, which built a software development platform to support external developers to create additional software features for Facebook.

Quadrant III (interaction): Amazon uses a simple product evaluation based on a 5-star rating system to support transactions among actors over the internet. The individual buying decision is guided by the reviews from the crowd, that is, how many stars a received on average plus the number of available reviews. Foursquare, on the other hand, recommends restaurants or bars based on user-check-ins, and thus leverages the activities of the crowd. Spotify shows simple user statistics, including how many times a specific song has been played, to guide the user through its content. Facebook implemented a simple messaging tool, where users could reach out to others or create whole private messaging groups for a certain context. Again, this feature leverages the network to exchange aggregated information from the network.

Quadrant IV (involvement): YouTube shows how the deep involvement of its community not only results in gaining the attention of its audience, but also in continuously acquiring new content, which in turn is again shared, and commented on, and from which more new content is derived. The distributed ledger technology (DLT) solution Ethereum shows how developers jointly co-create the code for a platform and how they organized to build consensus about how the solution should evolve. While other software development projects are guided by formal (hierarchical) decisions, Ethereum leverages democratic consensus mechanisms to advance the code, whereby new software code-branches sometimes evolve and become independent (e.g., so-called hard-forks). Preplounge represents another interesting example, where applicants for consulting jobs come together to practice business case studies in tandems: a student picks a counterpart, they conduct case interviews in both interviewer and interviewee roles, and may then find another partner for additional practice. Using the network, Preplounge provides a learning opportunity among strangers. Finally, one of the core features of Facebook is that its users create content such as status updates, shared links, photos, or videos, which are shown on the Facebook timeline. As a result, the user is constantly fed new content from their network, which in turn animates them to create new, additional content. Facebook has been used as an example to illustrate all four ideal types and to emphasize how these types can be used as complementary mechanisms.

Section 4.3.2 applies the typology in case studies to evaluate the artifact and to generate additional insights about its application.

4.2.2 Conceptualization and design of artifact 2: A framework for value creation in ecosystems

4.2.2.1 Development of design principles

Similar to section 4.2.1.1, the DP were developed building on Gregor et al. (2020, p. 23), who developed four fundamental building blocks for DP. This was done separately for RQ2a and RQ2b. The DP for RQ2a were adopted from Betz and Jung (2021b, p. 5) and are summarized in table 8 while the DP for RQ2b are summarized in table 9.

Design principles (DP) for RQ2a
DP4: "To describe value creation in … ecosystems, researchers and practitioners must apply the model independent of a single organization in the context of a shared purpose because it understands value creation to take place beyond a single organizational boundary" (Betz & Jung, 2021b, p. 5).
Addressed by DR4 and DR8

DP5: "To conceptualize value creation in ecosystems, researchers and practitioners must differentiate between offering assembly, orchestration activities, and … [means-to-interaction], where each component describes a specific source of value in an inter-organizational context"[33] (adapted from Betz & Jung, 2021b, pp. 5–6).
Addressed by DR4, DR5, DR6, and DR7

Table 9: Design principles for RQ2a

Following the research activities from RQ2a, the design principles for RQ2b were developed accordingly, as shown in table 10.

Design principles (DP) for RQ2b
DP6: To conceptualize the offering assembly activities and to address how services are created in ecosystems, researchers and practitioners must identify activities that comprise the provision, exchange, and usage of services, because all parties are active parts of the value creation in ecosystems.
Addressed by DR9
DP7: To conceptualize the orchestration activities, researchers and practitioners must identify activities which address the management of value capture, information exchange, and network stability, because actors are influenced rather than directed through implicit actions.
Addressed by DR10

[33] While Betz and Jung (2021b, pp. 5–6) introduce the term "change activities", this dissertation introduces the component "management of organizational setting" instead. This reflects how value creation activities include the management of environmental factors.

***DP8**:* To conceptualize the management of the organizational setting, researchers must identify activities that address the management of a shared infrastructure and the management of shared institutional logics because they describe the physical and non-physical medium, which connects the actors with each other.
Addressed by DR11

Table 10: Design principles for RQ2b

4.2.2.2 Design of the artifact

Concerning the previously described methodological steps for the artifact design (see section 3.4.2), the design was split into two sequences based on RQ2a and RQ2b. While the former targets the development of a taxonomic system, the conceptual grid, the latter aims at identifying relevant entities such as value creation activities that can be placed into the system.

Similar to Betz and Jung (2021a, p. 6127) ecosystems are conceptualized on two levels: firstly an actor level, on which distinct entities perform activities to create products and services, and secondly, a network or ecosystem level, which can be described with a shared value purpose, i.e., the challenge for which the network forms a solution. On the actor level, individual actors perform certain activities to create services.

As described in the previous section, the shared value purpose can be classified with four ideal types: transaction (or access to resources), solution (or the integration of services towards a whole), interaction (or connection of individual network participants), and involvement (mobilizing network participants to contribute to a greater whole). These distinct levels represent the initial starting point of the conceptualization of value creation in ecosystems.

It is important to mention that these levels are constantly influencing each other. Adapting the overall purpose will lead to changes in the value creation activities on the network level (top-down) while changes of value creation activities on the actor level may alter the overall purpose (bottom-up). As described in section 2.3, while the shared value purpose is difficult to observe, the vision of the orchestrator can serve as a proxy.

The first value creation component that will be used to conceptualize value creation is therefore located on the actor level, where autonomous actors will perform certain activities to create products and services. For the sake of simplicity, this dissertation uses the term service to address both physical goods and (immaterial) services, following Betz and Jung (2021a, p. 6124). SDL postulates that knowledge is the fundamental unit of exchange (Vargo & Lusch, 2004, p. 6) and knowledge and skills can be transferred in three ways: 1) directly, 2) through education or training, and 3) indirectly by embedding them in objects (Vargo & Lusch, 2004, p. 9). Thus, service will address both creating physical goods and immaterial services. These service building blocks, created by autonomous actors, can be combined and ultimately form the overall ecosystem offering. Thus, the first value creation component is referred to as the **offering assembly**. Betz and Jung (2021b, p. 6) argued in a similar way, although they further subdivided this component into create, exchange, and use activities. This dissertation built on these insights and later used them for RQ2b. Figure 38 extends the view of two value creation activities with the first value creation component, offering assembly.

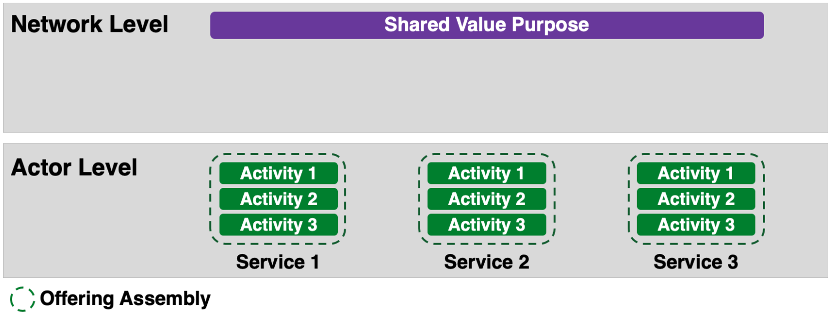


Figure 38: Conceptual levels of value creation in ecosystems, adapted from Betz and Jung (2021a, p. 6127)

Mintzberg (1983) defines the structure of an organization "… simply as the sum total of the ways in which its labor is divided into distinct tasks and then its coordination is achieved among these tasks" (p. 2). Transferred to the ecosystem context, it means that the organizational structure is the sum of the value creation activities (e.g., offering assembly) and how these activities are coordinated across organizational entities. This addresses the coordination need as identified by Jacobides et al. (2018, p. 2260). Various concepts address the process of creating order among the autonomous actors: alignment, coordination, and ultimately orchestration. Alignment describes how different actors are brought into positions and roles that are envisioned by an ecosystem strategy (Adner, 2017, p. 47). According to Adner (2017, p. 47), partner alignment is understood as a process of recognizing gaps and creating conditions for these gaps to be closed. Orchestration is defined as "… of deliberate, purposeful actions undertaken by the hub firm as it seeks to create value (expand the pie) and extract value (gain a larger slice of the pie) from the network" (Dhanaraj & Parkhe, 2006, p. 659). Both alignment and orchestration can be understood as means to prompt a specific behavior in other parties without direct control. The term coordination is used similarly and describes how "…ecosystems provide processes and rules on how to resolve them, and encourage alignment through rules of engagement, standards, and codified interfaces" (Jacobides et al., 2018, p. 2260).

Based on academic literature, alignment, coordination, and orchestration are often used interchangeably in the context of ecosystems. With ecosystems defined as a distinct organizational structure where one party cannot control the actions and decisions of other parties, and where autonomous actors co-create value (Pitelis & Teece, 2018, p. 534), this work uses the term orchestration to describe how actors are aligned or coordinated, following Autio (2021, pp. 1–2), who similarly argues:

> *Because ecosystems are characteri[z]ed by the presence of stakeholders who make active contributions to the ecosystem offering without relying on formal, one-to-one supplier contracts to coordinate their activities in a ‘command and control’ mode, achieving such an outcome requires careful orchestration to persuade others to behave in ways consistent with the ecosystem vision*

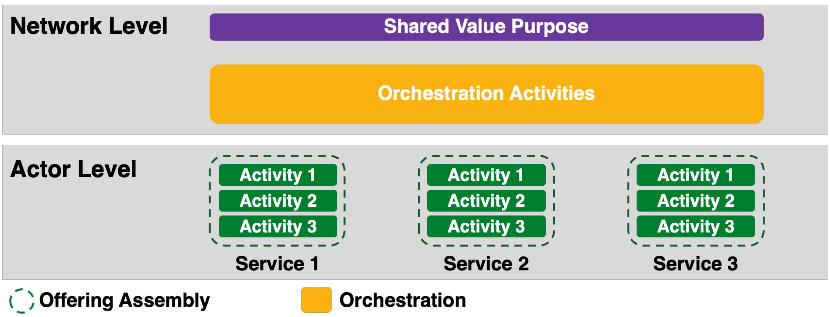


Figure 39: Conceptual levels of value creation in ecosystems with offering assembly and orchestration

Therefore, ecosystem **orchestration activities** form the second value creation component since there is a coordination need among the distinct service modules. Orchestration must be considered on the network level as it requires an overview of the environment, that is, of the available resources and value creation activities (Ferraro & Iovanella, 2015,

p. 5). In figure 39, the orchestration component is added to the ecosystem value creation conceptualization.

Section 2.1.1 described how the ecosystem concept is used in biology. One of the findings was that the ecosystem both comprises a biotic (life forms of different species) and an abiotic (the environment in which the species are embedded and interact with each other) component (Tansley, 1935, p. 299). Therefore, value creation analysis in the business context should also include such an environment in which these actors are embedded and in which they interact with each other.

However, such an environment can be difficult to identify, since ecosystems are of course part of larger systems or even the whole economy. Therefore, the analysis focused on *how* the different parties are enabled to interact with each other, namely the medium that promotes such interaction. On the one hand, such an environment comprises the shared technical infrastructure which helps the different actors to interact with each other (Autio & Thomas, 2018, p. 7; Betz et al., 2021, p. 7; Gawer & Cusumano, 2014, p. 418). Jacobides et al. (2018, p. 2258) further argued that such companies may be connected to a shared infrastructure such as a platform through shared or open-source technologies or technical standards (e.g., APIs or SDKs). In addition to this technical perspective, Autio and Thomas (2018, p. 10) argued that actors in an ecosystem share cultural aspects, social norms, and institutional logics. Anggraeni et al. (2007, p. 16) further mentioned shared norms, values, beliefs, and assumptions within complex systems. Therefore, the third value creation component includes shared infrastructure and norms. This component is referred to as **means-of-interaction**. Figure 40 adds this value creation component to the conceptualization of value creation in ecosystems. These means of interaction are located on both the network and actor levels.

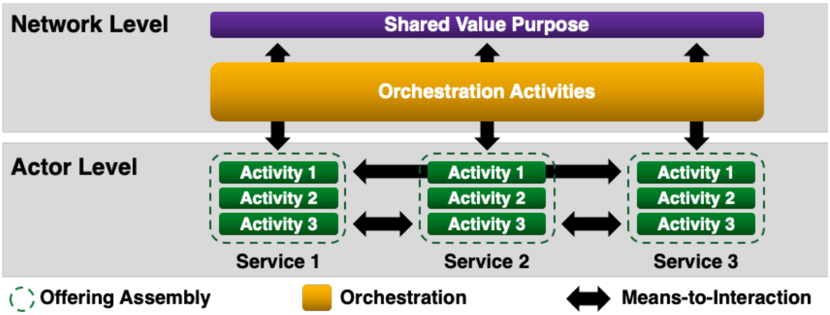


Figure 40: Conceptual levels of value creation in ecosystems with offering assembly, orchestration, and means-to-interaction

As a result, value creation in ecosystems was conceptualized in three value creation components: offering assembly, orchestration, and means-of-interaction. Offering assembly thus describes the specific value creation activities, i.e., the services that are provided by the individual organizations. Orchestration describes how these services are coordinated from a network perspective, e.g., by connecting a provider or a user or integrating different complementary services into a whole. Means-to-interaction describes how the interaction is facilitated, e.g., from a technical perspective by using a platform or through common interfaces and through establishing and maintaining shared norms and values.

Next to the identification of these value creation components, the graphical illustration of the taxonomic system was discussed. In comparison to Porter's (1985, p. 37) value chain, where resources enter the value chain from the left-hand side (come from up-stream suppliers) and leave the value chain to the right-hand side (flow to the customer or down-stream organizations), a linear resource-flow in ecosystems seems inappropriate. In addition, the use or consumption is an integral part of value creation in ecosystems.

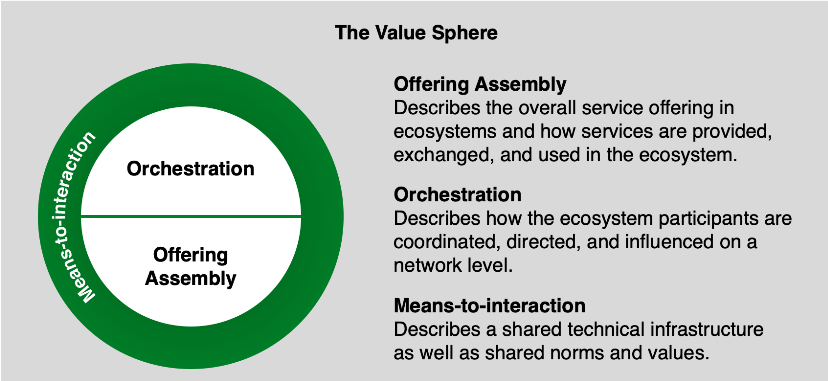


Figure 41: Result of RQ2a – The value sphere, adapted from Betz and Jung (2021b, p. 6)

Therefore, value creation in ecosystems is represented in a sphere. Adding complementary services (offering assembly activities), more sophisticated coordination activities (orchestration), and maintaining or extending the infrastructure and the shared norms and values (means-to-interaction) will expand the sphere, whereas removing certain activities will shrink the sphere. Thus, it accounts for the fact that the sphere tries to illustrate an open system that permanently evolves. The model is termed the **value sphere** and is based on Betz and Jung (2021b, p. 6). Figure 41 illustrates the model as a result that addresses RQ2a.

RQ2b identifies relevant value creation activities for the respective components from the results for RQ2a, namely the taxonomic system with the three defined value creation components.

Offering assembly. As discussed above, offering assembly describes how distinct actors perform activities to contribute to the overall ecosystem offering, in other words, how they create certain service building blocks. Existing value creation models were used to identify relevant value creation activities for this component. Furthermore, this dissertation extended the work of Betz and Jung (2021b, p. 6), who described their offering assembly component with the basic categories create, exchange, and use. Table 11 summarizes several value creation conceptualizations (see also section 2.1.3).

Source	Create	Exchange	Use
Value Chain (Porter, 1985, p. 37)	• Operations • Servicing	• Inbound Logistics • Outbound Logistics • Marketing and Sales	
Value Shop (Stabell & Fjeldstad, 1998, p. 423)	• Problem finding • Problem solving • Execution • Control and Evaluation	• Choice	
Value Network (Stabell & Fjeldstad, 1998, p. 430)	• Network promotion and contract management • Service provisioning • Infrastructure operation		
Ecosystem Service Model (Betz & Jung, 2021a, p. 6128)	• Need finding • Service assembly • Servicing	• Marketing and sales • Service provision	• Use

Table 11: Analysis of value creation conceptualizations

The value chain by Porter (1985, p. 37), the value shop and the value network by Stabell & Fjeldstad (1998, pp. 423, 430), and the ecosystem service model by Betz and Jung (2021a, p. 6128) were used for the detailed analysis. It is important to note that only primary activities were considered, building on the assumption that for an analysis of value creation from a network perspective, support activities (e.g., human resources or procurement) are redundant, as each of the autonomous organizations will conduct and coordinate these support measures for itself.

As shown in section 2.1.3, Christensen and Rosenbloom's (2013, p. 238) value network does not offer value creation activities but rather conceptualizes an embedded system of products and sub-products. Amit and Zott's sources of value in e-business are primarily a conceptualization of value capture. The e3-value ontology (Gordijn, 2004, p. 99) and the e-business model ontology (Osterwalder & Pigneur, 2003, p. 2) were also considered, however, they describe business models that include value creation on a different aggregation level, and were thus excluded from the detailed analysis.

The value chain contains five primary value creation activities distributed across the categories create (operations, servicing) and exchange (inbound logistics, outbound logistics, marketing, and sales). The value chain does not include the use or consumption of services. Similarly, the value shop includes five primary activities across the categories create (problem finding, problem-solving, execution, control, and evaluation) and exchange (choice). The value network (Stabell & Fjeldstad, 1998, p. 430) contains three primary activities in the category create (network promotion and contract management, service provisioning, infrastructure operation), while in this case, no activities address the exchange or use category. The ecosystem service model is the only approach that covers all three categories: create (need-finding, service assembly, servicing), exchange (marketing, exchange), and use (use).

To describe how services in an ecosystem are created, exchanged, and used, the value creation activities are aggregated across all three categories. Figure 42 summarizes the final value creation activities for the offering assembly component.

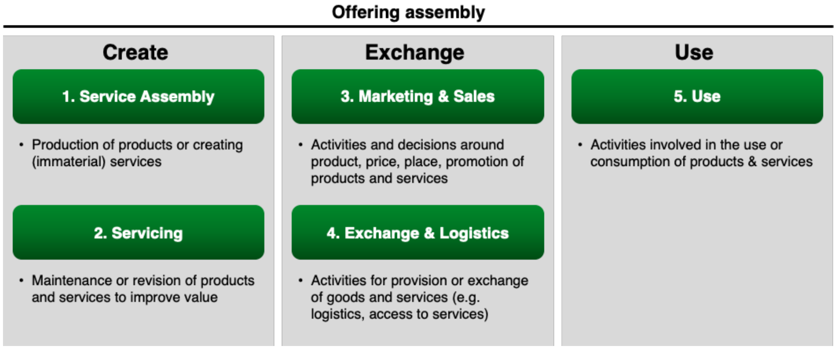


Figure 42: Offering assembly value creation activities

1. Service assembly. These activities describe how an actor creates a specific service. Since the activities address both physical products and intangible services, greater analytical flexibility is ensured, independent of a physical or immaterial (i.e., digitized) form (Betz & Jung, 2021a, p. 6128). Service assembly includes everything that primarily targets forming products and services, such as a taxi driver who picks up the customer and drives them to their desired location. Another example is the preparation of an apartment that can be booked on the Airbnb platform.

2. Servicing. These activities describe how the value of the product or service may be maintained or revised, for example by integrating customer feedback or repairing or improving certain aspects of the service (Betz & Jung, 2021a, p. 6128). An example can be a service hotline at Amazon, where issues are resolved, and complaints are processed. Another example may include handyman services, for example during the installation of Google Nest products.

3. Marketing and sales. These activities describe how the service is offered and sold (Betz & Jung, 2021a, p. 6128), how services are promoted or communicated, and how payments are facilitated. It is important to note that the latter can include direct payment mechanisms, such as the transfer of money, or indirect mechanisms such as the acquisition of additional customers, which may create additional revenues at a later stage.

4. Exchange and logistics. Similar to Betz and Jung's (2021a, p. 6128) service provision activities, exchange and logistics summarize how a good or service is transferred from the provider to the customer. A physical good, e.g., a taxi on Uber must be ordered and driven to a predefined location to pick up the customer. On Airbnb, the customer must receive access to the apartment. On the Amazon marketplace, products must be shipped to the customer. In the context of digitalized content such as movies, music, or software, this can mean that access to the data is granted, and content can be downloaded.

5. Use. These activities describe how the customer consumes or uses a product or service (Betz & Jung, 2021a, p. 6128). For example, it may describe how a customer is listening to music, watches a movie, or enjoys their stay in an Airbnb apartment. By integrating use activities into the model, the analysis does not stop at the service provider (as done in the value chain logic) but views the customer as an important and integral part of the value creation process.

It is important to stress that the five activities do not necessarily follow a sequential logic. For example, the service assembly may produce certain activities that support the use of a product after specific feedback has been gathered during the servicing activities.

Orchestration. As described above, not only is the term *orchestration* used ambiguously but there are also various concepts that describe the term. Therefore, it is necessary to clearly define orchestration as used in this dissertation before identifying orchestration activities for this value creation component. Table 12 lists several definitions of the term in the context of management.

Source	Definition
(Hinterhuber, 2002, p. 615)	"Virtual value chain orchestration is defined as [a] way of creating and capturing value by structuring, coordinating, and integrating the activities of previously separate markets, and by relating these activities effectively to in-house operations with the aim of developing a network of activities that create fundamentally new markets."
(Dhanaraj & Parkhe, 2006, p. 659)	"...coordinate, direct, influence, and manage the other network members."
(Wallin, 2006, p. 65)	"Orchestration is the capability to mobilize and integrate resources for the purpose of providing an offering to a customer and simultaneously create value for the customer, the orchestrator, and the network members involved. The orchestrator considers the constraints, based on which conversations are nurtured, to define and execute the purposeful resource allocation to create, produce, and provide the customer with the offering."
(Hurmelinna-Laukkanen & Nätti, 2012, p. 246)	"… such direction can and should be executed in a manner that does not sacrifice the independence of actors and flexibility that are inherently needed for creativity and innovation creation. Such discreet influence may happen through network orchestration. In the heart of orchestration there are three specific areas: knowledge mobility, network stability, and innovation appropriability."

(Korpela et al., 2013, p. 26)	"Both types of coordination [management and orchestration] are needed in order to ensure the successful integration of information: the management of relevant actors to formally guide the DBE in the desired direction, and orchestration to facilitate the formation of the ecosystem and of a common vision, and to motivate the actors to pursue common goals."
(Lessard et al., 2016, p. 214)	"…asset orchestration – the ability to combine selected technologies, individuals, and other resources in new products and processes regardless of location and across organizational boundaries."
(Gibson & Groom, 2018, p. 4)	"… orchestration is described as behind-the-scenes string-pulling and the steering of complex change processes towards desired objectives, with constant evaluation and scrutiny to keep things going, and the maintenance of detailed oversight of the idiosyncrasies of each coaching situation."
(Autio, 2021, p. 12)	"…set of deliberate and purposeful actions undertaken by the ecosystem orchestrator to encourage voluntary, value co-creating inputs and effect coordination among [a] hierarchically independent ecosystem of the ecosystem."

Table 12: Definitions of orchestration

Two important implications arise from these definitions. Firstly, orchestration can be understood as a coordination approach of distributed resources beyond the control of a single entity, and secondly, as an indirect approach that takes autonomy into account and uses rather indirect measures, such as motivation and enablement, to coordinate these resources. Korpela et al. (2013) emphasized that orchestration can be understood as "… 'softer' activities such as communicating the joint vision, motivating the actors and facilitating their participation in various joint activities" (p. 29). To describe orchestration, they use the categories *motivating* and *enabling,* which will be used later in this dissertation (Korpela et al., 2013, p. 29).

The orchestration of innovation networks was discussed in detail by Dhanaraj and Parkhe (2006, pp. 660–661), who defined three fundamental orchestration processes: managing knowledge mobility, managing innovation appropriability, and managing network stability. Knowledge mobility refers to the mobilization of distributed (informational) resources, for example through knowledge absorption, network identification, and interorganizational socialization (Dhanaraj & Parkhe, 2006, p. 662). Managing innovation appropriability refers to ensuring that the value that is created is fairly distributed across the network members, for example through fostering trust, procedural justice, and joint asset ownership (Dhanaraj & Parkhe, 2006, p. 663). Dhanaraj and Parkhe (2006, pp. 662, 663) stressed that allowing for autonomy and following rather indirect measures instead of hierarchical command-and-control mechanisms can be understood as an engine of innovation in such networks in contrast to fully integrated corporations. This corresponds with Autio (2021, pp. 6, 9) who emphasized that ecosystems are systems that generate unprompted, unpredictable outcomes and that orchestration facilitates and maximizes such generativity.

Nambisan and Sawhney (2011, p. 40) contributed to this discussion by adapting such orchestration processes and identifying innovation- and network design elements. Similar to Dhanaraj and Parkhe (2006, p. 661), they identified three fundamental orchestration processes: managing innovation coherence, managing innovation leverage, and managing innovation appropriability. Managing innovation coherence refers to the alignment and coordination of activities and outputs within the network, for example through coordinating interactions among network members or making changes in the available innovation architecture

(Nambisan & Sawhney, 2011, p. 48). Managing innovation leverage describes sharing or reusing certain technologies, processes, and intellectual properties, for example through identifying opportunities for asset leverage or modularizing specific assets (Nambisan & Sawhney, 2011, pp. 44–45). Managing innovation appropriability refers to establishing mechanisms for other network members to capture value, for example, through enhancing trust, transparency, or providing commercialization infrastructure (Nambisan & Sawhney, 2011, p. 51). The latter process was also emphasized by Dhanaraj and Parkhe (2006, p. 663).

For the identification of orchestration activities, the basic orchestration categories of *enabling* and *motivating* were used (Korpela et al., 2013, p. 29). At an initial stage, only orchestration processes from Dhanaraj and Parkhe (2006, p. 661) and Nambisan and Sawhney (2011, p. 40) were assigned to these basic categories. During this process, and in the light of the definition of orchestration from Dhanaraj and Parkhe (2006, p. 659) who understand orchestration as coordinating, directing, and influencing others, the researcher and the EWG members agreed to conceptualize orchestration by adding the third category *coordinating*. This step reflects the findings that orchestration in ecosystems may include mostly indirect measures of influencing and motivating others, but that more direct mechanisms may also be necessary. This concurs with the location of ecosystems on the organizational spectrum, which is neither market nor a hierarchy and where more direct, hierarchical mechanisms are used (see section 4.1). Figure 43 summarizes the conceptualization of ecosystem orchestration from the first iteration.

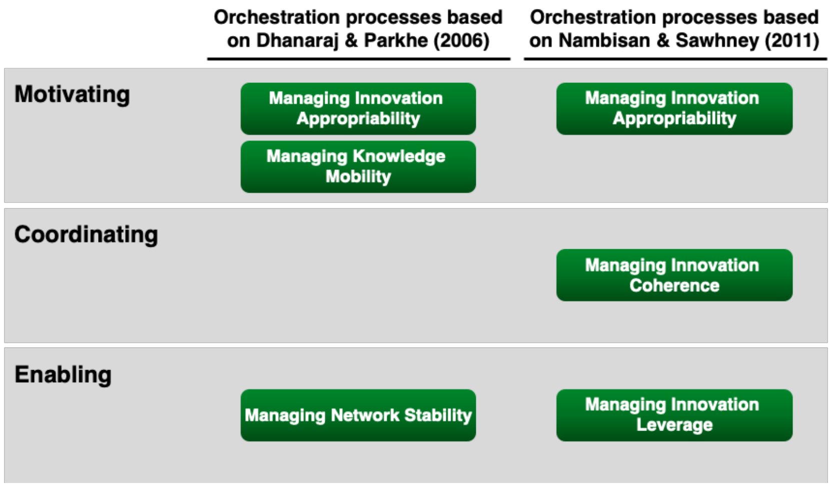


Figure 43: Conceptualization of orchestration (initial design iteration)

In subsequent iterations, other orchestration tasks such as processes, capabilities, and activities, were identified in the literature and assigned to the categories. Tables 13, 14, and 15 summarize the orchestration tasks that were identified in the respective categories of motivating, coordinating, and enabling.

Orchestration task (motivating)	**Source**
“Managing innovation appropriability”	(Nambisan & Sawhney, 2011, p. 45)
“Managing innovation appropriability”	(Dhanaraj & Parkhe, 2006, p. 661)
“…a powerful brand…”	(Fuller et al., 2019, p. 5)
“Controlling the bottleneck of the ecosystem”	(Lütjen et al., 2019, p. 512)
“Ensuring innovation appropriability”	(Hirvonen-Kantola et al., 2018, p. 8)
”Managing knowledge mobility”	(Dhanaraj & Parkhe, 2006, p. 661)

“Ensuring knowledge mobility”	(Hirvonen-Kantola et al., 2018, p. 8)
“Realignment of knowledge transfer to adapt cross-industry innovation”	(Lütjen et al., 2019, p. 512)
“Creating an open mindset for a diverse set of ecosystem partners”	(Lütjen et al., 2019, p. 512)
“…ensuring knowledge mobility…”	(Pikkarainen et al., 2017, p. 4)
“…supporting the knowledge extraction in the innovation process…”	(Pikkarainen et al., 2017, p. 4)
“…disseminating the information among network members…”	(Pikkarainen et al., 2017, p. 4)
“…information acquisition, transmission…”	(Pikkarainen et al., 2017, p. 4)
“…share knowledge of the network to outsiders…”	(Pikkarainen et al., 2017, p. 4)
“…persuade other actors to act to players’ benefit…”	(Pikkarainen et al., 2017, p. 4)
“…otivate and foster the voluntary collaboration…”	(Pikkarainen et al., 2017, p. 4)
“…governs the flow of knowledge…”	(Pitelis & Teece, 2018, p. 532)
“Gathering information from institutions, regulators and influencers”	(Lütjen et al., 2019, p. 512)

Table 13: Orchestration tasks for the category motivating

Orchestration task (Coordinating)	**Source**
“Managing innovation coherence”	(Nambisan & Sawhney, 2011, p. 45)
“… compelling mutual vision…”	(Fuller et al., 2019, p. 5)
“…determining principles of monitoring performance of actors…”	(Pikkarainen et al., 2017, p. 4)

"…monitoring performance of actors…"	(Pikkarainen et al., 2017, p. 4)
"…management of co-specialization and complementarities…"	(Lütjen et al., 2019, p. 508)
"Management competence for open innovation"	(Lütjen et al., 2019, p. 512)
"Evaluating opportunities with different partners"	(Lütjen et al., 2019, p. 512)
"Establishing a useful governance structure for the ecosystem"	(Lütjen et al., 2019, p. 514)
"Setting the agenda"	(Hirvonen-Kantola et al., 2018, p. 9)
"Coordinating"	(Hirvonen-Kantola et al., 2018, p. 9)
"Recognition of new entrepreneurial opportunities"	(Giudici et al., 2018, pp. 1377–1379)
"Building collaborative engagement"	(Giudici et al., 2018, pp. 1377–1379)
"Facilitating members' introspection"	(Giudici et al., 2018, pp. 1377–1379)
"Encouraging members' exploration of complementarities"	(Giudici et al., 2018, pp. 1377–1379)
"Fostering dispersed collaboration"	(Giudici et al., 2018, pp. 1377–1379)
"Formation of new business relationships"	(Giudici et al., 2018, pp. 1377–1379)
"…manage the evolution…"	(Gawer & Cusumano, 2013, p. 16)
"…develop a vision for their platform and promote this among potentially key players…"	(Gawer & Cusumano, 2013, p. 18)
"…facilitate third-party innovation…"	(Gawer & Cusumano, 2013, p. 18)

"…task sharing…"	(Pikkarainen et al., 2017, p. 4)
"…sets agenda and joint vision to the innovation network…"	(Pikkarainen et al., 2017, p. 4)
"…taking action to make ecosystem members to work towards the same goal."	(Pikkarainen et al., 2017, p. 4)
"…and reconfigure itself so as to create and capture value."	(Pitelis & Teece, 2018, p. 532)
"…coordinate activities and knowledge…"	(Pitelis & Teece, 2018, p. 532)
"…seize new business…"	(Pitelis & Teece, 2018, p. 532)
"…sense threats and opportunities…"	(Pitelis & Teece, 2018, p. 532)
"Leveraging complementarities, managing competition with cooperation (co-opetition) and internalisation [sic] with externalisation [sic] (e.g., open innovation)"	(Pitelis & Teece, 2018, p. 532)

Table 14: Orchestration tasks for the category coordinating

Orchestration task (Enabling)	**Source**
"Managing innovation leverage"	Nambisan & Sawhney, 2011, p. 45)
"…development of the ability to utilize cospecialized assets…"	(Lütjen et al., 2019, p. 508)
"Screening distant markets and technologies."	(Lütjen et al., 2019, p. 513)
"…ability to scale…"	(Fuller et al., 2019, p. 5)

"…provide platforms and assistance…"	(Pikkarainen et al., 2017, p. 4)
"…seeing that new techniques are diffused across subsidiaries…"	(Pitelis & Teece, 2018, p. 532)
"Managing network stability"	(Dhanaraj & Parkhe, 2006, p. 661)
"…integration of value-adding and non-value-adding partners in decision making process."	(Lütjen et al., 2019, p. 515)
"Maintaining relationships to value-adding, non-value-adding partners"	(Lütjen et al., 2019, p. 512)
"Maintaining network stability"	(Hirvonen-Kantola et al., 2018, p. 8)
"Ensuring mobilization"	(Hirvonen-Kantola et al., 2018, p. 8)
"…build a vibrant coalition around their platform…"	(Gawer & Cusumano, 2013, p. 18)
"…manage ecosystem relationships that are mutually beneficial…"	(Gawer & Cusumano, 2013, p. 18)
"Network formation…"	(Pikkarainen et al., 2017, p. 4)
"Network management..."	(Pikkarainen et al., 2017, p. 4)

Table 15: Orchestration tasks for the category enabling

The orchestration tasks in the three respective categories were grouped and aggregated in several iterations together with the practitioners. The result of this process is depicted in figure 44, which contains six orchestration activities.

	Orchestration Activities	Description
Motivating	11. Sharing information and knowledge	• Acquisition, processing, and distributing data, information, and knowledge • Motivate others to share information
	10. Ensuring value appropriability	• Providing mechanisms for others to capture value from their activities • Creating trust & accountability
Coordinating	9. Identifying and refining opportunities	• Setting, adjusting, refining as well as communicating opportunities for others • Defining performance measures & monitoring
	8. Coordinating activities and outputs	• Managing co-specialization through defining inputs and outputs for opportunities • Direct attention of others towards opportunities
Enabling	7. Ensuring network stability	• Identifying and integrating partners, and dissolve isolation through new relationships • Strengthen network through expected benefits
	6. Providing access to resources	• Definition of strategies to (re-)use assets, processes, or technologies across network • Modularize and group leverageable assets

Figure 44: Aggregated orchestration activities and their description

6. Providing access to resources. This orchestration activity describes how resources, processes, or tools are (re-)used by the participants, and how these assets are grouped in specific ways to facilitate easy use (Nambisan & Sawhney, 2011, p. 46). In addition, it includes the modularization of assets in such a way that they can easily be used by others. To be able to achieve this, continuous screening of markets and technologies (Lütjen et al., 2019, p. 512) or sensing threats and opportunities (Pitelis & Teece, 2018, p. 532) is necessary.

7. Ensuring network stability. Dhanaraj and Parkhe (2006, p. 663) described the dilemma of network stability, where loosely coupled entities have the advantage of adaption and agility, even though they are also prone to erosion and instability. This orchestration activity describes how additional network participants are integrated, how isolated parties are re-integrated, and how new relationships are constantly created, e.g., multiplexity, where two or more types of relationships among several actors occur together (Dhanaraj & Parkhe, 2006, p. 664). Other authors mention building a vibrant coalition (Gawer & Cusumano, 2013, p. 18), maintaining relationships with others (Lütjen et al., 2019, p. 512), or simply network management (Pikkarainen et al., 2017, p. 4). Additionally to managing ecosystem participants, network stability can be increased if reciprocity is expected by the participants, a phenomenon referred to as the “shadow of the future” (Dhanaraj & Parkhe, 2006, p. 664).

8. Coordinating activities and outputs. This activity describes a more direct way of interfering with the value creation activities. It includes defining a shared vocabulary or framework, defining interactions between the members, and the coordination of tasks (timing, location, etc.) (Nambisan & Sawhney, 2011, p. 46). Other authors mention the management of co-specialization or establishing useful governance structures (Lütjen et al., 2019, p. 512), coordinating (Hirvonen-Kantola et al., 2018, p. 8), and building a collaborative engagement (Giudici et al., 2018, p. 1378). Furthermore, it can include the specification of inputs and outputs that other parties create in the ecosystem.

9. Identifying and refining opportunities. This orchestration activity describes how opportunities to create value are identified, communicated, and jointly refined. Some authors describe how one entity must provide a compelling overall vision (Fuller et al., 2019, p. 5) or set the agenda (Hirvonen-Kantola et al., 2018, p. 8; Pikkarainen et al., 2017, p. 3). This activity is understood as identifying and promoting opportunities instead of using hierarchical command-and-control mechanisms of defining goals for others, which means that it is rather about the identification and joint evaluation of opportunities and encouraging others to pursue them (Giudici et al., 2018, p. 1378). The fact that ecosystems generate unprompted, innovative outputs means that a central vision or agenda for the whole system is not feasible for a single party. However, it may also include defining appropriate performance measures and evaluating whether the value creation activities create the expected benefits (Pikkarainen et al., 2017, p. 4).

10. Ensuring value appropriability. To motivate others to engage in value co-creation in ecosystems, they must perceive certain benefits for them. As autonomous actors act selfishly, i.e., they try to fulfill their needs, they will only participate if they can extract value for themselves. They must thus be able to receive compensation for their activities, e.g., a monetary reward (profits), valuable assets that they can leverage, new business relationships, etc. As a result, this orchestration activity aims at creating, maintaining, and improving mechanisms that ensure that others can extract some of the created value for themselves and that this is also perceived as such by the actors (Dhanaraj & Parkhe, 2006, p. 662). This can be ensured by creating trust among the participants or implementing fair and transparent mechanisms for commercialization (Nambisan & Sawhney, 2011, p. 46).

11. Sharing information and knowledge. These aggregated orchestration activities describe how data, information, and knowledge must be acquired, processed, and distributed across the network. The distribution of information and knowledge can be understood as a source of innovation, for example through (re-)combination of existing information or capabilities (Dhanaraj & Parkhe, 2006, p. 662). This also means that others must be motivated or persuaded to extract and share knowledge to promote unprompted outputs (Pikkarainen et al., 2017, p. 4). It is worth noting that this activity does not only include knowledge in the context of the knowledge hierarchy (Alt, 2018, p. 399) but also data or information. By doing so, others can combine different data pieces or contextualize information in their individual ways, therefore creating innovative outputs that one party possibly could not conceptualize on their own.

These orchestration activities describe how others can be enabled and motivated to pursue certain opportunities within the ecosystem in an indirect way in contrast to command-and-control mechanisms. Coordination activities are included in addition to these soft activities, which represent a direct way to influence value creation. This combination accounts for the fact that ecosystems are hybrid structures on the organizational spectrum and use mechanisms both from markets and hierarchies.

Furthermore, several authors mention that the provision of infrastructure (Nambisan & Sawhney, 2011, p. 46), a platform (Fuller et al., 2019, p. 5; Pikkarainen et al., 2017, p. 4), and the particular design of such an infrastructure plays an important role for the ecosystem (Autio, 2021, p. 9). As shown in RQ2a, a shared infrastructure is considered an essential part of the ecosystem analysis. This will be addressed by the last value creation component.

Means-to-interaction. The last value creation component describes the environment or the medium that binds the actors together in their value creation activities. As described earlier, this includes both a technological component and how actors share cultural aspects, social norms, and institutional logics (Autio & Thomas, 2018, p. 23). Thus, building on Betz, Schache, and Jung (2021, p. 7) two activities are defined for this value creation component: providing shared infrastructure and cultivating behavior.

12. Providing a shared infrastructure. Autio (2021, pp. 8–9) described the technological layer of ecosystems as the foundation of value creation, where its design decisions are crucial for the ecosystem to function and evolve. He (Autio, 2021, p. 9) identified three technological principles for ecosystems: optimization for connectivity, maximization of generativity, and the control of bottlenecks. The first one describes how technology supports connecting different actors, for example, through the design of interfaces or a modular architecture (Autio, 2021, p. 9). This is also supported by other authors (see Adner, 2017, p. 54; Jacobides et al., 2018, p. 2258; Williamson & de Meyer, 2012, p. 27). The second principle, maximization of generativity, describes how additional functionalities make it easy for providers and users to contribute content, complementary services, or applications, and generate other inputs, such as reviews (Autio, 2021, p. 9). This is in line with Jacobides et al. (2018, p. 2261), who emphasized the importance of technological modularity with their thin crossing points to integrate independent components. The third principle addresses controlling the technological bottlenecks in the infrastructure to maximize value capture. Value appropriation, however, has already been included in the orchestration activities above. In addition to establishing and maintaining a shared infrastructure, other authors mention technological standards and common interfaces that provide technical support, for example, by providing SDK or code libraries (Jacobides et al., 2018, p. 2258; Parker et al., 2017, p. 3; P. Williamson & de Meyer, 2012, p. 38). By developing a shared infrastructure with common interfaces and support in adopting such technologies, value creation in ecosystems is supported.

13. Cultivating behavior. The last activity in the means-to-interaction component addresses how ecosystem participants share institutional logics, which comprises cultural values (Betz et al., 2021, p. 3), norms, meanings, and symbols (Autio & Thomas, 2018, p. 10). Jacobides et al. (2018, p. 2268) mentioned that different behaviors could be the result of the unique complementarities in ecosystems. Autio (2021, p. 9) identified several institutional and behavioral principles: conflict resolution, regulatory embedding, and promotion of norms. Conflict resolution describes how potential conflicts between actors in an ecosystem might require mediation and support to reach a solution. Regulatory embedding describes if and how ecosystem participants comply with regulatory norms such as national laws, while the promotion of norms describes how specific behavior is reinforced through agreed-upon rules. By promoting rules and norms, resolving conflicts, and thus creating rules of engagement (Jacobides et al., 2018, p. 2260), value creation and interaction among ecosystem participants can be supported. Figure 45 summarizes the means-to-interaction component with its two value creation activities.

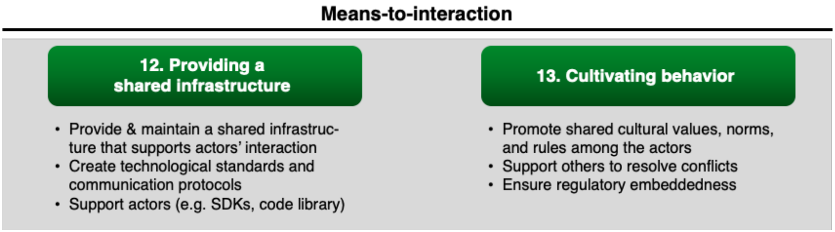


Figure 45: Aggregated means-to-interaction activities

As a result, for RQ2b all identified value creation activities are deployed within the respective value creation components of the value sphere. This leads to the final framework that consists of three components with a total of 13 value creation activities for ecosystems. The offering assembly component was structured using create, exchange, and use. In these sub-components, the activities service assembly, servicing, marketing and sales, exchange and logistics, and use were identified as value creation activities. The orchestration component was structured using enable, coordinate, and motivate. In these sub-components, the value creation activities providing access to resources, ensuring network stability, identifying, and refining opportunities, coordinating activities and outputs, sharing data and information, and ensuring value appropriability were defined as orchestration activities. In the means-to-interaction component, providing shared infrastructure and cultivating behavior were defined as value creation activities. Here it is worth noting that the orchestration activities support all offering assembly activities, while the means-to-interaction activities provide the medium for the former value creation components. The value sphere with all value creation activities is depicted in figure 46.

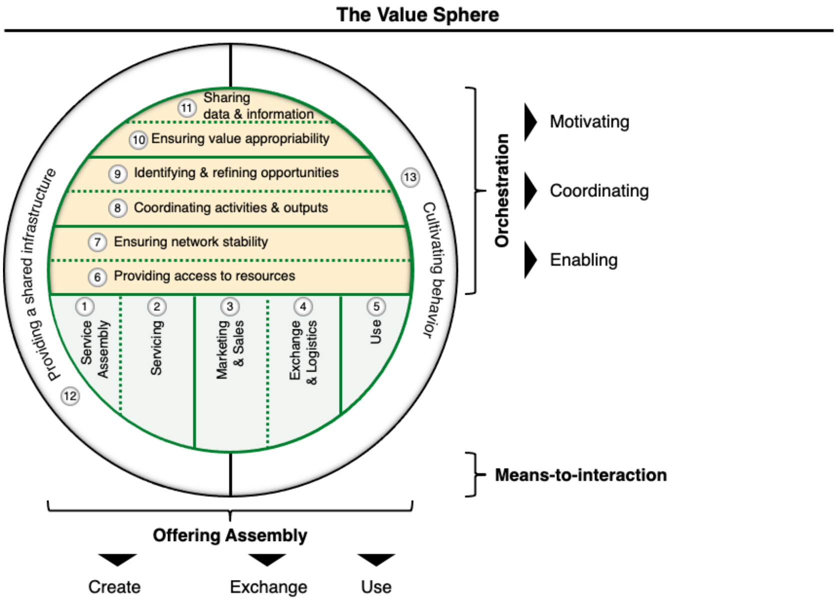


Figure 46: The final value sphere as a result to address RQ2b

Note that the offering assembly activities (1–5) should not be understood as a linear sequence of activities (i.e., a process) but rather as an accumulation of activities that are connected through means-to-interaction activities and orchestration activities.

Furthermore, the model must be understood as organization-independent as it rather describes value creation from the network perspective and focuses the attention on important activities such as orchestration which are necessary for the overall offering to come into being. It thus lifts our understanding of inter-organizational value creation from an organization-centric perspective to a network perspective.

The value sphere does not replace existing models or conceptualizations but rather complements existing views with this network perspective. For example, company-specific value creation activities such as human resources, procurement, etc. will still be pursued on a company level, however, it is assumed that only if company-specific value creation activities are in place, will participation in ecosystems be possible.

Finally, the value creation activities in the value sphere should not be considered in isolation, but rather in combination. For example, in isolation, the offering assembly activities (e.g., service assembly and use) only provide limited insights into value creation as a whole. The combination of two or more activities, however, provides insights from a network perspective. Similarly, orchestration activities must be considered in combination with each other. For example, providing access to resources (e.g., a business process) by itself may not be enough to prompt outputs from other actors, but has to be combined with sharing information on how to use the resources and the identification of opportunities that could be pursued. These combinations are also important across value creation components, e.g., service assembly combined with the identification of opportunities and access to possible resources. For example, Uber may identify an opportunity for a taxi driver (e.g., a person who needs to travel from location A to B), provide access to a navigation system (provide access to resources) within the Uber app (provide shared infrastructure), and even offer to process payments (marketing and sales) including a transparent commercialization infrastructure (value appropriability), which distributes value among the participants.

4.3 Results for research step 3: Evaluation

Both artifacts from the design steps were evaluated separately and in several iterations. Concerning the methodological approach from section 3.5, the artifact was evaluated in three stages, both qualitatively and quantitatively. The first stage describes the continuous feedback-loops, where qualitative feedback from practitioners was continuously gathered and integrated during the design phase. The second stage describes a quantitative test to determine whether the designed artifacts meet the criteria based on Sonnenberg and vom Brocke (2012, p. 391). Next to the evaluation criteria on the survey for which a 7-point Likert scale was used, the practitioners had the opportunity to provide additional comments. The third stage refers to the application of the artifacts in three case studies. The specific setup of the research activities and the evaluation activities based on ADR (Sein et al., 2011, p. 43) also ensured that various people were included in the evaluation process in addition to those who designed the artifact. While the ADR core team (researcher plus EWG) represents the smallest sub-group as well as the one that was closest to the artifact development, the consortium (end-users) was the next largest group. Furthermore, the practitioners from the consortium were used to identify additional experienced colleagues who were not part of the CC Ecosystem and the previous design activities who could provide unbiased feedback. This approach was adopted for the surveys and the case studies.

4.3.1 Survey results

Both artifacts were evaluated based on the evaluation criteria for DSR artifacts proposed by Sonnenberg and vom Brocke (2012, p. 391). Since both artifacts are considered models, the criteria for RQ1 and RQ2 included (a) completeness, (b) fidelity with real-world phenomena, (c) internal consistency, (d) level of detail, and (e) robustness. The evaluation was done using a 7-point-Likert scale from 1 (strongly disagree) to 7 (strongly agree).

4.3.1.1 Evaluation of results of RQ1

Table 16 summarizes the survey results for the evaluation concerning RQ1. The survey was conducted as an online survey with a total of 30 participants using the online tool SurveyMonkey.

In general, the evaluation survey showed a very high approval in all five evaluation dimensions. The arithmetic mean of all five dimensions is above 5 with 4 being the neutrality threshold. This is in accordance with the qualitative feedback from the EWG and the CCEW meetings as part of the stage 1 evaluation.

Criteria	Arithmetic mean	Standard deviation
Completeness	5.70	0.92
Fidelity with real world phenomena	5.57	1.01
Internal consistency	5.87	0.82
Level of detail	5.50	1.20
Robustness	5.33	1.12
n = 30, 1 (strongly disagree) – 7 (strongly agree)		

Table 16: Evaluation results from the survey for RQ1

The highest approval was reached in the dimension “internal consistency”, which was calculated as 5.87 with a standard deviation of 0.82. Thus the practitioners were able to confirm that the combination of the two conceptual dimensions of the typology provides a logical and comprehensible way to better understand the shared value purpose in ecosystems.

The second-highest approval was calculated for the dimension “completeness” with an arithmetic mean of 5.7 and a standard deviation of 0.92. The practitioners acknowledged that the typology creates a complete set of ideal types since nobody could add additional ideal types or remove any of the proposed ideal types in the discussions.

The lowest approval value was reached for the dimension “robustness” with an arithmetic mean of 5.33 and a standard deviation of 1.12. The practitioners mentioned that absolute certainty about the model’s applicability is not possible, especially in a system dynamic with various unprompted changes where new technological features could lead to additional idea types, e.g., to the left or the right on the organizational spectrum.

In general, during the discussions, the practitioners confirmed that the model provides an interesting and useful distinction of the functional side of a shared value purpose, i.e., the overarching goal of what the interaction of the different actors aims at. They mentioned that if this network purpose were combined with context (e.g., the domain of home, living, health, etc.), the practitioners would obtain a better understanding of what kind of problem the ecosystem solves.

However, the practitioners also mentioned that the model as such requires guidance concerning what managerial insights come with such a typology. Nevertheless, with the calculated scores, the evaluation appears to support the design of the artifact.

4.3.1.2 Evaluation of the results of RQ2

Table 17 summarizes the survey results for RQ2a. The survey was conducted as an online survey using the online tool SurveyMonkey with a total of 30 participants. The survey results were part of the publication of Betz and Jung (2021b, p. 7).

The highest approval was reached in the dimension “internal consistency” with an arithmetic mean of 6.14 and a standard deviation of 0.88. The practitioners mentioned that the model is comprehensible and that no logical problems are apparent. However, it was also mentioned that it is difficult to evaluate this artifact component in isolation of RQ2b since it only provides a high-level overview of the value creation components.

Criteria	Arithmetic mean	Standard deviation
Completeness	5.97	1.03
Fidelity with real world phenomena	5.87	0.90
Internal consistency	6.14	0.88
Level of detail	5.66	0.97
Robustness	5.36	1.07
N = 30, 1 (strongly disagree) – 7 (strongly agree)		

Table 17: Evaluation results from the survey for RQ2a

The second-highest approval value was calculated for “completeness” with an arithmetic mean of 5.97 and a standard deviation of 1.03, which is in alignment with the feedback from the practitioners. The model shows three components of value creation on an ecosystem level, and no component seems missing on the network level. Nevertheless, the fact that the model represents a different aggregation level compared to the value chain was sometimes difficult for the participants to grasp and the question arose if any other support activities must be considered (e.g., human resources).

The lowest approval value was calculated for the dimension “robustness” with an arithmetic mean of 5.36 and a standard deviation of 1.07. While this is still above the neutrality threshold, it reflects uncertainty concerning whether the model will be able to address varying organizational or technological circumstances, similar to the concerns described for RQ1 (e.g., new technological solutions).

Table 18 summarizes the survey results for RQ2b. The survey was conducted as an online survey with a total 31 participants using the online tool SurveyMonkey.

Criteria	Arithmetic mean	Standard deviation
Completeness	6.19	0.70
Fidelity with real world phenomena	5.84	0.78
Internal consistency	6.06	0.89
Level of detail	6.16	0.86
Robustness	5.94	0.81
n = 31, 1 (strongly disagree) – 7 (strongly agree)		

Table 18: Evaluation results from the survey for RQ2b

The highest approval was reached in the dimension completeness with an arithmetic mean of 6.19 and a standard deviation of 0.70. The practitioners found that the model describes value creation in ecosystems in a complete manner without omitting important components or value creation activities. The practitioners mentioned that the selected activities for the three components describe value creation from a network perspective and that no activities could be added. One practitioner commented that a detailed explanation is necessary, especially to distinguish “providing access to resources” and “sharing data and information.

The second-highest approval value was calculated for level of detail with an arithmetic mean of 6.16 and a standard deviation of 0.86. This means that the aggregation level of the components and their value creation activities is sufficient but detailed enough to allow for further analysis. This is important as the tool is intended for a strategic analysis of value creation in ecosystems. One practitioner mentions that such a tool must not aim at describing everything in an ecosystem but it should direct the user's attention towards crucial activates without increasing complexity.

The lowest approval value was calculated for fidelity with real world phenomena with an arithmetic mean of 5.84 and a standard deviation of 0.78. Despite being the lowest value, it still indicated a general approval regarding how the model describes the real world. However, this concern can be mitigated by applying the model in real cases and to test the artifacts for their descriptive power (see section 4.3.2).

When the two surveys from RQ2a and RQ2b are compared, it can be seen that further developing the model led to higher approval rates, e.g., for completeness, level of detail, as well as robustness. Only the approval values for fidelity with real world phenomena and internal consistency decreased marginally. This provides further support for the final artifact and demonstrates, that the design could be improved with the research activities from RQ2b.

4.3.2 Case study-based evaluation

This section presents three descriptive case studies that demonstrate the applicability of the artifacts and provide further insights into the conceptualization of value creation in ecosystems. The first case study describes the network around *PostFinance – valuu*, a comparison platform for financial services in Switzerland. The second case study describes the network around *Scramble*, a recruitment platform for companies and students in Switzerland. The third case study describes the network around *PropTech Startup*[34] *(PTS)*, a platform for real estate broker services.

[34] This case study has been anonymized for data protection reasons; the company is referred to as PropTech Startup.

4.3.2.1 Case study 1: PostFinance - valuu

Introduction. PostFinance is a Swiss universal bank and subsidiary company of the Swiss Post Corporation. In 2021, the institute reported more than 2.7 million customers and CHF 124 billion assets under management (PostFinance, 2021, p. 2) and is thus considered as one of Switzerland's leading financial services providers. Due to the public ownership of the Swiss Post, PostFinance is subject to stricter regulatory measurements, for example, the limited access to the capital and mortgage market due to the "Postorganisationsgesetz" ("the postal organization law), which was only revised in 2020 (PostFinance, 2021, p. 3) and which ruled out any loan or mortgage products from PostFinance. Despite these strict rules, PostFinance aimed to participate in the loan and mortgage market by creating the mortgage comparison platform valuu in 2019 (PostFinance, 2021, p. 37).

The mortgage market in Switzerland amounted to approximately CHF 1.064 billion of outstanding mortgages by the end of 2018 and grew approximately 21% over the previous six years (MoneyPark, 2019). The market is dominated by three groups of financial institutions: cantonal banks, large universal banks, and banks from the Raiffeisen consortium that manage more than 76% of the market (MoneyPark, 2019). However, the Swiss banking market appears to be highly fragmented with over 250 independent institutes (Valuu & Business Engineering Institute Sankt Gallen, 2019). This scattered market creates opportunities for intermediaries who support customers in the process of identifying, comparing, and closing mortgages. Several intermediaries entered the market in Switzerland, for example, MoneyPark, e-hypo.ch, UBS key4, hypomat.ch, hypoguide, hypoplus, homegate.ch, etc. Three basic approaches can be identified on the market, namely, an informative approach which aggregates specific information, a digital closing approach where customers can close a mortgage in a fully digitalized process, and a digital closing and advisory approach which combines the latter with expert advice on mortgage conditions (Valuu & Business Engineering Institute Sankt Gallen, 2019). Similarly, the Swiss market for small and medium-sized loans is also characterized by a fragmented institutional environment in which intermediaries increased their involvement (Valuu & Business Engineering Institute Sankt Gallen, 2019), and where a total loan volume of CHF 15.4 billion was issued via digital platforms in 2020 alone (Dietrich & Amrein, 2021).

Valuu launched in 2019 with its first module, a mortgage comparison solution that matched other Swiss financial services institutes and their mortgages with private customers. Based on an initial questionnaire, which investigates the specific customer needs and financial situation, the matchmaking algorithm identifies suitable products, compares these products, and offers a fully digitalized process to close the mortgage (PostFinance, 2021, p. 37). In addition to the mortgage comparison solution, valuu introduced a loan comparison module and a retirement advisory module. Since its launch, valuu was able to close approximately CHF 500 million in mortgages via its digital mortgage process (Dietrich, 2021). Valuu works together with several Swiss financial services institutes, e.g., Wir Bank, Swisscanto, Banque Cantonale Neuchâteloise, Hypothekarbank Lenzburg, Clientis, Bank SLM, Credit Suisse, Berner Kantonalbank, etc. (Valuu, 2021b).

Analysis. Valuu started as a comparison platform for mortgages that connects various independent mortgage providers (e.g., banks, pension funds) with private customers. It thus cultivated a shared value purpose of the type transaction, where the overall solution is the exchange of services, i.e., a financing product, between the participating institutes and the customer. Valuu communicates the following value proposition: "You can compare and purchase favorable financing and insurance solutions easily and securely online"[35] (Valuu, 2021a). This combines access to information and resources about financial products and the possibility to purchase them, where the latter implies a common process that lets valuu process purchase decisions and transmit the

[35] Translated from German: "Sie können günstige Finanzierungs- und Versicherungslösungen einfach und sicher online vergleichen und abschliessen."

corresponding process steps to the respective partner institute. While valuu started with a mortgage comparison they quickly expanded their activities in the domains of financing and investments with a loan comparison and retirement advisory process. To expand their exposure in the ecosystem, valuu used a horizontal expansion approach and transferred the shared value purpose towards similar domains.

In addition to a horizontal expansion of its activities, valuu could also consider the expansion towards other shared value purpose types. For example, as the mortgage process is itself part of a larger “home” process, a possible expansion lies in the extension across this customer journey, which will include several other actors such as real estate owners, real estate brokers, real estate sellers, notaries, etc. Such a process may be more tightly controlled using hierarchical coordination measures to ensure high quality and close alignment of all actors and thus increasing ecosystem exposure towards type (II). Figure 47 summarizes these ideas.

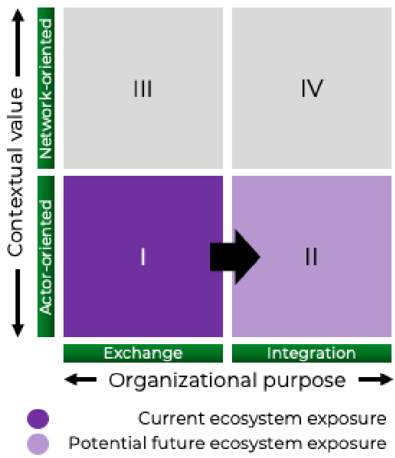


Figure 47: Valuu ecosystem exposure

The value creation configuration can be described using the value sphere with its three components: offering assembly, orchestration, and means-to-interaction. The service assembly activities describe how the individual actors contribute to the overall ecosystem (e.g., with their specific services), which include capital and the respective mortgage conditions (e.g. duration, interest payments, etc.). More than 100 financial institutions, insurance companies, pension funds are connected to the platform. While valuu aggregates the information and compares the results to identify the best solution for the customer, the partner institute is ultimately the customer's contract partner.

A customer survey, which was conducted by valuu in cooperation with the Business Engineering Institute St. Gallen, revealed that a digital mortgage comparison should be paired with human interaction points. Among 1033 survey participants, more than 70% wished that mortgage specialists guide them through the process, and more than 60% mentioned that the combination of digital comparison tools and personal interaction is preferable. Therefore, valuu trained an advisory team, which guides customers through the process and answers questions. This refers to the servicing activities.

Marketing and sales activities are automated by the platform, where the algorithm identifies the best fitting solution depending on the customer preferences from a short questionnaire before the process. It is important to mention, that the conditions for the mortgages are fixed during the comparison process, based on the customer information. This means, that the interest conditions, for example, don't change while the customer is in the comparison process. In addition, valuu is promoting the comparison solution on the market, for example with TV commercials or promotion offerings with discounts.

The service exchange is accompanied by various activities. Firstly, based on the customer input the selected mortgage, valuu screens the available customer information and provides a contract recommendation for the respective issuing institute. Secondly, valuu offers a digital mortgage closure function, where the customer can close a loan decision immediately and a physical contract is issued and sent to the customer. The digital mortgage closure is binding, however, subject to a final validation. After the mortgage closure, the customer interacts directly with the issuing institution, for example with questions or possibly a refinancing solution (which is also available on the valuu platform).

After the comparison and the mortgage decision from the institution and the customer side, the mortgage is paid out to the customer. This concludes the offering assembly activities. Figure 48 summarizes the activities.

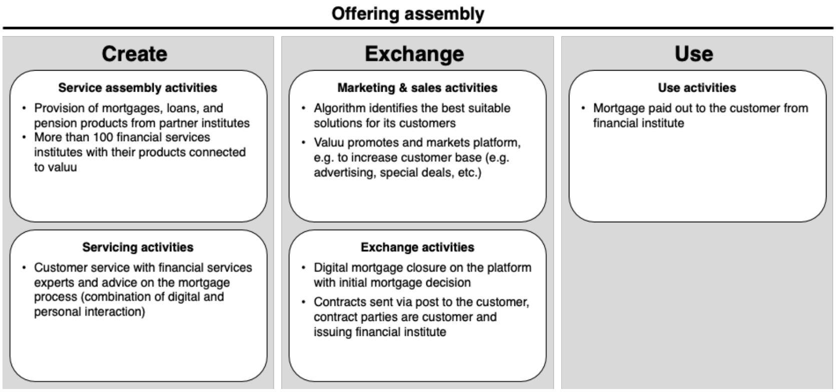


Figure 48: Valuu offering assembly activities

The orchestration activities describe, how the network participants and their activities are aligned. First, there are several activities to enable the actors in the network. For example, valuu provides access to resources for all participants. Firstly, the platform acquires basic information about the customers' financial situation, which is later used to make a financing decision. Second, the platform offers a simple mortgage comparison and closure process, which guides the customer. Additionally, valuu offers a pre-decision process and validates customer information for the partner institution, so that a loan decision can be made fast and without unnecessary feedback loops. To stabilize the network, valuu is continuously identifying additional partner institutions. After the customer onboarding on the platform and the provision of financial information, valuu also reaches out to the customer to guide them through the process.

Valuu coordinates value creation with hierarchical elements, as well. The platform automatically identifies business opportunities between customers and banks based on the customer information and the corresponding loan conditions. Nevertheless, the ultimate choice which loan to choose lies with the customer. In addition, valuu provides an online closure function, where the customer is able to immediately close the mortgage on the platform, while contracts are later sent via postal service. Furthermore, valuu predefines inputs and outputs and thus creates an efficient process for all involved parties. To integrate the mortgage products from the respective service providers, mortgage conditions are discussed initially to ensure the right fit for the platform’s customers. Furthermore, after the customers entered their personal information, the loan conditions are frozen, meaning no changes in interest rate are possible anymore. The customer thus interacts with the platform (and the service providers) seamlessly, without process breach or any other inconveniencies during the user journey. Next to these hierarchical activities, valuu also shared important information to motivate the participants, both about general financial topics (e.g. a guidebook on mortgages, loans, or pensions (Valuu, 2021c)). Furthermore, valuu operates its service hotline, where customers can get in touch with several finance professionals to support in their decision-making process. Also, the value appropriation model is clear to both customers and providers, which provides additional motivation to participate in the ecosystem. From the provider perspective, valuu deceloped a transparent commission-based value appropriation model. Valuu receives a commission for every mortgage closure from the respective institute. From the user perspective, value clearly communicates potential savings for the user compared to the average market interest rates (Valuu, 2021b). Figure 49 summarizes the orchestration activities.

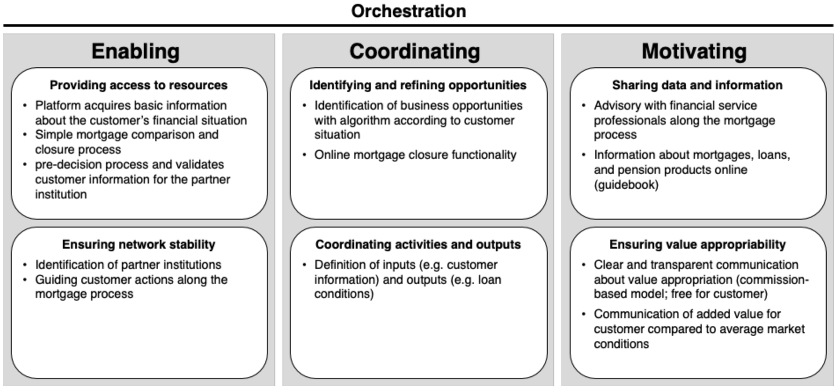


Figure 49: Valuu orchestration activities

Finally, the ecosystem leverages a shared infrastructure and valuu also aims at cultivating behavior among its participants. At the heart of the infrastructure lies valuu's platform, on which the mortgage or loan comparisons are facilitated. This platform comprises an easy-to-use customer interface, which guides the users through the process. Unlike other approaches, valuu initially did not operate a dedicated interface for its partner institutes. The loan conditions were decided in bilateral discussion between valuu and the providers without real-time interfaces for data exchange between valuu and the partner institute. As a potential expansion, valuu could implement real-time interfaces with the partnering banks including digital signature services, where mortgages could be closed, contracts digitally signed, and all required data exchanged between all parties to further increase process efficiency. Additionally, the individual behavior of the parties in the ecosystem is a crucial part of the value creation. Valuu tries to support the mortgage or loan comparison process, for example, by verifying customer information. As the contract-parties for mortgage transactions are the customer and the partner bank, valuu has only limited influence on the individual behavior during the transactions and can only provide guidelines. Figure 50 summarizes the means-to-interaction activities.

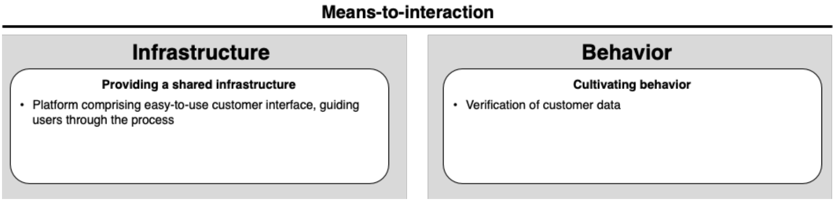


Figure 50: Valuu means-to-interaction activities

Discussion. Valuu provides an interesting case of an ecosystem on the market-side of the organizational spectrum. While valuu defines a standardized process to investigate the financial situation on the customer-side and uses its algorithm to match the best fitting product to the customer needs, the ultimate decision, which mortgage to choose and how to adapt the offering to the individual circumstances lies with the customer. Valuu transparently communicates that it considers its services as an independent mediation service, where the contractual partners are the bank and the customer instead of valuu. Thus, valuu provides services to increase the overall efficiency of the loan market and to create value by guiding both customers and providers. While valuu already increased its market exposure by offering private loans and pension products, increased ecosystem exposure could be achieved by developing further shared value purposes, e.g., of the type solution. The offering assembly activities are distributed across several organizations. The mortgage design and distribution lie with the specific issuing institute, while marketing for the platform and servicing activities are conducted by valuu. Furthermore, valuu carefully enables, coordinates, and motivates all participants. With standardized workflows, a definition of inputs and outputs or sharing data and information on the value appropriation, valuu creates a favorable environment for others and therefore incentivizes value creation. The typology of the shared value purpose and the value sphere therefore outline the value creation configuration in this ecosystem.

Conclusion. Valuu established a market-like structure, where individual services providers like financial services institutions can offer their mortgages, loans, or pension service to customers. With the platform, valuu aims at increasing market efficiency, e.g., in the mortgage market, and thereby contributes to value creation with workflows, mortgage comparison, and a digital closure functionality. The case demonstrates the high autonomy of participants, for example, with the final decision being made by the customer based on the comparison results. After the comparison, the institute and the customer enter a reciprocal contractual relationship. The case demonstrates, how value creation in ecosystems can be achieved with loosely coupled entities, where valuu's role lies in enabling transactions among the different parties.

4.3.2.2 Case study 2: Scrambl

Introduction. In the third quarter of 2021, Switzerland counted more than 5 million people in employment in the secondary and tertiary sector (Bundesamt für Statistik, 2021a). In addition, the number of open positions grew strongly, with a total of 67'000 unfilled jobs in the secondary and tertiary sector, more than 27'000 open positions more compared to the same quarter in 2020 (Bundesamt für Statistik, 2021a). Especially for highly qualified personnel, it was increasingly difficult to recruit during the same time period (Bundesamt für Statistik, 2021a). In addition, there are 253'000 unemployed people in the third quarter of 2021(approximately 4.9%) (Bundesamt für Statistik, 2021b). This is complemented by the fact that a large fraction (56%) of Swiss people in general and 64% of 18-29 year old employees, are willing to change their jobs, according to a survey from 2019 (Handelszeitung, 2020). With various open positions and a strong willingness of Swiss people to change jobs, this creates a large potential for value creation and increasing market efficiency in the human resources area.

The Lucerne-based HR-tech startup Scrambl aims at supporting the Swiss job market and increasing efficiency through identifying the most suitable candidates for companies and the most suitable jobs and projects for talents. Additionally, Scrambl aims at helping talents to create meaningful work-situations, where people pursue fulfilling jobs. To do so, Scrambl helps with a flex-working model, where talents are able to work similar to a freelancing-model. Companies do not need to hire the talents directly but can book them via the platform without any payrolling or other administrative tasks. This increases flexibility for both sides.

To achieve this, the 2020-founded startup built a skill-matching platform, which develops detailed skill-profiles including soft-skills, hard-skills, and experience and knowledge with specific tasks, tools, or methods. The skill profile, which is created both from the talents and companies for their jobs, are compared and the algorithm calculates a matching score: the degree to which both skill profiles correspond to each other. This sets Scrambl apart from other approaches. On regular job-posting platforms, job postings are placed on the platform and can be searched by its visitors. Scrambl, on the other hand, uses the skill profiles to show the job postings to the most suitable candidates. This leads to better fits and less administrative effort to identify the best skill fit among a large crowd of applications, while making job transitions easier for talents, who also need less time and effort to identify suitable jobs. The flex-working model also helps companies to get to know the talents, e.g., by inviting them for work trials, where no definitive hiring decision is necessary beforehand.

Scrambl secured a first pre-seed investment round in August 2021 and by now serves several customers in various domains. As of December 2021, Scrambl has more than 600 registered profiles on the platform.

Analysis. After an initial shift in focus from a flex-working model towards the skill matching approach by the end of 2020, the startup developed its ecosystem exposure in a market-like structure. The platform created a platform for job postings on the one hand, where companies are able post their jobs with a respective skill-profile attached to it. On the other hand, talents can create their own personal profile, similar to other social media platforms and a personal skill-profile. Both for the company and the talent side, the skill profile is not publicly visible and only used for the skill matching calculation in the background. When a company publishes a project with a skill profile, the project is pushed to suitable talents, for which they can express their interest. Thus, leveraging the skill matching algorithm, Scrambl established a type I (transaction) shared value purpose, where transactions e.g., getting to know each other, are facilitated between the companies and the talents. In addition, from early on Scrambl increased its ecosystem exposure by establishing a type III (interaction) shared value purpose, where the different parties can interact with each other. If a talent indicates interest in a specific job posting, the company can approach the talent via chat-function. Furthermore, they can exchange information (e.g., previous work results, information on the projects, or talents can even create offerings for projects) on the platform which increases the likelihood that both parties decide to work with each other. Thus, Scrambl decided to use two purpose types to establish its ecosystem exposure and to support the ecosystem in its evolution.

To further increase its ecosystem exposure, Scrambl already discussed several options, which might help to strengthen the ecosystem. First, developing a type II (solution) shared value purpose might be valuable for the network, which may comprise fixed workflows regarding hiring decisions and talent management. However, to achieve this integration approach, interfaces towards HR-management software providers (e.g., workday, which is used to manage talent acquisition, performance management and talent development, or SAP successfactors, which is used for transactional processes (talent acquisition) and experience-based processes guiding the user in their day-to-day work). For example, a direct interface to the talent acquisition tools and a compatible workflow and data structure will allow a deep integration within HR-management tools of Scrambl's customers. Other business potential lies in the development of a type IV (involvement) shared value purpose. This is, however, a highly complex field and requires bringing together various providers and users paired with defined workflows and therefore higher coordination effort. As an example, Scrambl may try to create spontaneous teams consisting of different skills and expertise, which are connected with customers and their specific project requests. To bring the team together and to prepare them to effectively deliver their work results, Scrambl may also provide tools or project managers to align the activities of these actors. Thus, Scrambl may create a virtual skill-allocation process for projects, where providers and users are brought together, depending on their individual needs. Figure 51 summarizes Scrambl's ecosystem exposure.

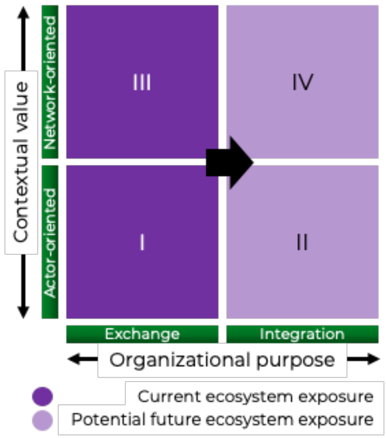


Figure 51. Scrambl ecosystem exposure

To better understand the value creation configuration in this ecosystem, the value sphere is used to outline the most important components and value creation activities. The first component describes the offering assembly activities and thus, how the single participants contribute to the overall value creation. First, the service assembly activities comprise talents, who offer their time and skills for companies and their projects. Initially, Scrambl built its community around business students with a focus on innovation management, marketing and communication, business development, etc. Furthermore, junior positions in business development of consulting are targeted since access to the university is relatively easy compared to professional services. For the future, there are also ideas to integrate educational services, for example trainings, summer school programs, or executive education programs which can be matched to customer needs on the platform.

Scrambl performs several servicing activities to gather important feedback from users and to strengthen the network. On the one hand, Scrambl works together closely with the customers (e.g., companies with open position) and supports them with job postings or gathers feedback from past activities. If any problems arise, Scrambl functions as a single point of contact and helps to resolve them, e.g. functional problems on the platform or questions regarding flex-working inquiries. From the user perspective, that is the talent-side, Scrambl also gathers feedback or answers questions, e.g., regarding contracts, salary details, etc.

Scrambl is marketing its platform, both on a user and on a customer side. For example, Scrambl uses an ambassador program to grow its talent-community, where individual volunteers use their own personal network or distribute flyers and other information at the universities. The ambassadors receive a small monetary reimbursement for their services. On the customer side, Scrambl actively approaches prospective clients with public open positions. This way, Scrambl aims at growing both the talent and the customer side, simultaneously. In addition, talents have their own options of marketing their services, for example, by creating their personal profiles or by uploading and demonstrating certain work results (e.g., presentations). Thus, there are multiple marketing and sales layers in this case.

The exchange of (professional) services via Scrambl is a very sensitive topic since hiring decisions are always crucial and possible very costly for the hiring entity. Scrambl promotes the exchange, that is, the introduction of the two parties and makes skills transparent. Furthermore, Scrambl supports with administrative tasks (e.g. contracts) of the transaction. While a first introduction, e.g., in an interview is relatively cheap a hiring choice comes at higher costs, where Scrambl uses its predefined contracts with predefined cancellation policies to ease the transactions between the parties. Also, Scrambl continuously uses customer feedback to strength the network. For example, after some interviews, customers reported a lack of preparation form the talents. Therefore, Scrambl implemented an interview briefing, with tips and other information to help talents prepare for interviews.

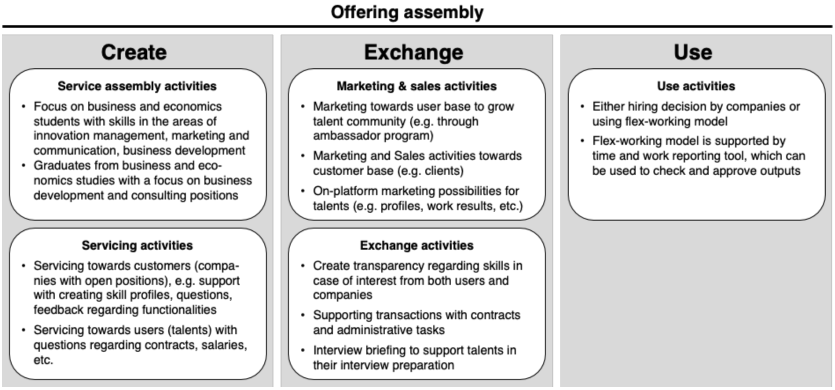


Figure 52. Scrambl offering assembly activities

If the two parties decide to work together, the actual use of the talents' services takes place in the clients' organization. Either the companies directly hire the talents or they use the flex-working model. For the latter, Scrambl implemented a tool to help report time and work results, which can be checked and approved by the company. Therefore, there is additional transactional support when service is consumed. Figure 52 summarizes the offering assembly activities.

Orchestration activities are another crucial component in the overall value creation. First of all, Scrambl aims at enabling other parties, on the one hand to identify the right skills for specific jobs, on the other hand, to identify suitable jobs and projects which allow for meaningful work. To do this, Scrambl established its SkillMatcher, a matchmaking algorithm which identifies skill-based matches in the community. Next to the algorithm, the SkillMatcher functions with a skill-ontology, which provides a data structure for jobs, skills, tasks, and knowledge. Without this ontology, a structured skill matching approach would be highly difficult, since job postings traditionally use text-based, unstructured data (e.g. traditional resumes). Next to the access to important resources, Scrambl is ensuring network stability with various activities. For example, Scrambl continuously recruits new talents and companies for the platform, to grow the overall community. Furthermore, Scrambl actively reaches out to its talents and proposes interesting jobs, which meet the talents' skill profiles. This way, interactions between the parties are incentivized.

Using its algorithm, Scrambl identifies potential matches between candidates thereby identifying opportunities among network participants. Furthermore, as the software provides tools for the participants to create flex-working relationships, the platform defines a simple vocabulary and structure to create flex-working opportunities. For example, talents can write offerings for freelance projects. A user interface provides a structure for the offering. After sending it to the respective company, the company can accept the offering. The previously defined structure also functions as time and expense reporting tool. Besides these measures, Scrambl does not use other hierarchical measures, for example, there is no input or output control for the respective transactions between the parties.

To motivate the network participants, several other orchestration activities are performed. For example, Scrambl carefully shares information about job postings (e.g., via mail within the talent community), and also in other social networks. The latter has the advantage of reaching out to other non-Scrambl talents to increase the talent community. In addition, a transparent value capture model is important to motivate others to participate in the ecosystem. Previously, Scrambl used a success-based matching-fee-model, where companies paid for successful hires of talents. The use of the platform is free for the talent side. However, Scrambl is currently working on a new model to monetize matches, that is, interest indications from both talents and companies. Companies only pay a fee for talents, where both sides show interest. Additionally, the flex-working model is monetized with a service fee, that is deducted from the gross salary between a company and the flex-worker. In this case, Scrambl transparently communicates all expected costs to all involved parties, e.g., taxes, social security charges, and ultimately a small Scrambl service fee. Figure 53 summarizes the orchestration activities.

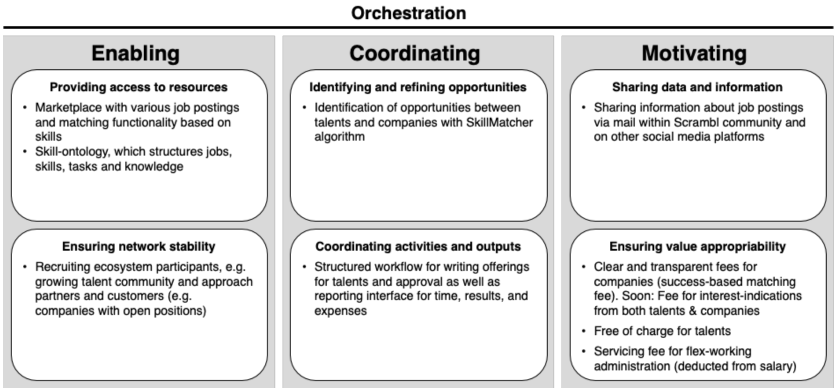


Figure 53. Scrambl orchestration activities

Finally, there are several means-to-purpose activities, which are performed in the ecosystem. First, a shared technical infrastructure is developed and maintained to enable transactions between the parties. Second, to offer the flex-working model, the platform was initially designed with interfaces to the Swiss payrolling provider payrollplus, who performed the payrolling activities in the background. However, the payrolling function can now be offered by Scrambl's platform itself. Furthermore, Scrambl built interfaces to other partner organizations, for example, to receive data on job postings in Switzerland. Scrambl also tries to cultivate behavior among its participants. For example, the way the Scrambl platform is designed is to incentivize people to take responsibility of their own actions (e.g., supported by the design of the offer-writing and time reporting tools). Additionally, Scrambl constantly feeds its community information and also briefs the talent side on how to interact with the companies (e.g., in short calls). Especially, the flex-working model, which requires higher responsibility, is often new for the students and requires support to some extent. Figure 54 summarizes the means-to-interaction activities.

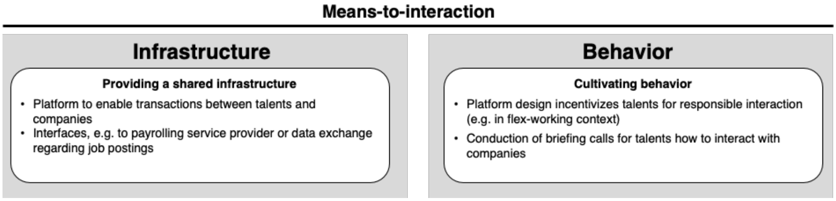


Figure 54: Scrambl means-to-interaction activities

Discussion. This case demonstrates, how Scrambl tries to develop a professional services ecosystem, which on the one hand helps talents to find suitable jobs and projects for meaningful work and on the other hand supports companies to identify skills and experience which best complement their existing teams. Scrambl started by establishing a type I (transaction) and a type II (interaction) purpose, where both talents and companies are enabled to create enter self-determined working relationships with each other. The case shows, how two organizational solutions can be combined to support the network. Furthermore, the value sphere can be used to describe the value creation configuration. First of all, the value sphere shows how the offering assembly activities are distributed among autonomous actors. Interestingly, Scrambl does not interfere with how the services are provided, that is, how the talents work together with the respective companies. It merely provides an organizational solution to an inefficient allocation of resources (e.g. skills). Secondly, with the aim of creating possibilities for self-directed and autonomous work, Scrambl enables and motivates other participants and uses less hierarchical measures to coordinate the individual behavior. Only when it comes to flex-working instances, where talents follow a flex-working model to support a company's projects, does Scrambl provide more detailed workflows and standards to coordinate the parties' interaction. Lastly, the means-to-interaction activities, that is the development and maintenance of a shared infrastructure (e.g., a platform and interfaces to other contributing parties) supports the interaction of the actors and integrates several functions (e.g. payrolling) to deliver the full service portfolio. While Scrambl and the human resource ecosystem is still in its early stages, the case demonstrates another specific organizational configuration which targets high autonomy and self-directed decisions of the ecosystem's community.

Conclusion. With a high demand for skilled workers and a high willingness to switch employment, Scrambl aims at reducing market friction and increase efficiency regarding the deployment of human capital. Scrambl aims at using detailed skill profiles to identify the best matches among talents and companies, and therefore provides an innovative mechanism to increase market efficiency. With the combination of two shared value purpose types and a unique configuration of the value sphere that promotes self-directed actions, Scrambl cultivated an ecosystem that creates value both from a personal perspective, a professional perspective, as well as from a market perspective.

4.3.2.3 Case study 3: PropTech[36] Startup

Introduction. The German startup sector has developed several successful companies during the last years, especially with regard to technology startups. In 2021, German tech startups received more than EUR 8.1billion of venture capital (VC) from VC funds (Sifted, 2021). According to the consultancy Roland Berger, the German startup scene significantly contributes to the German economy, for example, concerning employment: in 2020, more than 415.000 people were working in German startups or scale-ups[37], a 55% increase compared to 2018. (Schaible et al., 2021).

One of those German startups is PTS, which was founded in 2018 in Germany, originally with the vision of creating a mediating platform for

[36] PropTech stands for Property Technology and describes the digital transformation of the real estate industry. PropTech is used synonymously to describe technology startups in this industry.
[37] A startup, which is in the process of expansion.

construction financing solutions. However, PTS realized a huge business potential in the property marketing and sales area and build an online platform for real estate companies with products and services to support the real estate marketing and sales process.

PTS bundles a wide portfolio of products and services, for example, photography services (e.g., photographers, who take professional photos of real estate objects), visualization services (e.g. 360-degree virtual tours of apartments, houses, or other objects), or digital floor plan service (e.g., 2D or 3D digital floor plans of objects). To offer the wide range of services, PTS cultivated a large network of autonomous services providers and uses its digital platform to connect these providers with their customers, e.g., real estate marketers. On the one hand, the platform functions similar like a digital marketplace, where products and services can be identified and bought. On the other hand, PTS created processes and workflows so that the value creation process best serves customer needs. By now, PTS works together with several large real estate companies.

Analysis. PTS' digital platform was designed to integrate various services (e.g., visualizations, photography, government information inquiries, etc.), which in turn are provided by a wide network. Thereby, PTS works together with other networks (e.g., photography networks) and aggregates these offerings, so that these fragmented services can be easily marketed to real estate companies. Furthermore, PTS is designed as a "one-face-to-the-customer" model, which means, real estate customers mostly interact with PTS, instead of various independent providers. From a customer perspective, this reduces redundancies and therefore saves time and costs. Additionally, PTS developed several workflows on the platform, which helps to coordinate value creation and therefore improves output quality. For example, after a photographer took photos of real estate objects, he can easily upload the results on the platform, making the photos available for digital editing. Furthermore, customers can be integrated in such workflows, too, for example, by requesting customer feedback. Nevertheless, such workflows or processes vary across the service portfolio. Especially since a large fraction of value creation is based on software (e.g., generating virtual 3D-visualizations), workflows oftentimes lack high complexity which makes collaboration across entities easier. PTS developed a type 2 (solution) shared value purpose, which integrates several autonomous providers in a “one-stop-shop” solution, where customers can easily obtain the requested services. It is important to mention that this does not describe a simple, linear retail solution, but there are various reciprocal feedback loops, where the value creation process is well calibrated across all participating organizations, for example, by distributing customer feedback to the respective providers or by distributing information from the providers to the customers, to improve the process or the respective service outputs. Figure 55 summarizes the classification of the shared value purpose.

Regarding the future development of the platform and the whole ecosystem, PTS discussed various opportunities, already. Firstly, PTS has identified various services along the real estate marketing customer journey, which complement the service portfolio on the platform. In addition, PTS works on continuously adding additional partner organizations to the network, for example, photographers in peripheral locations to better reach their customers. However, also leveraging additional purpose types have been discussed. For example, based on the type 1 (transaction) purpose, additional features could be identified, such as a financing comparison function. Furthermore, collaboration with real estate comparison websites represents a potential development area, where information (e.g., about real estate objects) could be shared with the PTS platform and vice versa, PTS’ service offering could be made available on the comparison portal via APIs. Another potential area of development could be supporting the real estate marketers, e.g., by coordinating object-tours. This represents a type III (interaction) expansion, where the interaction between real estate marketers and (multiple) private persons will be coordinated. However, PTS mentioned that despite the business potential, such an opportunity is currently not planned, since this would shift PTS' business model towards a full-stack real estate management CRM tool, which doesn't match PTS' strategy. Figure 55 indicates potential areas of ecosystem development.

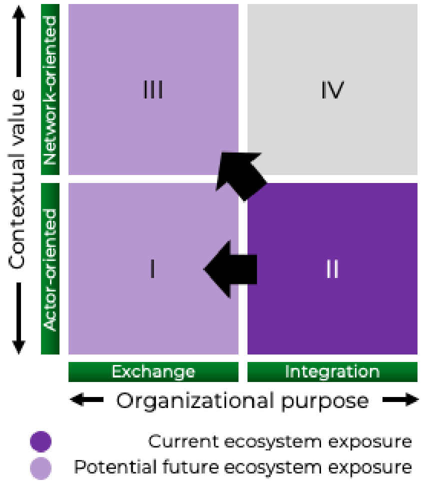


Figure 55: PTS ecosystem exposure

The value sphere is used to describe the value creation activities of the network. The offering assembly component describes how the specific services are created, exchanged, and used.

There are various providers connected to the platform who perform service assembly activities. The platform integrates various services in a portfolio: visualizations, digital staging, floor plans, an apartment locator for photographs, professional photo services, editorial shooting, drone shootings, video tours, image editing, virtual tours, and government office inquiries. PTS leverages autonomous providers for service provision who perform their specific activities. In addition, PTS also leverages whole networks of actors in order to connect customers and providers, e.g., based on proximity. While the actors perform their tasks autonomously, PTS aims at supporting value creation by defining quality standards or certain guidelines, which always creates a tension between autonomy and ensuring high quality.

PTS' platform functions as the single interface between customers and providers. The servicing activities comprise feedback loops between customers and providers, which are firstly useful to ensure the quality of the end results. Secondly, these feedback loops can enhance the overall processes, for example, by extracting knowledge on how to better serve the clients and setting market standards. For example, a potential for improvement was identified for government office inquiries, after several customers provided feedback that government information documents should be provided separately from the invoice for easier processing. This information was used to instruct the providers and as a result improved the overall process output from the customer perspective.

Marketing and Sales activities on PTS' platform are automated to a maximum, where customers are connected automatically with the best fitting service provider (e.g., a photographer, who can easily reach the client). The network is already able to generate its own transactions without dedicated marketing and sales activities from PTS. For example, service inquiries were placed in the early morning hours from customers in Germany and the service provision was done already by service providers in Asia, meaning that even before the business day started, the platform was able to receive a customer order and the service provision was completed on the same day. Individualized marketing and sales activities from the provider perspective as mostly unnecessary. However, as the platform gathered data about quality standards, for example, the providers can use the information to adapt their own offering and to offer higher quality and therefore more valuable services, if they wish to expand. Other activities, for example, pricing are facilitated together with the respective partner organizations.

Regarding the exchange activities, PTS leverages various partner networks in which the best fitting service provider is connected with the clients. This is important as some of the services require physical interaction, e.g., a drone pilot at the real estate site or government office inquiries possible with personal interactions. Nevertheless, PTS designed the platform in such a way that it facilitates the exchange of services on the platform itself. For example, digital work results (e.g., photos, edited photos, videos, etc.) can be uploaded by the providers and either downloaded or used directly on the platform or which are sent to the client's own systems via APIs.

This also addresses the use activities, which describe how the service outcomes are used by the clients. Since the results are used in further value creation activities (e.g., during the real estate marketing process), PTS ensures that the results are transferred in such a way that allow easy integration into the customer processes, for example, through technical interfaces to the clients' systems. Figure 56 summarizes the offering assembly activities.

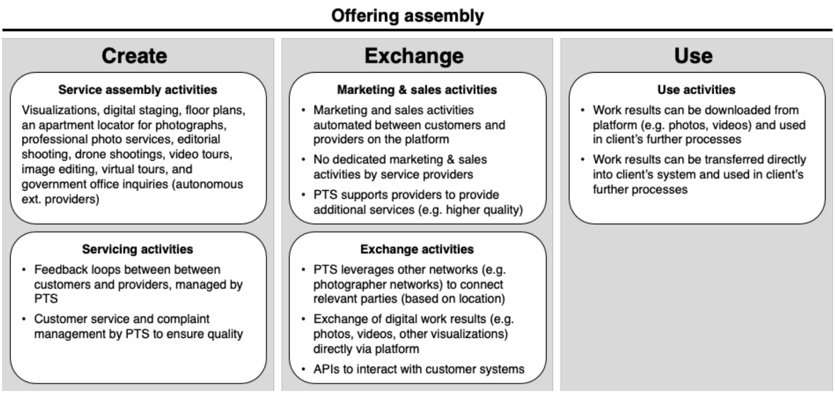


Figure 56: PTS offering assembly activities

Orchestration is another crucial component regarding the service provision in the ecosystem. To enable the providers and clients to interact with each other, PTS provides access to various important resources. For example, for some products, the platform defines workflows, which supports the interaction regarding efficiency and effectiveness, especially if there are various individual parties involved. Secondly, through PTS' platform, small providers can leverage the technical interfaces and thus receive access to the respective client systems. Furthermore, PTS carefully cultivates the ecosystem, for example, by identifying additional providers or by approaching new customers. However, customers also approached PTS requesting to integrate specific service providers based on individual recommendations.

Another important aspect is reflected by the coordinating activities. Firstly, PTS uses its platform to identify business opportunities and connect the right parties with each other. This is mostly automated and works without high effort, for example, if picture editing services are requested. Furthermore, the PTS can easily suggest further complementary services to support the customers in their value creation. To ensure that the shared value purpose is materialized, PTS carefully coordinates activities and outputs. On the one hand, the oftentimes predefined workflows together with a definition of inputs (e.g., which information must be provided initially) supports the value creation in terms of quality and efficiency. For example, for digital staging services, PTS instructs its clients to share much more information with the service providers compared to when it launched this service. By doing so, the process can be facilitated with fewer feedback loops between customers and providers and thus increases efficiency for all parties involved.

Furthermore, PTS facilitates several activities to motivate the network participants. As mentioned above, PTS carefully extracts information from various touchpoints with customers and service providers. These reciprocal information exchanges ensure that all parties receive access to relevant data to facilitate their own value creation activities. Furthermore, PTS' information can be used to support provides to advance their own service offering, for example, by making standards explicit to the providers and by instructing them how these standards can be met. This motivates the partner organizations to use the platform for their own benefit to improve their own business. Secondly, PTS provides a transparent pricing policy, which includes the price-setting mechanisms and the value appropriation model. The prices for the services are set with the service providers jointly and PTS receives a predefined percentage as service commission. This in turn provides a predictable environment for service providers, in which they can offer their services. Furthermore, PTS also communicates potential the potential value for customers in terms of saved time and effort. Figure 57 summarizes these activities.

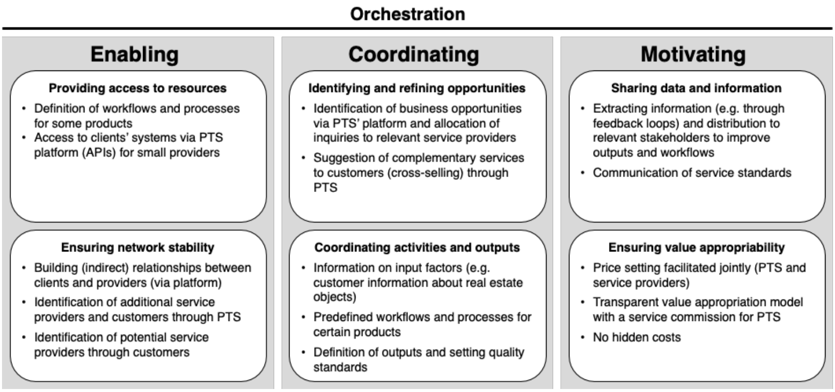


Figure 57: PTS orchestration activities

Finally, the last component describes the means-to-interaction activities, both from a shared technical infrastructure and from a behavioral perspective. As mentioned above, the heart of the ecosystem is PTS' platform, which connects its users and facilitates interactions between them. On the one hand, the software provides a frontend for both customers or it is connected to the providers' systems, which allows easy integration of their services (e.g., photos, videos, and other digital visualizations). However, the shared infrastructure also includes the clients' real estate management systems, which are connected to the platform via APIs. This is a crucial aspect, as value creation in the ecosystem must be considered across organizational borders. Additionally, this shared infrastructure allows access to the wider system environment for other service providers, e.g., photographers, which oftentimes don't use sophisticated ICT. Additionally, the shared infrastructure, PTS carefully cultivates behavioral norms to protect the ecosystem. In one case, PTS dealt with a service provider who asked for significantly higher prices despite the predefined terms and conditions for a professional photography service. Despite their efforts to negotiate a fair deal for all involved parties, the provider insisted on his high price, which resulted in a loss-transaction for PTS, as they covered a part of the unanticipated costs for their client. The business relationship with this provider was terminated as PTS aims at cultivating a collaborative approach between all parties, where issues should be resolved in good faith and fair for all parties. PTS decided that such a service provider could, in the long run, harm the ecosystem and cancelled further collaboration. Figure 58 summarizes the means-to-interaction component.

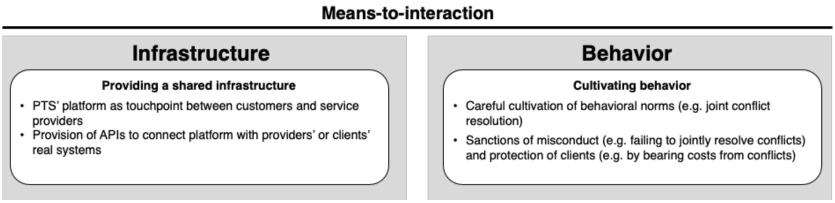


Figure 58: PTS means-to-interaction activities

Discussion. The PTS case describes, how a type 2 shared value purpose is used to develop ecosystem exposure. This type describes a network structure that brings together several autonomous providers and customers, however, careful coordination measures are applied to create a seamless customer experience ("one-face-to-the-customer") and to ensure high quality and standardized outputs. The case also demonstrates that a high focus on a single shared value purpose is rather important to strengthen the value proposition and to generate enough traction in an early stage. When such a purpose materialized and the network functions, potential expansions towards other shared value purpose types can be one strategy to increase the ecosystem exposure.

The value sphere describes the specific value creation configuration in the ecosystem. The offering assembly component describes what services are being provided and how these services reach the customer. It is important to mention that PTS operates with a one-face-to-the-customer approach, where a seamless user experience and a tight quality and output control was chosen. While this configuration still includes various autonomous actors, sometimes even on different continents, it also requires more hierarchical coordination elements. In addition, various value creation activities in the offering assembly component are facilitated by PTS (the orchestrator), for example, servicing, marketing and sales, or some exchange activities. By doing so, PTS can create the seamless experience which it promises to its customers. The orchestration component shows that the balance between soft orchestration activities (e.g., enabling and motivating) is skewed towards hierarchical coordination measures. PTS not only distributes important information or provides access to resources (e.g., access to real estate management systems) but also provides various routines, processes or workflows, which support the value creation procedure to increase quality and reduce costs. Predefined inputs and outputs further support this approach. In addition, the shared technical infrastructure describes an important component, where on the one hand a digital platform is used to facilitate transactions between the actors, and which on the other hand is connected to clients' systems, so that service outputs can be easily integrated in their own workflows. This emphasizes that a digital platform alone might not be enough to understand value creation in ecosystems. Another insight in this case sheds light on the orchestration role. While the orchestrator is oftentimes associated with pulling the strings in the background, this case demonstrates that the orchestrator might be significantly involved in the offering assembly (e.g. by pursuing servicing, marketing, or exchange activities).

Conclusion. PTS nicely demonstrated how leveraging ecosystems can lead to significant business success. After only 3 years of operations, the founders were able to exit the startup after demonstrating its viability. Furthermore, the case demonstrates how a tighter control of the ecosystem using hierarchical coordination elements paired with access to workflows or processes can lead to significant efficiency gains from the customer perspective. The case also underlines the complexity of the orchestration role, which might take over several offering assembly activities, for the value creation configuration to function.

4.3.2.4 Summary of case study evaluation

The case study-based evaluation section demonstrates the applicability and expected benefits of the artifacts as suggested by Oesterle and Otto (2010, p. 289). Both research artifacts were applied to three real-life cases to analyze and discuss value creation in ecosystems.

The section yields some additional insights about the artifacts' application. First, the typology of the shared value purpose provides insights into multilateral interaction mechanisms and can be used to describe ecosystem exposure, that is, the organizational complexity which the orchestrating organization is exposed to. As shown in the above analysis, focus on a single type may be beneficial as initial starting point. Second, to increase interactions of network participants, there are two basic strategies: the first one is referred to as horizontal expansion (see section 4.3.2.1), where within a specific type, additional products and services may be offered. The advantage of this strategy the responsible entity can build on existing collaboration mechanisms (e.g., a marketplace) and simply increase its product portfolio. The second strategy refers to a horizontal expansion, where additional purpose types can be developed (e.g., developing a type II shared value purpose in addition to a type I shared value purpose). This leads to a complementary solution to an organizational problem.

Third, the application of the value sphere reveals that the value creation components must not be set equal to the respective roles in an ecosystem (e.g., user, provider, orchestrator, contributor). All cases demonstrate that the orchestrator was active in all three value creation components, that is, offering assembly, orchestration, and means-to-interaction. Within the offering assembly component, marketing and sales was particularly interesting, as it showed to layers (see section 4.3.2.2): there possibly marketing activities which aim at promoting the network or the ecosystem solution per se and one layer which may help the individual actors (e.g., providers) to market and promote their own services. This is a crucial insight and should be considered when designing similar approaches.

Four, the analysis demonstrated specific configurations of the respective orchestration activities, based on the location of the shared value purpose on the organizational spectrum. The further the shared value purpose was located on the left of the typology, that is, the higher the autonomy of the participants, the less prominent were hierarchical coordination activities such as the identification of opportunities or the coordination of inputs and outputs. This is in line with the theoretical foundation developed in section 4.2.1.2, which describes the location of the ecosystem on the organizational spectrum depending on the application of hierarchical coordination mechanisms.

5 Discussion

The following paragraphs present the discussion together with the theoretical contribution and implications for practical application.

5.1 Discussion of the research results

This dissertation developed two main results. RQ1 aimed at developing a classification of the shared value purpose to better understand ecosystems and their purpose, while RQ2 aimed at developing a framework for value creation in ecosystems that is independent of a single organization.

Several key findings were derived from the first part of the analysis and results. First, with its first dimension, the developed typology addresses ecosystems as an organizational structure. While ecosystems can be considered as being closely related to the market, this means that they are rather located to left on the organizational spectrum, and hence the two categories (exchange and integration) help to better understand the organizational nature of these network structures. While the exchange category describes a rather open, market-like structure with only a few hierarchical coordination elements, the integration category implies more hierarchical coordination elements that are needed for the service to be materialized.

Second, the category contextual value adds a value dimension to the typology, which describes the context in which value is created. The actor-oriented dimension describes a rather self-directed value creation from the customer perspective, where services or resources are consumed. The network-oriented category describes different contexts that can be accessed by the customer and where value originates from a rather reciprocal interaction with others. The combination of these two dimensions thus provides an image that describes a) the organizational structure and b) the expected value from the customer perspective, that originates from the interaction of the ecosystem participants.

Third, the typology also shifts the focus from classifying the ecosystem towards classifying the shared value purpose. While there are several classificatory frameworks and ecosystem types (e.g., business ecosystem, innovation ecosystem, etc.) that are oftentimes difficult to delaminate from each other, the analysis shows that the overarching purpose might be a suitable analytical focus. By doing so, the typology does not distinguish between the ecosystems per se but rather describes their purpose from an organizational perspective. For example, the purpose may be to enable transactions with access to resources for the participants or to enable the participants to interact with each other in different contexts.

Fourth, the results and the application in the case studies show that various purposes can be combined to strengthen the network and to evolve the ecosystem. The single purpose types can provide complementary functionalities, for example, an integrated service solution that combines different modules from multiple actors (type: *solution*) can be combined with the type *transaction*, where users can choose among various modules, similar to a marketplace. Thus, the typology offers distinct but compatible solutions, which can be used to cultivate an ecosystem rather than to describe four disjunct types of ecosystems.

The second part of the research results developed the value sphere as a framework of value creation in ecosystems. The first insight from these research activities addresses the conceptualization of the value creation components. While other value creation frameworks (e.g., the value chain) describe value creation from a single organization and a rather production-technology perspective, the developed artifact conceptualizes value creation as an organizational problem that is solved through a careful orchestration of autonomous actors. While distinct actors perform certain activities to create services, one of the main challenges is the steering process with only a few hierarchical governance mechanisms. Furthermore, the participants and their activities are connected from an infrastructural and a behavioral perspective (e.g., with shared values and norms, rather than formalized contracts). The major perspective shift thus comes from reframing the problem: ecosystems create value through solving an organizational problem rather than through applying a specific production technology (e.g., long-linked, intensive, or mediating production technology). Value is a result of effective relationships rather than a mere sequence of value creation activities.

Second, the artifact conceptualizes orchestration as the interplay of enabling activities, coordinating activities, and motivating activities. This resonates with the location on the organizational spectrum (close to the market extreme), where mostly indirect measures are taken to align the participants in ecosystems and only a few hierarchical elements are used. The interplay of direct and indirect elements, therefore, characterize the ecosystem and likely determine the exact location on the organizational spectrum.

Third, the analysis extends the conceptualization of value creation by integrating the technological and behavioral elements that are shared by the participants. Such a shared infrastructure resonates with the idea of recursiveness, where technological elements from different actors are embedded within each other and create a complex shared structure that supports value creation in ecosystems. Furthermore, the behavioral component describes the shared institutional logics, with its rules, norms, symbols, etc. as an important value creation element, since the interaction is oftentimes not regulated by complex, formal contracts. This, in turn, creates high levels of flexibility and can be understood as a source of generativity in terms of innovative solutions.

Fourth, the value sphere must be understood as being organization-independent and conceptualizes value creation from a service perspective, with each building block as part of the whole. This implies, for example, that the value sphere does not allow any conclusions concerning specific roles, where roles (e.g., the orchestrator, the provider) are blurring since an orchestrator oftentimes also provides his own service building blocks. Vice versa, a provider can very well leverage orchestration activities (e.g., enable others) for his benefit and for the benefit of the network. The value sphere puts the spotlight on these value creation activities that are important for understanding value creation from a network perspective, independently of a single organization.

5.2 Theoretical contribution

This dissertation aimed contributing to the theoretical understanding of ecosystems, especially regarding the purpose of and value creation in ecosystems.

The developed typology combines the location of ecosystems on the organizational spectrum and the contextual value. Thereby, this dissertation enhances the understanding of where ecosystems must be located, and how such network structures are characterized compared to other business networks. The contextual value dimension provides additional insights into the source of value from a customer perspective, which is an important analytical lens for complex systems such as ecosystems. Through this combination, the shared value purpose as a central reference point around which an ecosystem evolves can be classified, which describes a solution that an ecosystem provides for an organizational problem.

Other classificatory frameworks that aim to classify ecosystems only provide limited insights as the concepts can oftentimes not be delaminated from each other. This applies, for example, to business ecosystems, innovation ecosystems, platform ecosystems, knowledge ecosystems, etc. While some of the classificatory frameworks also leverage an organizational perspective to differentiate such networks, this dissertation advances these approaches by developing a deeper understanding of the location of ecosystems in the organizational perspective. Furthermore, to our knowledge, the combination with the contextual value perspective is a new approach and provides a novel analytical insight when analyzing value creation in ecosystems. While the actor-oriented category describes a rather exchange-oriented perspective where the source of value comes from providing access to and exchanging resources, the network-oriented perspective describes a deeper integration of the participants into the value creation, where value is a result of different contexts that can be accessed.

The second major contribution is the conceptualization of a framework for value creation in ecosystems, namely the value sphere. First, the model identifies value creation components, that is, it reframes value creation and lifts it from a single organization level towards a network level. The second contribution is the identification of relevant value creation activities that can be used to describe value creation in further detail. The model builds on offering assembly activities (similar to existing concepts), which describe how the services in the ecosystem are assembled – orchestration activities – which describe how the activities of these independent entities are aligned, and means-to-interaction activities, which are supportive activities that describe how the shared infrastructure is maintained and how the behavior is influenced. This approach opens a new perspective on value creation that is no longer bound to a single organization.

Existing literature supports the original hypothesis, namely that a perspective shift away from a linear process (e.g., the value chain) towards a systems perspective is necessary (see Normann & Ramirez, 1993; Peppard & Rylander, 2006), however, to the best of our knowledge, no conceptualizations have yet been developed that propose a model of value creation in ecosystems. Thus, this dissertation provides a significant contribution to the concept of value creation and ecosystems with a new analytical framework.

As discussed earlier, orchestration was identified as an important value creation component of the ecosystem perspective. This conceptualization of orchestration is another important contribution that advances the understanding of ecosystems. This dissertation puts together several aspects and aggregates these concepts. In doing so, it can be seen where existing orchestration concepts (e.g., orchestration of innovation networks), which use rather indirect coordination measures, must be complemented with hierarchical elements. The proposed dimensions enable, coordinate, and motivate thus provide an ecosystem-specific approach to orchestration that combines both market and hierarchical coordination elements.

Existing work on orchestration is highly fragmented and oftentimes contains only fragments of such orchestration elements, without clarifying what orchestration is, what elements characterize orchestration, and how these elements are connected.

As stated earlier, this dissertation aimed at advancing our understanding of value creation in ecosystems, and by proposing the typology of the shared value purpose (the overall “why”) and by developing a framework for value creation in ecosystems, this dissertation provides a significant contribution to the existing knowledge base and also presents a starting point for further research inquiries, for example, to better understand value capture or to develop generic strategies in terms in this context. From the previous research activities, it can be hypothesized that value capture in ecosystems involves creating and maintaining relationships between different actors, however, further research is necessary to derive a deeper understanding of this aspect.

5.3 Implications for practical application

As mentioned earlier, there is currently a significant amount of interest in the ecosystem concept from practitioners. On the one hand, this interest is driven by the fast developments in ICT, which create increasing opportunities for people and organizations to interact with each other. On the other hand, it is also driven by the success of companies such as Google, Apple, Facebook, Amazon, etc., which were able to create some of the most valued organizations (in terms of market capitalization) in the world by developing large network structures such as ecosystems.

The first practical implication addresses the understanding of the shared value purpose. The typology from RQ1 supports practitioners in understanding the reason “why” behind ecosystems, and offers a starting point from where such ecosystems can be developed and evolved. The four ideal types address distinct organizational challenges that are solved in ecosystems. The typology thus supports practitioners who plan on leveraging the ecosystem concept for their own organizations.

The second implication addresses how to conceptualize value creation, i.e., in which terms to think about such value creation. The value sphere proposes a shift away from a linear and sequential value creation logic and stresses the importance of including the user in the analysis. The conceptualization of orchestration helps practitioners to understand how such ecosystems can be coordinated and how actors and their value creation activities can be aligned. This is a crucial element of the understanding of value creation and emphasizes an appropriate balance between indirectly influencing and directly coordinating others. Furthermore, the value sphere directs the practitioners' attention towards managing a shared infrastructure and cultivating behavior. The former is important as a shared infrastructure may very well contain building blocks from various actors and thus must be carefully analyzed. The latter is important since inappropriate behavior of single actors may lead to disturbances and uncertainty in the ecosystem and, as a result, hinder value creation. The value sphere, therefore, provides a suitable analytical grid to understand value creation in ecosystems for the practitioners, which directs their attention to the relevant elements.

The typology of the shared value purpose represents a tool to conceptualize ecosystems as an organizational solution to a multilateral collaboration problem while the value sphere represents a framework to structure value creation, which is distributed across multiple organizational entities. As mentioned in section 1.2, practitioners from the areas of business development, innovation management, or product management may use the developed tools to conceptualize ecosystems and to discuss the value creation configuration to position their own organization within such complex networks.

6 Conclusion

6.1 Brief summary of the research results

Brian Arthur concludes his book *The nature of Technology* with an important observation: “Digitization allows functionalities to be combined even if they come from different domains, because once they enter the digital domain they become objects of the same type—data strings—that can therefore be acted upon in the same way” (Arthur, 2009, p. 61). Digitalization creates significant opportunities for combining various domains and entities. This is also true for organizations that use ICT to connect with other entities and constantly exchange resources with each other.

With the internet on the rise and the increasing application of digital technologies in the business domain, companies are increasingly part of complex network structures. The development of ecosystems is just one of the phenomena that result from the possibilities to create value collaboratively across organizational borders. Ecosystems form a unique organizational structure on the spectrum of markets and hierarchies and combine coordination elements from both domains. Autonomous actors collaborate and contribute individual building blocks that in turn form a higher-order offering, which a single actor could not create alone. Although the interest from both academics and practitioners has been increasing during recent years, with no overarching theory of ecosystems we are still at an early stage of fully understanding this phenomenon.

This dissertation aimed at contributing to the knowledge base of ecosystems with this design-oriented research study. The research was facilitated following the DSR research paradigm and therefore built on knowledge from previous theoretical work and the experience and expertise of practitioners. For a deeper theoretical understanding, and to help organizations learn how to participate in ecosystems and to analyze how value is created in such structures, the dissertation developed two main research artifacts. The first artifact is a typology that classified the shared value purpose to identify distinct problems from an organizational and contextual-value perspective. The 2x2 matrix describes the location of the ecosystem on the organizational spectrum and the source of value. While other classificatory frameworks and ecosystem types are already available, their distinction of ecosystems (e.g., in business or innovation ecosystems) is frequently arbitrary and does not sufficiently inform researchers and managerial decision-makers. The typology thus describes solutions to four organizational problems.

The second artifact is a framework of value creation, which firstly identified three distinct value creation components that must be considered for ecosystems. Secondly, 13 distinct value creation activities were defined, namely five activities for the offering assembly component, six activities for the orchestration component, and two activities for the means-to-interactions component. This artifact proposes an organization-independent perspective on value creation and describes how services are composed of autonomous entities and how these activities are aligned, both from coordination and infrastructure and behavioral perspectives, to form the overarching offering.

These new perspectives on value creation in ecosystems propose a new, complementary perspective for researchers and practitioners who are exposed to ecosystems and wish to better understand such complex organizational structures. The artifacts direct the user's attention towards challenging aspects of value creation in ecosystems and enable researchers and practitioners to decompose these challenges into manageable chunks, for example, the balance of direct and indirect coordination activities.

6.2 Limitations and potential future areas of research

Despite the rigorous research approach applied, there are several limitations of this research, both general and artifact-specific, that should be highlighted. The first limitation addresses the design activities, in particular the analysis part, which builds on the knowledge base. While the interest in ecosystems has been increasing significantly in recent years, there is still no overarching theory of ecosystems. Furthermore, the term is widely and ambiguously used in various contexts to address a whole range of phenomena and concepts. This is problematic since the synthesis of the knowledge base builds on differing understandings with only limited theoretically unifying ground. While the dissertation tried to rigorously define and explain the concepts used, a certain degree of conceptual vagueness cannot be avoided completely.

The second limitation addresses the research design and the nature of the developed results. The DSR paradigm supports researchers to develop artifacts as solutions to complex problems (A. Hevner et al., 2019, p. 1). Thus, the developed models represent designed solutions from which implications can be made on how to design these solutions, rather than objective facts about the nature and characteristics of ecosystems per se. This is important since the phenomenon of ecosystems can be considered as a grand challenge (see Eisenhardt et al., 2016, p. 1113), and a complex problem space in which facts about the nature of the problem and a solution cannot easily be deduced. This dissertation rather provides theoretical knowledge about how to conceptualize, build, and apply research artifacts in the domain at hand.

The third limitation addresses the focus on the financial services industry regarding the research consortium. While each participant has profound experience in their field, ecosystems must be understood as a cross-industry phenomenon and the practitioners represent only the financial services perspective on this. However, many of the practitioners have experience with cross-industry partnerships and therefore with collaboration in differing service domains. Furthermore, two of the proposed case studies in section 4.3.2 were selected from other industries and thus provide additional support for the findings.

The fourth limitation addresses the development of the artifact from RQ1. The typology was conceptualized based on existing knowledge. Nevertheless, it cannot be ruled out that additional characteristics must be considered, for example in the means-to-purpose dimension, which locates ecosystems on the organizational spectrum. Other mechanisms or characteristics could be included to develop a more detailed understanding of the hybrid nature of ecosystems. Similarly, the contextual-value dimension, which distinguishes between the actor- and network-oriented categories, aggregates and simplifies these aspects to some extent and it cannot be ruled out that additional characteristics must be taken into account to provide a more detailed picture.

Concerning the value sphere and its value creation activities, the fifth limitation addresses the choice of the respective activities. Each activity was chosen and carefully reviewed for validity and applicability. Despite these activities during the three design stages, it cannot be ruled out that additional activities might be necessary, or that some activities can be summarized for easier applicability. This is especially true for the orchestration activities, which combine direct and indirect coordination activities in a unified model. Nevertheless, due to the fragmented literature and a wide range of different orchestration approaches, the consolidated orchestration activities might be subject to further refinement, especially when the model is applied in the field.

There are, however, also several research opportunities based on the results of this dissertation. The first potential area addresses the shared value purpose. It could be interesting to investigate whether there are specific sequences or procedures concerning developing ecosystems that are promising to ensure the success of the network. For example, it can be hypothesized that a shared value purpose of the type *transaction* is less investment-intensive as fewer direct coordination mechanisms are involved. In addition, the shared value purpose of the type *involvement* is subject to same-side network effects, where the network becomes more attractive for users with an increasing number of other users (e.g., the telephone network). Ideally, this research opportunity could investigate strategic implications and guidelines on how and in which sequence such types could be implemented.

The second area of future research addresses the investigation of value capture in ecosystems, that is, to identify isolation mechanisms that allow certain actors to extract value from the ecosystem. This was deliberately excluded from this dissertation due to the high complexity as such an endeavor requires a sharp focus to develop viable insights. The value sphere could represent a starting point for this endeavor, where the value creation components can be considered as the first level of analysis, and the value creation activities as a detailed level of analysis.

The third area of future research could be the combination of the two artifacts to identify configuration patterns of the value sphere in the context of a single shared value purpose type. It can be hypothesized that the exchange and the integration categories of the dimension means-to-purpose have unique patterns regarding their orchestration activities, for example, fewer coordination activities and more enabling and motivating activities. Vice versa, there is likely a stronger focus on direct coordination activities in the integration category of the means-to-purpose domain. In the contextual value domain, different orchestration or means-to-interactions patterns might also be visible.

The fourth area of research could be an investigation of the means-to-interaction component of the value sphere, both regarding the shared infrastructure activities and the cultivating behavior activities. Concerning the value network (Christensen & Rosenbloom, 2013, p. 238) it would be interesting to investigate if certain hierarchical patterns describe how the shared infrastructure is composed (e.g., platforms versus functionalities) and what implications such embedded systems have for the respective providers. Furthermore, with respect to the cultivating behavior activities, it could be interesting to further investigate shared behavioral norms, values, and cultural aspects for ecosystems, especially with empirical data. While there are first approaches to analyze cultural aspects (see Betz et al., 2021), this area is still widely unresearched.

6.3 Closing remarks

The rapidly growing possibilities for information and resource exchange using digital technologies have had a significant impact on value creation. With increasing interconnections between individuals and whole organizations, complex webs of interdependent actors emerge, and value creation can hardly be viewed in isolated entities but requires a system perspective. While business networks are not an entirely new phenomenon, ecosystems impose new organizational structures, where individual actors contribute much more autonomously and value creation greatly exceeds the individual capabilities.

Participating in and understanding value creation in ecosystems requires leaving well-trodden paths and rethinking value creation from a network perspective. Firstly, ecosystems require much more indirect, incentive-based ways of management, which embraces autonomy and enables other actors to do what they do best. Secondly, an ecosystem perspective requires thinking in terms of how to identify opportunities for others and to grow the pie rather than to determine how to get the biggest piece. Thirdly, competitive advantage is less dependent on building the cheapest or the most differentiated products and services, but rather on how organizations are cultivating relationships in such networks.

This dissertation aimed to contribute to a better understanding of collaborative value creation in ecosystems: how to participate in such ecosystems and how to identify crucial elements of this collaborative value creation. While this chapter concludes the journey of this research endeavor, it also marks the starting point of learning, unlearning, and relearning. Knowledge is not absolute, and only by applying and refining these and the many other ideas out there will we improve our understanding of such a phenomenon.

It is hoped that this dissertation will provide valuable insights and that it will trigger further discussions and inspire others to refine our current understanding of value creation in our technology- and information-driven world. We are still at the very beginning of grasping the profound changes triggered by digital technologies. In this sense, I encourage others to refine these ideas and to contribute their own. As Nassim Nicholas Taleb stated: “we tend to treat our knowledge as personal property to be protected and defended. It is an ornament that allows us to rise in the pecking order. ... We take what we know a little too seriously.” (2010, p. 51). In this sense: let us stay curious together.

Literature

Adler, P. (2001). Market, Hierarchy, and Trust: The Knowledge Economy and the Future of Capitalism. *Organization Science*, *12*(2), 215–234.

Adner, R. (2006). Match Your Innovation Strategy to Your Innovation Ecosystem. *Harvard Business Review*, *84*(4), 98–107.

Adner, R. (2013a). Don't Draw the Wrong Lessons from Better Place's Bust. *Harvard Business Review*, 2–5.

Adner, R. (2013b). *The Wide Lens: What Successful Innovators See That Others Miss*. Portfolio Penguin.

Adner, R. (2017). Ecosystem as Structure: An Actionable Construct for Strategy. *Journal of Management*, *43*(1), 39–58. https://doi.org/10.1177/0149206316678451

Adner, R., & Kapoor, R. (2010). Value Creation in Innovation Ecosystems: How the Structure of Technological Interdependence Affects Firm Performance in New Technology Generations. *Strategic Management Journal*, *31*(3), 306–333. https://doi.org/10.1002/smj.821

Adner, R., & Kapoor, R. (2015). Innovation Ecosystems and the Pace of Substitution: Re-Examining Technology S-Curves. *Strategic Management Journal*, *37*(4), 625–648. https://doi.org/10.1002/smj.2363

Ahuja, G. (2000). Collaboration Networks, Structural Holes, and Innovation: A Longitudinal Study. *Administrative Science Quarterly*, *45*(3), 425–455. https://doi.org/https://doi.org/10.5465/apbpp.1998.27664401

Alderman, L. (2010, August 20). Nespresso and Rivals Vie for Dominance in Coffee War. *The New York Times*. https://www.nytimes.com/2010/08/21/business/global/21coffee.html?

Alipay. (2021a). *Alipay Developer Documentation*. https://global.alipay.com/docs/

Alipay. (2021b). *Make Your App a Super App*. https://global.alipay.com/platform/site/product/mini-program

Almquist, E., Cleghorn, J., & Sherer, L. (2018). The B2B Elements of Value. *Harvard Business Review*, *March-April*, 72–82.

Almquist, E., Senior, J., & Bloch, N. (2016). The Elements of Value. *Harvard Business Review*, *September*, 46–92.

Alphabet Inc. (2021). *Alphabet Inc. Annual Report*. https://abc.xyz/investor/static/pdf/2020_alphabet_annual_report.pdf?cache=8e972d2

Alt, R., Legner, C. (2008). Schwerpunktstichwort ‚Business Networking'. In S. Häberle (Ed.), *Das neue Lexikon der Betriebswirtschaftslehre, Band A-E* (Issue 1, pp. 165–169). De Gruyter.

Alt, R. (2018). Electronic Markets on Digitalization. *Electronic Markets*, *28*(4), 397–402. https://doi.org/10.1007/s12525-018-0320-7

Alt, R., Ehmke, J. F., Haux, R., Henke, T., Mattfeld, D. C., Oberweis, A., Paech, B., & Winter, A. (2019). Towards Customer-Induced Service Orchestration - Requirements for the Next Step of Customer Orientation. *Electronic Markets*, *29*(1), 79–91. https://doi.org/10.1007/s12525-019-00340-3

Alt, R., & Smits, M. (2007). Networkability of Organizations and

Business Networks. *Proceedings of the 15th European Conference on Information Systems, ECIS 2007*, 119–130.

Amabile, T. M. (1983). *The Social Psychology of Creativity*. Springer-Verlag.

Amazon Inc. (2021a). *About the Online Dispute Resolution Platform (ODR)*. https://www.amazon.de/-/en/gp/help/customer/display.html?nodeId=G9NMDH46UFNMFNKN

Amazon Inc. (2021b). *Amazon Annual Report 2020*. https://s2.q4cdn.com/299287126/files/doc_financials/2021/ar/Amazon-2020-Annual-Report.pdf

Amazon Inc. (2021c). *Our Mission*. https://www.aboutamazon.co.uk/uk-investment/our-mission

Amazon Inc. (2021d). *Richtlinien für Inhalte*. https://www.amazon.de/gp/help/customer/display.html?nodeId=201995150

Amit, R., & Zott, C. (2001). Value Creation in E-Business. *Strategic Management Journal*, *22*(6–7), 493–520. https://doi.org/10.1002/smj.187

Andresen, K., Brockmann, C., & Dräger, C. (2013). A Classification of Ecosystems of Enterprise System Providers - An Empirical Analysis. *Proceedings of the 26th Hawaii International Conference on System Sciences I 2013*, 4034–4044. https://doi.org/10.1109/HICSS.2013.639

Anggraeni, E., Den Hartigh, E., & Zegveld, M. (2007). Business Ecosystem as a Perspective for Studying the Relations Between Firms and Their Business Networks. *ECCON 2007 Annual*

Meeting, *January*, 1–28.

Ansari, S., Garud, R., & Kumaraswamy, A. (2016). The Disruptor´s Dilemma: TIVO and The U.S. Television Ecosystem. *Strategic Management Journal*, *37*, 1829–1853. https://doi.org/https://doi.org/10.1002/smj.2442

Ant Group. (2020). *H SHARE IPO*. https://gw.alipayobjects.com/os/bmw-prod/9364e1f1-7ffa-4082-8b4c-9b5c55f28d37.pdf

Ant Group. (2021). *Company Profile*. https://www.antgroup.com/en/about/introduction

Appan, R., & Browne, G. (2012). The Impact of Analyst-Induced Misinformation on the Requirements Elicitation Process. *MIS Quarterly*, *36*(1), 85–106. https://doi.org/10.2307/41410407

Apple Inc. (2020). *Apple Reveals New Developer Technologies to Foster the Next Generation of Apps*. https://www.apple.com/newsroom/2020/06/apple-reveals-new-developer-technologies-to-foster-the-next-generation-of-apps/#:~:text=Cupertino%2C California — Apple today announced,build the apps of tomorrow.

Arthur, W. B. (2009). *The Nature of Technology*. Penguin Books.

Autio, E. (2021). Orchestrating Ecosystems: A Multi-Layered Framework. *Innovation: Organization & Management*, 1–14. https://doi.org/10.1080/14479338.2021.1919120

Autio, E., Mudambi, R., & Yoo, Y. (2021). Digitalization and Globalization in a Turbulent World: Centrifugal and Centripetal Forces. *Global Strategy Journal*, *11*(1), 3–16. https://doi.org/10.1002/gsj.1396

Autio, E., & Thomas, L. D. W. (2014). Innovation Ecosystems: Implications for Innovation Management. In *Oxford Handbook of Innovation Management* (Issue April 2020). https://doi.org/10.1093/oxfordhb/9780199694945.013.012

Autio, E., & Thomas, L. D. W. (2018). Ecosystem Value Co-Creation. *Academy of Management Annual Meeting Proceedings*, *April*, 1–30. https://doi.org/10.5465/AMBPP.2018.15913abstract

Bailey, K. D. (1994). *Typologies and Taxonomies: An Introduction to Classification Techniques*. SAGE Publications.

Baker, M. J. (2000). Writing a Literature Review. *The Marketing Review*, *1*, 219–247. https://doi.org/10.1362/1469347002529189

Baldwin, C. (2012). Organization Design for Business Ecosystems. *Journal of Organization Design*, *1*(1), 20–23. https://doi.org/10.7146/jod.6334

Baldwin, C., & Clark, K. B. (1997). Managing in an Age of Modularity. *Havard Business Review*.

Baldwin, C.Y. (2007). Modularity, Ttransactions, and the Boundaries of Firms: A Synthesis. *Harvard Business School Working Paper, No. 08-013*. http://www.grjm.net/documents/celine_hiroux/BALDWIN_2007_modularity-firms.pdf

Baldwin, Carliss Y. (2008). Where do Transactions Come From? Modularity, Transactions, and the Boundaries of Firms. *Industrial and Corporate Change*, *17*(1), 155–195. https://doi.org/10.1093/icc/dtm036

Banalieva, E. R., & Dhanaraj, C. (2019). Internalization Theory for the Digital Economy. *Journal of International Business Studies*, *50*(8), 1372–1387. https://doi.org/10.1057/s41267-019-00243-7

Barile, S., Lusch, R., Reynoso, J., Saviano, M., & Spohrer, J. (2016). Systems, Networks, and Ecosystems in Service Research. *Journal of Service Management*, *27*(4), 652–674. http://10.0.4.84/JOSM-09-2015-0268

Barnert, J.-P. (2020, August 19). Delivery Hero to Replace Wirecard in Germany's DAX Index. *Bloomberg*. https://www.bloomberg.com/news/articles/2020-08-19/delivery-hero-to-replace-wirecard-in-germany-s-dax-index

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/http://dx.doi.org/10.1177/014920639101700108

Baskent, E. Z. (2020). A Framework for Characterizing and Regulating Ecosystem Services in a Management Planning Context. *Forests*, *11*(1), 1–20. https://doi.org/10.3390/f11010102

Baskerville, R., Kaul, M., Pries-Heje, J., Storey, V. C., & Kristiansen, E. (2016). Bounded Creativity in Design Science Research. *2016 International Conference on Information Systems, ICIS 2016*, 1–17.

Beers, B. (2020). *How Netflix Pays for Movie and TV Show Licensing*. Investopedia. https://www.investopedia.com/articles/investing/062515/how-netflix-pays-movie-and-tv-show-licensing.asp

Berentzen, C., Betz, C., & Dosch, H. (2021). Die Commerzbank auf dem Weg ins Ökosystem – Open Banking als Wegbereiter für kollaborative Geschäftsmodelle. *Banking & Information Technology*, *22*, 48–54.

Berger, C., Eichhammer, P., Reiser, H. P., Domaschka, J., Hauck, F. J., & Habiger, G. (2021). A Survey on Resilience in the IoT: Taxonomy, Classification, and Discussion of Resilience Mechanisms. *ACM Computing Surveys*, *54*(7). https://doi.org/10.1145/3462513

Betz, C., Burkhalter, M., & Jung, R. (2019). Prerequisites for Value Co-Creation in Business Ecosystems. *25th Americas Conference on Information Systems, AMCIS 2019*, 1–5.

Betz, C., & Jung, R. (2021a). Conceptualizing and Analyzing Business Ecosystem Service Offerings. *Proceedings of the 54th Hawaii International Conference on System Sciences | 2021*, 6123–6132.

Betz, C., & Jung, R. (2021b). Value Creation in Business Ecosystems – A Design Theory for a Reference Model. *27th Americas Conference on Information Systems, AMCIS 2021*.

Betz, C., Schache, K., & Jung, R. (2021). Why Partnerships in Ecosystems Fail - Towards a Construct of Cultural Values in Ecosystems. *25th Pacific Asia Conference on Information Systems, PACIS 2021*.

Biedebach, M., & Hanelt, A. (2020). Towards a Typology of Ecosystem Roles in the Era of Digital Innovation – An Inductive Empirical Analysis. *Forty-First International Conference on Information Systems, India*, 1–17.

Birkinshaw, J. (2019). Ecosystem Businesses Are Changing the Rules of Strategy. *Harvard Business Review*, 1–8. https://hbr.org/2019/08/ecosystem-businesses-are-changing-the-rules-of-strategy

Bowman, C., & Ambrosini, V. (2000). Value Creation Versus Value Capture: Towards a Coherent Definition of Value in Strategy.

British Journal of Management, *11*(1), 1–15. https://doi.org/10.1111/1467-8551.00147

Brandenburger, A. M., & Nalebuff, B. J. (1997). *Co-opetition*. Currency Doubleday.

Brown, R., & Mawson, S. (2019). Entrepreneurial Ecosystems and Public Policy in Action: A Critique of the Latest Industrial Policy Blockbuster. *Cambridge Journal of Regions, Economy and Society*, *12*(3), 347–368. https://doi.org/10.1093/cjres/rsz011

Bundesamt für Statistik. (2021a, November 26). *Beschäftigungsbarometer im 3. Quartal 2021*. https://www.bfs.admin.ch/bfs/de/home/statistiken/industrie-dienstleistungen/unternehmen-beschaeftigte/beschaeftigungsstatistik/offene-stellen.assetdetail.19444502.html

Bundesamt für Statistik. (2021b, December 13). *Schweizerische Arbeitskräfteerhebung im 3. Quartal 2021: Arbeitsangebot*. https://www.bfs.admin.ch/bfs/de/home/statistiken/arbeit-erwerb.assetdetail.19684287.html

Burkhalter, M. (2019). *Allocentric Business Models - An Allocentric Business Model Ontology for the Orchestration of Value Co-Creation Using the Example of Financial Service Ecosystems*. University of St.Gallen.

Burkhalter, M., Betz, C., Auge-Dickhut, S., & Jung, R. (2021). Orchestrating Value Co-creation in Business Ecosystems – Shifting from an Idiocentric Towards an Allocentric Perspective on the Business Model Concept. In K. Wendt (Ed.), *Theories of Change - Change Leadership Tools, Models and Applications for Investing in Sustainable Development* (pp. 257–291). Springer International Publishing.

Ceccagnoli, M., Forman, C., Huang, P., & Wu, D. J. (2012). Cocreation of Value in a Platform Ecosystem: The Case of Enterprise Software. *MIS Quarterly*, *36*(1), 263–290.

Cennamo, C., & Santaló, J. (2019). Generativity Tension and Value Creation in Platform Ecosystems. *Organization Science*, *30*(3), 617–641. https://doi.org/10.1287/orsc.2018.1270

Chandler, A. D., & Daems, H. (1979). Administrative Coordination, Allocation and Monitoring: A Comparative Analysis of the Emergence of Accounting and Organization in the U.S.A. and Europe. *Accounting, Organizations and Society*, *4*(1–2), 3–20. https://doi.org/10.1016/0361-3682(79)90003-5

Chandler, J., & Vargo, S. (2011). Contextualization and Value-in-Context: How Context Frames Exchange. *Marketing Theory*, *11*(1), 35–49. https://doi.org/10.1177/1470593110393713

Chargeback Gurus. (2021). *Disputes and Chargebacks on the Alipay Platform*. https://www.chargebackgurus.com/blog/alipay-chargebacks

Chesbrough, H. (2010). Business Model Innovation: Opportunities and barriers. *Long Range Planning*, *43*(2–3), 354–363. https://doi.org/10.1016/j.lrp.2009.07.010

Chesbrough, H. (2011). Bringing Open Innovation to Services. *MIT Sloan Management Review*, *52*(2), 85–90.

Chesbrough, H., Lettl, C., & Ritter, T. (2018). Value Creation and Value Capture in Open Innovation. *Journal of Product Innovation Management*, *35*(6), 930–938. https://doi.org/10.1111/jpim.12471

Christensen, C. M. (1997). *The Innovator's Dilemma - When New Technologies Cause Great Firms to Fail*. Harvard Business

School Press.

Christensen, C. M., Cook, S., & Hall, T. (2005). Marketing Malpractice - The Cause and the Cure. *Harvard Business Review*, *83*(12).

Christensen, C. M., & Rosenbloom, R. S. (2013). Explaining the Attacker's Advantage: Technological Paradigms, Organizational Dynamics, and the Value Network. *Research Policy*, *24*, 233–257. https://doi.org/10.1108/S0742-3322(2013)0000030015

Ciaccia, C. (2020). *Didi Chuxing: The Chinese Ride-Sharing Giant*. Investopedia. https://www.investopedia.com/articles/small-business/012517/didi-chuxing.asp#:~:text=Chuxing%3A An Overview-,Didi Chuxing is a mobile transportation company headquartered in Beijing,%2C Australia%2C and Latin America.

Cicero, S. (2017). Platform Design Toolkit. *Innotribe*, *1*, 1–36. http://platformdesigntoolkit.com/platform-design-whitepaper/

Cloutier, C., & Langley, A. (2017). Negotiating the Moral Aspects of Purpose in Single and Cross-Sectoral Collaborations. *Journal of Business Ethics*, *141*(1), 103–131. https://doi.org/10.1007/s10551-015-2680-7

Coase, R. H. (1937). The Nature of the Firm. *Journal of Law, Economics, and Organization*, *4*(1), 33–47. https://doi.org/10.1093/oxfordjournals.jleo.a036947

Commerzbank. (2020). *The Future of Collaboration in Corporate Banking*. https://developer.commerzbank.com/shared/documents/commerzbank-open-banking-whitepaper-2020.pdf

Constantin, J., & Lusch, R. (1994). *Understanding Resource Management: How to Deploy Your People, Products, and*

Processes for Maximum Productivity. The Planning Forum.

Constine, J. (2014, January 14). Who Gets Rich From Google Buying Nest? Kleiner Returns 20X On $20M, Shasta Nets ~$200M. *Tech Crunch*. https://techcrunch.com/2014/01/13/nest-investors-strike-it-rich/

Cooper, H. M. (1988). Organizing Knowledge Syntheses: A Taxonomy of Literature Reviews. *Knowledge in Society*, *1*(1), 104–126. https://doi.org/10.1007/BF03177550

Crabtree, J. (2018, February 9). Didi Chuxing Took on Uber and Won. Now it's Taking on the World. *Wired*. https://www.wired.co.uk/article/didi-chuxing-china-startups-uber

Cusumano, Michael, Yoffie, D., & Gawer, A. (2020). The Future of Platforms. *MIT Sloan Management Review*.

Cusumano, Micheal;, Gawer, A., & Yoffie, D. B. (2019). *The Business of Platforms*. Harper Business.

Czakon, W. (2016). Network Strategies Logic. *Problemy Zarządzania*, *14*(4 (64)), 17–30. https://doi.org/10.7172/1644-9584.64.1

Dahlman, C. J. (1979). The Problem of Externality. *The Journal of Law and Economics*, *22*(1), 141–162. https://doi.org/10.1086/466936

Davidson, S., Harmer, M., & Marshall, A. (2015). Strategies for Creating and Capturing Value in the Emerging Ecosystem Economy. *Strategy and Leadership*, *43*(2), 2–10. https://doi.org/10.1108/SL-01-2015-0003

De Meyer, A., & Williamson, P. J. (2020). *Ecosystem Edge*. Stanford University Press.

De Vita, G., Tekaya, A., & Wang, C. L. (2011). The Many Faces of Asset

Specificity: A Critical Review of Key Theoretical Perspectives. *International Journal of Management Reviews*, *13*(4), 329–348. https://doi.org/10.1111/j.1468-2370.2010.00294.x

Dean, B. (2021). *Netflix Subscriber and Growth Statistics: How Many People Watch Netflix in 2021?* Backlinko. https://backlinko.com/netflix-users

Delivery Hero. (2020). *Annual Report 2019*. https://ir.deliveryhero.com/download/companies/delivery/AnnualReports/DE000A2E4K43-JA-2019-EQ-E-00.pdf

Desai, N., Mazzoleni, P., & Tai, S. (2007). Service Communities: A Structuring Mechanism for Service-Oriented Business Ecosystems. *Proceedings of the 2007 Inaugural IEEE-IES Digital EcoSystems and Technologies Conference, DEST 2007*, 122–127. https://doi.org/10.1109/DEST.2007.371957

Desmet, D., Maerkedahl, N., & Shi, P. (2019). Adopting an Ecosystem View of Business Technology. *McKinsey & Company*, 1–9.

Deutsche Börse. (2016, February 3). *Deutsche Börse Startet Neuen XDAXDAX-Index*. https://web.archive.org/web/20171204061235/http://deutsche-boerse.com/dbg-de/presse/pressemitteilungen/Deutsche-Boerse-startet-neuen-XDAXDAX-Index/2386400

Dhanaraj, C., & Parkhe, A. (2006). Orchestrating Innovation Networks. *Academy of Management Review*, *31*(3), 659–669. https://doi.org/https://doi.org/10.5465/amr.2006.21318923

Dietrich, A. (2021, August 30). *Valuu erreicht neuen Meilenstein – Fakten zur bisherigen Entwicklung und zur Erweiterung des Geschäftsmodells*. https://blog.hslu.ch/retailbanking/2021/08/30/valuu-erreicht-neuen-meilenstein-fakten-zur-bisherigen-entwicklung-und-zur-erweiterung-des-geschaeftsmodells/

Dietrich, A., & Amrein, S. (2021, July 20). *Marktvolumen von CHF 15.4 Milliarden – die Relevanz von Marketplace Lending in der Schweiz steigt*. https://blog.hslu.ch/retailbanking/2021/07/20/marktvolumen-von-chf-15-4-milliarden-relevanz-von-marketplace-lending-in-der-schweiz-steigt/

Dondofema, R. A., & Grobbelaar, S. S. S. (2019). Conceptualising Innovation Platforms Through Innovation Ecosystems Perspective. *Proceedings - 2019 IEEE International Conference on Engineering, Technology and Innovation, ICE/ITMC*. https://doi.org/10.1109/ICE.2019.8792668

Dong, H., Khadeer Hussain, F., & Chang, E. (2001). Exploring the Conceptual Model of Digital Ecosystems. *2007 Second International Conference on Digital Telecommunications*, 7.

Doty, D. H. (1994). Typologies as a Unique Form of Theory Building: Toward Improved Understanding and Modeling. *Academy of Management Review*, *19*(2), 230–251. https://doi.org/https://doi.org/10.5465/amr.1994.9410210748

Dredge, S. (2011, October 24). *Steve Jobs Resisted Third-Party Apps on iPhone, Biography Reveals*. https://www.theguardian.com/technology/appsblog/2011/oct/24/steve-jobs-apps-iphone

Dubé, L., & Paré, G. (2003). Rigor in Information System Positivist Case Research. *MIS Quarterly*, *27*(4), 597–635. https://doi.org/https://doi.org/10.2307/30036550

Dul, J., & Hak, T. (2008). *Case Study Methodology in Business*

Research. Butterworth-Heinemann.

Dunn, T., Fletcher, C., & Lamb, J. (2020). Influential Article Review - Value Creation within Ecosystems. *Journal of Strategic Innovation and Sustainability*, *14*(7), 1–14. https://www.proquest.com/scholarly-journals/influential-article-review-value-creation-within/docview/2540104237/se-2?accountid=10297%0Ahttp://resolver.ebscohost.com/openurl?ctx_ver=Z39.88-2004&ctx_enc=info:ofi/enc:UTF-8&rfr_id=info:sid/ProQ%3Aabiglobal&rf

Dyer, J. H. (1996). Does Governance Matter? Keiretsu Alliances and Asset Specificity as Sources of Japanese Competitive Advantage. *Organization Science*, *7*(6), 649–666. https://doi.org/10.1287/orsc.7.6.649

Eckert, C. (2011). *Architektur zur Netzwerksteuerung in der Finanzindustrie*. Logos Verlag.

Edvardsson, B., Kleinaltenkamp, M., Tronvoll, B., McHugh, P., & Windahl, C. (2014). Institutional Logics Matter When Coordinating Resource Integration. *Marketing Theory*, *14*(3), 291–309. https://doi.org/10.1177/1470593114534343

Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *Academy of Management Review*, *14*(4), 532–550. https://doi.org/10.5465/amr.1989.4308385

Eisenhardt, K. M., Graebner, M. E., & Sonenshein, S. (2016). Grand Challenges and Inductive Methods: Rigor Without Rigor Mortis. *Academy of Management Journal*, *59*(4), 1113–1123. https://doi.org/10.5465/amj.2016.4004

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic Capabilities: What are They? *Strategic Management Journal*, *21*(10–11), 1105–

1121. https://doi.org/10.1002/1097-0266(200010/11)21:10/11<1105::AID-SMJ133>3.0.CO;2-E

Eisenmann, T., Parker, G., & Van Alstyne, M. W. (2006). Strategies for Two-Sided Markets. *Harvard Business Review*, *84*(10), 1–11. https://doi.org/10.1007/s00199-006-0114-6

Eisenmann, T., Parker, G., & Van Alstyne, M. W. (2011). Platform Envolvement. *Strategic Management Journal*, *32*(12), 1270–1285. https://doi.org/DOI: 10.1002/smj.935

Engelhardt, J.-F., & Badde, S. (2021). Strategy Design in a Digital Ecosystem: The Ecosystem Growth and Collaboration (EGC) Model. *Marketing Review St. Gallen*, *5*, 60–70.

Faber, A., Riemhofer, M., & Bondel, G. (2019). A Systematic Mapping Study on Business Ecosystem Types. *25th Americas Conference on Information Systems, AMCIS 2019*, 1–10.

Ferraro, G., & Iovanella, A. (2015). Organizing Collaboration in Inter-Organizational Innovation Networks, from Orchestration to Choreography. *International Journal of Engineering Business Management*, *7*(24), 1–14. https://doi.org/10.5772/61802

Frenkel, A., Israel, E., & Maital, S. (2015). The Evolution of Innovation Networks and Spin-off Entrepreneurship: The Case of RAD. *European Planning Studies*, *23*(8), 1646–1670. https://doi.org/10.1080/09654313.2014.998171

Fuller, J., Jacobides, M. G., & Reeves, M. (2019). The Myths and Realities of Business Ecosystems. *MIT Sloan Management Review*. https://mitsmr.com/2Nt8fmC

FundingUniverse. (n.d.-a). *Amazon.com, Inc. History*. http://www.fundinguniverse.com/company-histories/amazon-com-inc-history/

FundingUniverse. (n.d.-b). *Netflix, Inc. History*. http://www.fundinguniverse.com/company-histories/netflix-inc-history/

Gawer, A. (2014). Bridging Differing Perspectives on Technological Platforms: Toward an Integrative Framework. *Research Policy*, *43*(7), 1239–1249. https://doi.org/10.1016/j.respol.2014.03.006

Gawer, A., & Cusumano, M. (2013). Industry Platforms and Ecosystem Innovation. *Journal of Product Innovation Management*, *31*(3), 417–433. https://doi.org/http://dx.doi.org/10.1111/jpim.12105

Gawer, A., & Cusumano, M. (2014). Industry Platforms and Ecosystem Innovation. *Journal of Product Innovation Management*, *31*(3), 417–433. https://doi.org/10.1111/jpim.12105

Ghazawneh, A., & Henfridsson, O. (2015). A Paradigmatic Analysis of Digital Application Marketplaces. *Journal of Information Technology*, *30*(3), 198–208. https://doi.org/10.1057/jit.2015.16

Gibson, L., & Groom, R. (2018). Ambiguity, Manageability and the Orchestration of Organisational Change: A Case Study of an English Premier League Academy Manager. *Sports Coaching Review*. https://doi.org/10.1080/21640629.2017.1317173

Giudici, A., Reinmoeller, P., & Ravasi, D. (2018). Open-System Orchestration as a Relational Source of Sensing Capabilities: Evidence from a Venture Association. *Academy of Management Journal*, *61*(4), 1369–1402. http://10.0.21.89/amj.2015.0573

Google. (2019). *Updates to Works with Nest*. https://blog.google/products/google-nest/updates-works-with-nest/

Google. (2021a). *From the Garage to the Googleplex*. https://about.google/our-story/

Google. (2021b). *Help is on the Way*. https://store.google.com/us/magazine/installation?hl=en-US

Google. (2021c). *Integrate with Google Nest*. https://developers.google.com/nest/device-access

Google. (2021d). *Nest Hub Max*. https://store.google.com/us/product/google_nest_hub_max?hl=en-US

Google. (2021e). *Nest Learning Thermostat*. https://store.google.com/us/product/nest_learning_thermostat_3rd_gen?hl=en-US

Google. (2021f). *Welcome to Google Nest. Build Your Helpful Home.* https://store.google.com/us/category/connected_home?hl=en-US&GoogleNest=&utm_source=nest_redirect&utm_medium=google_oo&utm_campaign=homepage

Gordijn, J. (2004). E-Business Value Modelling Using the e3-Value Ontology. In W. L. Currie (Ed.), *Value Creation from E-Business Models* (pp. 98–127). Elsevier Butterworth-Heinemann.

Gregor, S. (2006). The Nature of Theory in Information Systems. *MIS Quarterly: Management Information Systems*, *30*(3), 611–642. https://doi.org/10.2307/25148742

Gregor, S., Chandra Kruse, L., & Seidel, S. (2020). The Anatomy of a Design Principle. *Journal of the Association for Information Systems*, *21*(6), 1622–1652. https://doi.org/10.17705/1jais.00649

Gregor, S., & Hevner, A. (2013). Positioning and Presenting Design Science Research for Maximum Impact. *MIS Quarterly:*

Management Information Systems, *37*(2), 337–355. https://doi.org/10.25300/MISQ/2013/37.2.01

Gregor, S., & Jones, D. (2007). The Anatomy of a Design Theory. *Journal of the Association for Information Systems*, *8*(5), 312–335. http://aisel.aisnet.org/jais/vol8/iss5/1/

Grilo, A., Van Den Berg, R. J., Li, M. S., & Crave, S. (2008). Identifying the Value of Enterprise Interoperability in the Context of Innovation Ecosystems. *2008 IEEE International Technology Management Conference, ICE 2008*.

Grönroos, C. (1990). *Service Managing and Marketing. Managing the Moments of Truth in Service*. Lexington Books.

Grönroos, C. (2006). Adopting a Service Logic for Marketing. *Marketing Theory*, *6*(3), 317–333. https://doi.org/10.1177/1470593106066794

Grönroos, C. (2011). *Value Co-Creation in Service Logic: A Critical Analysis*. https://doi.org/10.1177/1470593111408177

Grönroos, C., & Voima, P. (2003). Critical Service Logic: Making Sense of Value Creation and Co-Creation. *Journal of the Academy of Marketing Science*, *41*, 133–150. https://doi.org/10.1007/s11747-012-0308-3

Gruber, T. R. (1993). A Translation Approach to Portable Ontology Specifications. *Knowledge Acquisition*, *5*(2), 199–220. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.117.3273&rep=rep1&type=pdf

Guggenberger, T. M., Möller, F., Haarhaus, T., Gür, I., & Otto, B. (2020). Ecosystem Types in Information Systems. *Twenty-Eighth European Conference on Information Systems (ECIS2020)*.

Gulati, R., Puranam, P., & Tushman, M. (2012). Meta-Organizational Design: Rethinking Design in Inter- Organizational and Community Contexts. *Special Issue on Strategy and the Design of Organizational Architecture*, *33*(6), 571–586. https://doi.org/10.1002/smj.1975/abstract

Hamer, S. (2010). Developing an Innovation Ecosystem: A Framework for Accelerating Knowledge Transfer. *Journal of Management & Marketing in Healthcare*, *3*(4), 248–255. http://10.0.4.155/175330310X12736578177607

Handelszeitung. (2020, January 27). *Schweizer wechseln eher ihren Job – doch unzufrieden sind sie nicht*. https://www.handelszeitung.ch/beruf/schweizer-wechseln-eher-ihren-job-doch-unzufrieden-sind-sie-nicht

Hastings, R., & Meyer, E. (2020). *No Rules Rules*. Penguin Press.

Hawking, S. (2018). *Brief Answers to the Big Questions*. John Murray.

Hayter, C. (2016). A Trajectory of Early-Stage Spinoff Success: the Role of Knowledge Intermediaries within an Entrepreneurial University Ecosystem. *Small Business Economics*, *47*(3), 633–656. http://10.0.3.239/s11187-016-9756-3

Hein, A., Schreieck, M., Riasanow, T., Setzke, D. S., Wiesche, M., Böhm, M., & Krcmar, H. (2020). Digital Platform Ecosystems. *Electronic Markets*, *30*, 87–98. https://doi.org/10.1007/s12525-019-00377-4

Hein, A., Weking, J., Schreieck, M., Wiesche, M., Böhm, M., & Krcmar, H. (2019). Value Co-Creation Practices in Business-to-Business Platform Ecosystems. *Electronic Markets*. https://doi.org/10.1007/s12525-019-00337-y

Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M. A., Singh, H., Teece, D. J., & Winter, S. G. (2007). *Dynamic Capabilities: Understanding Strategic Change in Organizations*. Blackwell Publishing.

Helfat, C. E., & Raubitschek, R. S. (2018). Dynamic and Integrative Capabilities for Profiting from Innovation in Digital Platform-Based Ecosystems. *Research Policy*, *47*(8), 1391–1399. https://doi.org/10.1016/j.respol.2018.01.019

Helkkula, A., Kowalkowski, C., & Tronvoll, B. (2018). Archetypes of Service Innovation: Implications for Value Cocreation. *Journal of Service Research*, *21*(3), 284–301. https://doi.org/10.1177/1094670517746776

Henriette, E., Feki, M., & Boughzala, I. (2016). Digital Transformation and Challenges. *Proceedings of the 2016 Mediterranean Conference on Information Systems (MCIS)*, 1–7.

Hersko, T. (2019, September 27). Netflix's Latest Claim That It Wants Data Transparency Rings Hollow. *IndieWire*. https://www.indiewire.com/2019/09/netflix-viewership-numbers-transparency-1202177150/

Hevner, A., March, S., & Park, J. (2004). Design Science in Information Systems Research. *MIS Quarterly*, *28*(1), 75–105. https://doi.org/10.2307/25148625

Hevner, A. R. (2007). A Three Cycle View of Design Science Research. *Scandinavian Journal of Information Systems*, *19*(2), 87–92. http://aisel.aisnet.org/sjis/vol19/iss2/4

Hevner, A., vom Brocke, J., & Maedche, A. (2019). Roles of Digital Innovation in Design Science Research. *Business and Information Systems Engineering*, *61*(1), 3–8.

https://doi.org/10.1007/s12599-018-0571-z

Hibbert, S., Winklhofer, H., & Temerak, M. S. (2012). Customers as Resource Integrators: Toward a Model of Customer Learning. *Journal of Service Research*, *15*(3), 247–261. https://doi.org/10.1177/1094670512442805

Hinterhuber, A. (2002). Value Chain Orchestration in Action and the Case of the Global Agrochemical Industry. *Long Range Planning*, *35*(6), 615–635. https://doi.org/10.1016/S0024-6301(02)00160-7

Hirsch, I. (2019, September 27). Bezahldienst Alipay erobert Europa – weil die Chinesen am liebsten mobil bezahlen. *Focus*. https://www.focus.de/finanzen/boerse/alibaba-tochter-chinesischer-bezahldienst-alipay-erobert-europa_id_10795067.html

Hirvonen-Kantola, S., Iivari, M., & Hurmelinna, P. (2018). Innovation Ecosystem Orchestration Activities in Spatial Planning Agencies. *ISPIM Innovation Symposium*, *June*, 1–11. https://manchester.idm.oclc.org/login?url=https://search.proquest.com/docview/2076369111?accountid=12253%0Ahttp://man-fe.hosted.exlibrisgroup.com/openurl/44MAN/44MAN_services_page?genre=article&atitle=Innovation+Ecosystem+Orchestration+Activities+in+Spati

Holbrook, M. (2002). Introduction to Consumer Value. In M. Holbrook (Ed.), *Consumer Value - A Framework for Analysis and Research* (pp. 1–28). Routledge.

Huet, J.-M., & Tcheng, H. (2018). Digital Ecosystem Management, the New Frontier? *DigiWorld Economic Journal*, *107*(3), 191–198.

Hunt, S. D. (2004). On the Service-Centered Dominant Logic of Marketing. *Journal of Marketing*, *68*(1), 21–22.

Hurmelinna-Laukkanen, P., & Nätti, S. (2012). Network Orchestration for Knowledge Mobility – The Case of an International Innovation Community. *Journal of Marketing Management*, *4*, 244–264.

Iansiti, M., & Lakhani, K. (2017). Managing Our Hub Economy. *Harvard Business Review*, 85–92.

Iansiti, M., & Levien, R. (2004). Strategy as Ecology. *Harvard Business Review*, *82*(3), 1–11.

Jacobides, M. G. (2019a). In the Ecosystem Economy, What's Your Strategy? *Harvard Business Review*, *October*, 128–138.

Jacobides, M. G. (2019b). The Delicate Balance of Making an Ecosystem Strategy Work. *Harvard Business Review*, 1–5. https://hbr.org/2019/11/the-delicate-balance-of-making-an-ecosystem-strategy-work

Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a Theory of Ecosystems. *Strategic Management Journal*, *39*(8), 2255–2276. https://doi.org/10.1002/smj.2904

Jacobides, M. G., Knudsen, T., & Augier, M. (2006). Benefiting from Innovation: Value Creation, Value Appropriation and the Role of Industry Architectures. *Research Policy*, *35*, 1200–1221. https://doi.org/10.1016/j.respol.2006.09.005

Jacobides, M. G., Sundararajan, A., & Van Alstyne, M. (2019). Platforms and Ecosystems: Enabling the Digital Economy. *Briefing Paper World Economic Forum*, *February*. https://doi.org/http://doi.org//10.1086/506237

Jax, K. (2006). Ecological Units: Definitions and Application. *The Quarterly Review of Biology*, *81*(3), 237–258.

Jie, Z. (2020, February 26). Shared Bikes in Beijing Subject to New

Policies. *China Daily*. http://global.chinadaily.com.cn/a/202002/26/WS5e55e4bca3101 2821727a76c.html

Johnson, R. E., & Foote, B. (1988). Designing Reusable Classes. *Journal of Object-Oriented Programming*, *1*(2), 22–30, 35. http://www.laputan.org/drc.html

Johnson, R., Moore, S., Petriwsky, K., Rice, C., John, C., & Sand, D. (2018). Winning in Digital Ecosystems. *Digital McKinsey:Insights*, *3*(1), 5–25. https://www.mckinsey.com/~/media/mckinsey/business functions/mckinsey digital/our insights/digital mckinsey insights number 3/digital-mckinsey-insights-issue-3-revised.pdf

Jütting, M. (2020). Exploring Mission-Oriented Innovation Ecosystems for Sustainability: Towards a Literature-Based Typology. *Sustainability*, *12*. https://doi.org/https://doi.org/10.3390/su12166677

Kapoor, R., & Lee, J. M. (2010). Coordinating and Competing in Ecosystems: How Organizational Forms Shape New Technology Investments. *Academy of Management Annual Meeting Proceedings*, 1–45. https://doi.org/10.1002/smj.2010

Katz, M. L., & Shapiro, C. (1985). Network Externalities, Competition, and Compatibility. *American Economic Review*, *75*(3), 424–440. https://doi.org/10.2307/1814809

Kawohl, J. (2021). *The Ecosystem Strategy Map*. https://ecosystemizer.com/tools/ecosystem-strategy-map/

Kelly, H. (2015, August 11). Meet Google Alphabet - Google's new parent company. *CNN Business*. https://money.cnn.com/2015/08/10/technology/alphabet-google/index.html

Kerr, D. (2013, July 25). Google Reveals it Spent $966 Million in Waze Acquisition. *Cnet*. https://www.cnet.com/tech/services-and-software/google-reveals-it-spent-966-million-in-waze-acquisition/

Kestenbaum, R. (2021, June 14). The Risks Keep Growing For Amazon Third-Party Sellers. *Forbes*. https://www.forbes.com/sites/richardkestenbaum/2021/06/14/the-risks-keep-growing-for-amazon-third-party-sellers/?sh=8a8804a6abfc

Ketonen-Oksi, S., & Valkokari, K. (2019). Innovation Ecosystems as Structures for Value Co-Creation. *Technology Innovation Management Review*, *9*(2), 25–35. https://doi.org/10.22215/TIMREVIEW/1216

Khadka, R., Saeidi, A., Jansen, S., Hage, J., & Helms, R. (2011). An Evaluation of Service Frameworks for the Management of Service Ecosystems. *PACIS 2011 - 15th Pacific Asia Conference on Information Systems: Quality Research in Pacific*.

Kiefer, C., Seffinga, J., Spiller, P., Gertsch, M., Bucherer, S., Künzle, C., Eppenberger, A., Modheji, S., Zerndt, T., Auge-Dickhut, S., Betz, C., & Heines, R. (2019). *Ecosystems 2021 – was bringt die Zukunft? Gestaltung und Positionierung der Finanzindustrie*. https://www2.deloitte.com/content/dam/Deloitte/ch/Documents/financial-services/deloitte-ch-fs-de-ecosystems-2021.pdf

Kleinaltenkamp, M., Brodie, R. J., Frow, P., Hughes, T., Peters, L. D., & Woratschek, H. (2012). Resource Integration. *Marketing Theory*, *12*(2), 201–205. https://doi.org/10.1177/1470593111429512

Knodel, J., & Manikas, K. (2015). Towards a Typification of Software

Ecosystems. In J. Fernandes, R. Machado, & K. Wnuk (Eds.), *Software Business. ICSOB 2015. Lecture Notes in Business Information Processing, vol 210* (pp. 60–65). Springer.

Kohlborn, T. (2012). *Identification and Evaluation of Service Bundles for Governmental One-Stop Portals*. Queensland University of Technology.

Kohlmann, F., & Alt, R. (2007). Business Process and Services Computing (BPSC'07). *Proc. First Int'l Working Conf. Business Process and Services Computing (BPSC '07)*, 180–193. https://www.alexandria.unisg.ch/67531/1/BPSC'07%2520Kohlmann_Alt.pdf

Korn, K. C., & Pine II, B. J. (2011). The Typology of Human Capability: A New Guide to Rethinking the Potential for Digital Experience Offerings. *Strategy and Leadership*, *39*(4), 35–40. https://doi.org/10.1108/10878571111147396

Korpela, K., Ritala, P., & Vilko, J. (2013). A Management and Orchestration Model for Integrating Digital Business Ecosystems. *International Journal of Integrated Supply Management*, *8*(1), 24–51. https://doi.org/10.1504/IJISM.2013.055066

Kyncl, R. (2017, September 13). The Inside Story of How Netflix Transitioned to Digital Vdeo After Seeing the Power of YouTube. *VOX*. https://www.vox.com/2017/9/13/16288364/streampunks-book-excerpt-youtube-netflix-pivot-video

Lado, A. A., & Wilson, M. C. (1994). Human Resource Systems and Sustained Competitive Advantage: A Competency-Based Perspective. *The Academy of Management Review*, *19*(4), 699–727. https://doi.org/https://doi.org/10.2307/258742

Lawsky, D. (2008, March 11). Google Closes DoubleClick Merger After

EU Approval. *Reuters*. https://www.reuters.com/article/us-google-doubleclick-eu-idUSBFA0005802008031l

Lee, S. H., Peng, M. W., & Barney, J. B. (2007). Bankruptcy Law and Entrepreneurship Development: A Real Options Perspective. *Academy of Management Review*, *32*(1), 257–272. https://doi.org/10.5465/amr.2007.23464070

Legner, C., Eymann, T., Hess, T., Matt, C., Böhmann, T., Drews, P., Mädche, A., Urbach, N., & Ahlemann, F. (2017). Digitalization: Opportunity and Challenge for the Business and Information Systems Engineering Community. *Business and Information Systems Engineering*, *59*(4), 301–308. https://doi.org/10.1007/s12599-017-0484-2

Lenka, S., Parida, V., & Wincent, J. (2017). Digitalization Capabilities as Enablers of Value Co-Creation in Servitizing Firms. *Psychology & Marketing*, *34*(1), 92–100. https://doi.org/10.1002/mar

Lepak, D. P., Smith, K. G., & Taylor, M. S. (2007). Value Creation and Value Capture: A Multilevel Perspective. *Academy of Management Review*, *32*(1), 180–194. https://doi.org/10.5465/AMR.2007.23464011

Lessard, D., Teece, D. J., & Leih, S. (2016). The Dynamic Capabilities of Meta-Multinationals. *Global Strategy Journal*, *6*(3), 211–224. https://doi.org/10.1002/gsj.1126

Letaifa, S. Ben. (2014). The Uneasy Transition from Supply Chains to Ecosystems: The Value-Creation/Value-Capture Dilemma. *Management Decision*, *52*(2), 278–295. https://doi.org/10.1108/MD-06-2013-0329

Li, F., Tian, C., Cao, R., & Jiang, S. (2008). Value Network Model for Service Ecosystem in Business Environment. *NOMS 2008 -*

IEEE/IFIP Network Operations and Management Symposium: Pervasive Management for Ubiquitous Networks and Services, 955–958. https://doi.org/10.1109/NOMS.2008.4575256

Liao, R. (2018, November 7). WeChat Reaches 1M Mini Programs, Half the Size of Apple's App Store. *Tech Crunch*. https://techcrunch.com/2018/11/07/wechat-mini-apps-200-million-users/

Lingens, B., Böger, M., & Gassmann, O. (2021). Even a Small Conductor Can Lead a Large Orchestra: How Startups Orchestrate Ecosystems. *California Management Review*, *63*(3), 118–143. https://doi.org/10.1177/00081256211005497

Liu, M., Tu, Z., Wang, J., & Wang, Z. (2020). A Novel Multi-Layer Network Model for Service Ecosystems. *Proceedings of International Conference on Service Science, ICSS*, 23–30. https://doi.org/10.1109/ICSS50103.2020.00012

Loebbecke, C., & Picot, A. (2015). Reflections on Societal and Business Model Transformation Arising from Digitization and Big Data Analytics: A Research Agenda. *Journal of Strategic Information Systems*, *24*(3), 149–157. https://doi.org/10.1016/j.jsis.2015.08.002

Löhe, J., & Legner, C. (2009). Assessment of SOA Potentials in B2B Networks - Concept and Application to German Esed Car Distribution Networks. *22nd Bled EConference EEnablement: Facilitating an Open, Effective and Representative ESociety - Proceedings*, 314–337.

Long, T. (2007, July 9). Sept. 7, 1998: If the Check Says "Google Inc.," We're "Google Inc." *Wired*. https://www.wired.com/2007/09/dayintech-0907/

Lovely, S. (2020, September 27). 3 Key Ways Netflix Has Changed Its Content Strategy. *Nasdaq*. https://www.nasdaq.com/articles/3-key-ways-netflix-has-changed-its-content-strategy-2020-09-27

Low, E. (2021, April 20). Netflix Reveals $17 Billion in Content Spending in Fiscal 2021. *Variety*. https://variety.com/2021/tv/news/netflix-2021-content-spend-17-billion-1234955953/

Luo, Y., Fan, Y., & Wang, H. (2013). Business Correlation-Aware Modelling and Services Selection in Business Service Ecosystem. *International Journal of Computer Integrated Manufacturing*, *26*(8), 772–785. http://10.0.4.56/0951192X.2013.766938

Lusch, R. F., & Nambisan, S. (2015). Service Innovation: A Service-Dominant Logic Perspective. *MIS Quarterly: Management Information Systems*, *39*(1), 155–175. https://doi.org/10.25300/MISQ/2015/39.1.07

Lütjen, H., Schultz, C., Tietze, F., & Urmetzer, F. (2019). Managing Ecosystems for Service Innovation: A Dynamic Capability View. *Journal of Business Research*, *104*, 506–519. https://doi.org/10.1016/j.jbusres.2019.06.001

Madhavaram, S., & Hunt, S. D. (2008). The Service-Dominant Logic and a Hierarchy of Operant Resources: Developing Masterful Operant Resources and Implications for Marketing Strategy. *Journal of the Academy of Marketing Science*, *36*(1), 67–82. https://doi.org/10.1007/s11747-007-0063-z

Makadok, R., & Coff, R. (2002). The Theory of Value and the Value of Theory: Breaking New Ground versus Reinventing the Wheel. *Academy of Management Review*, *27*(1), 10–13.

March, S. T., & Smith, G. F. (1995). Design and Natural Science Research on Information Technology. *Decision Support Systems*, *15*(4), 251–266. https://doi.org/10.1016/0167-9236(94)00041-2

Marx, K. (1867). *Capital* (Reprint 19). Progress Publishers.

Matthies, B. D., D'Amato, D., Berghäll, S., Ekholm, T., Hoen, H. F., Holopainen, J., Korhonen, J. E., Lähtinen, K., Mattila, O., Toppinen, A., Valsta, L., Wang, L., & Yousefpour, R. (2016). An Ecosystem Service-Dominant Logic? - Integrating the Ecosystem Service Approach and the Service-Dominant Logic. *Journal of Cleaner Production*, *124*, 51–64. https://doi.org/10.1016/j.jclepro.2016.02.109

Matzler, K., Bailom, F., von den Eichen, S. F., & Kohler, T. (2013). Business Model Innovation: Coffee Triumphs for Nespresso. *Journal of Business Strategy*, *34*(2), 30–37. https://doi.org/10.1108/02756661311310431

McPhee, C., Dedehayir, O., & Seppänen, M. (2017). Editorial: Platforms and Ecosystems. *Technology Innovation Management Review*, *7*(9), 3–5. https://doi.org/10.22215/timreview/1101

Meth, H., Mueller, B., & Maedche, A. (2015). Designing a Requirement Mining System. *Journal of the Association for Information Systems*, *16*(9), 799–837. https://doi.org/10.17705/1jais.00408

Mintzberg, H. (1983). *Structure in Fives: Designing Effective Organizations*. Prentice Hall.

MoneyPark. (2019). *Hypomarktstudie: Vermittler erobern den Hypothekarmarkt*. https://moneypark.ch/news-wissen/hypotheken-und-zinsen/vermittler-erobern-den-hypothekarmarkt-eine-analyse-der-wichtigsten-akteure-von-2012-bis-2018/

Moore, J. F. (1993). Predators and Prey: A New Ecology of

Competition. *Harvard Business Review*, *71*(3), 75–86. http://blogs.law.harvard.edu/jim/files/2010/04/Predators-and-Prey.pdf

Moore, J. F. (1998). The Rise of a New Corporate Form. *Washington Quarterly*, *21*(1), 167–181. https://doi.org/10.1080/01636609809550301

Moore, J. F. (2006). Business Ecosystems and the View of the Firm. *The Antitrust Bulletin*, *51*(1), 31–75. https://doi.org/10.1177/0003603X0605100103

Morgan, D. (1996). Focus Groups. *Annual Review of Sociology*, *22*(1), 129–152. https://doi.org/https://doi.org/10.1146/annurev.soc.22.1.129

Muegge, S. (2013). Platforms, Communities, and Business Ecosystems: Lessons Learned about Technology Entrepreneurship in an Interconnected World. *Technology Innovation Management Review*, *3*(2), 5–15. https://doi.org/10.22215/timreview655

Mukhopadhyay, S., & Bouwman, H. (2019). Orchestration and Governance in Digital Platform Ecosystems: A Literature Review and Trends. *Digital Policy, Regulation and Governance*, *21*(4), 329–351. https://doi.org/10.1108/DPRG-11-2018-0067

Murphy, A., Tucker, H., Coyne, M., & Touryalai, H. (2020). *Global 2000 - The World's Largest Public Companies*. https://www.forbes.com/global2000/#f3b66c5335d8

Nambisan, S., & Sawhney, M. (2011). Orchestration Processes in Network-Centric Innovation: Evidence From the Field. *Academy of Management Executive*, *25*(3), 40–57. https://doi.org/10.5465/AMP.2011.63886529

Nespresso. (2016). *Nespresso Coffee Centres of Excellence*. https://nestle-nespresso.com/sites/site.prod.nestle-nespresso.com/files/Nespresso - Corporate Production Centres Factsheet.pdf

Nespresso. (2021a). *Discover the Positive Cup*. https://www.sustainability.nespresso.com/discover-the-positive-cup-hub1

Nespresso. (2021b). *Highest Quality Sustainable Coffee*. https://nestle-nespresso.com/our_products/coffee

Nespresso. (2021c). *How it all Started. Our History*. https://nestle-nespresso.com/about_us/story

Nespresso. (2021d). *Nespresso Customer Service*. https://www.nespresso.com/de/de/services#/

Nespresso. (2021e). *Our Purpose*. https://nestle-nespresso.com/about_us/the_purpose

Nestlé. (2021). *Nestlé Annual Report 2020*. https://www.nestle.com/sites/default/files/2021-03/2020-annual-review-en.pdf

Netflix. (2002). *Prospectus Netflix IPO*. https://www.sec.gov/Archives/edgar/data/1065280/000101287002002475/d424b4.htm#TX202_16

Netflix. (2016). *Netflix Open Source Software Center*. https://netflix.github.io/

Netflix. (2021a). *About Netflix*. https://about.netflix.com/en

Netflix. (2021b). *Netflix Inc. Annual Report*. https://s22.q4cdn.com/959853165/files/doc_financials/2020/ar/8f

311d9b-787d-45db-a6ea-38335ede9d47.pdf

Netflix. (2021c). *Personalization & Search*. https://research.netflix.com/business-area/personalization-and-search

Netflix. (2021d). *Verbinden Sie Ihre Lieblingsgeräte mit Netflix*. https://devices.netflix.com/de/

Nickerson, R. C., Varshney, U., & Muntermann, J. (2013). A Method for Taxonomy Development and its Application in Information Systems. *European Journal of Information Systems*, *22*(3), 336–359. https://doi.org/10.1057/ejis.2012.26

Nielsen, R. P. (1988). Cooperative Strategy. *Strategic Management Journal*, *9*(5), 475–492. https://doi.org/10.1002/smj.4250090507

Normann, R., & Ramirez, R. (1993). From Value Chain to Value Constellation: Designing Interactive Strategy. *Harvard Business Review*.

O’Hern, M. S., & Rindfleisch, A. (2010). Customer Co-Creation: A Typology and Research Agenda. *Review of Marketing Research*, *6*(November 2010), 84–106. https://doi.org/10.1108/S1548-6435(2009)0000006008

Oesterle, H., Becker, J., Frank, U., Hess, T., Karagiannis, D., Krcmar, H., Loos, P., Mertens, P., Oberweis, A., & Sinz, E. J. (2010). Memorandum on Design-Oriented Information Systems Research. *European Journal of Information Systems*, *20*(20), 1–4. https://doi.org/http://dx.doi.org/10.1057/ejis.2010.55

Oesterle, H., Fleisch, E., & Alt, R. (2000). *Business Networking - Shaping Enterprise Relationships on the Internet*. Springer.

Oesterle, H., & Otto, B. (2010). Consortium Research. *Business &*

Information Systems Engineering, *2*(5), 283–293. https://doi.org/10.1007/s12599-010-0119-3

Oliveira, L., Fleury, A., & Fleury, M. T. (2021). Digital Power: Value Chain Upgrading in an Age of Digitization. *International Business Review*, *September 2019*, 101850. https://doi.org/10.1016/j.ibusrev.2021.101850

Olsson, H. H., & Bosch, J. (2015). Strategic Ecosystem Management: A Multi-case Study on Challenges and Strategies for Different Ecosystem Types. *Proceedings - 41st Euromicro Conference on Software Engineering and Advanced Applications, SEAA 2015*, 398–401. https://doi.org/10.1109/SEAA.2015.44

Osterwalder, A., & Pigneur, Y. (2002). Constructing the e-Economy An e-Business Model Ontology for Modeling e-Business. *BLED 2002 Proceedings, Article 2*, 12.

Osterwalder, A., & Pigneur, Y. (2003). *Modeling Value Propositions in E-Business*. 429–436. https://doi.org/10.1145/948005.948061

Otto, B., & Oesterle, H. (2010). Relevance through Consortium Research? A Case Study. *18th European Conference on Information Systems, ECIS 2010*, *June 2010*.

Ouden, E. Den. (2012). *Innovation Design - Creating Value for People, Organizations and Society*. Springer Verlag.

Pagani, M., & Pardo, C. (2017). The Impact of Digital Technology on Relationships in a Business Network. *Industrial Marketing Management*, *67*(August), 185–192. https://doi.org/10.1016/j.indmarman.2017.08.009

Parker, G., van Alstyne, M., & Jiang, X. (2017). Platform Ecosystems: How Developers Invert the Firm. *MIS Quarterly*, *41*(1), 255–266.

https://doi.org/10.25300/MISQ/2017/41.1.13

Parolini, C. (1999). *The Value Net - A Tool for Competitive Strategy*. John Wiley & Sons Ldt.

Payne, A. F., Storbacka, K., & Frow, P. (2008). Managing the Co-Creation of Value. *Journal of the Academy of Marketing Science*, *36*, 83–96. https://doi.org/10.1007/s11747-007-0070-0

Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems*, *24*(3), 45–77. https://doi.org/10.2753/MIS0742-1222240302

Peltoniemi, M. (2006). Preliminary Theoretical Framework for the Study of Business Ecosystems. *Emergence: Complexity & Organization*, *8*(1), 10–19. https://doi.org/https://doi.org/10.2147/PROM.S229569

Peltoniemi, M., & Vuori, E. (2008). Business Ecosystem as the New Approach to Complex Adaptive Business Environments. *Proceedings of EBusiness Research Forum*, 1–15. https://www.rolandberger.com/de/Insights/Publications/Startups-könnten-bis-2030-fast-4-Millionen-Jobs-in-Deutschland-schaffen.html

Penrose, E. (1959). *The Theory of the Growth of the Firm*. Oxford University Press.

Peppard, J., & Rylander, A. (2006). From Value Chain to Value Network: Insights for Mobile Operators. *European Management Journal*, *24*(2–3), 128–141. https://doi.org/10.1016/j.emj.2006.03.003

Petrini, M., De Freitas, C. S., & Da Silveira, L. M. (2017). A Proposal for a Typology of Sharing Economy. *Revista de Administracao Mackenzie*, *18*(5), 39–62. https://doi.org/10.1590/1678-69712017/administracao.v18n5p39-62

Pickett, S. T. A., & Cadenasso, M. L. (2002). The Ecosystem as a Multidimensional Concept: Meaning, Model, and Metaphor. *Ecosystems*, *5*(1), 1–10. https://doi.org/10.1007/s10021-001-0051-y

Pidun, U., & Reeves, M. (2020). *Why Do Most Business Ecosystems Fail?* https://www.bcg.com/de-de/publications/2020/why-do-most-business-ecosystems-fail

Pidun, U., Reeves, M., & Edzard Wesselink. (2021). How Healthy is Your Business Ecosystem? *MIT Sloan Management Review*.

Pidun, U., Reeves, M., & Schüssler, M. (2019). Do You Need a Business Ecosystem? *BCG Henderson Institute*, 11. https://www.bcg.com/publications/2019/do-you-need-business-ecosystem.aspx

Pidun, U., Reeves, M., & Schüssler, M. (2020). How Do You “Design” a Business Ecosystem? *BCG Hendersen Institute*, 1–15. https://www.bcg.com/de-de/publications/2020/how-do-you-design-a-business-ecosystem

Pikkarainen, M., Ervasti, M., Hurmelinna, P., & Nätti, S. (2017). The Roles of Innovation Network Orchestrators in Healthcare Ecosystem. *Proceedings of ISPIM Conferences*, *June*, 1–14. http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=124004912&site=ehost-live

Pitelis, C. (2012). Clusters, Entrepreneurial Ecosystem Co-creation, and Appropriability: A Conceptual Framework. *Industrial & Corporate Change*, *21*(6), 1359–1388. http://10.0.4.69/icc/dts008

Pitelis, C. N., & Teece, D. J. (2018). The New MNE: 'Orchestration' Theory as Envelope of 'Internalisation' Theory. *Management International Review*, *58*(4), 523–539. https://doi.org/10.1007/s11575-018-0346-2

Polese, F., Carrubbo, L., Bruni, R., & Maione, G. (2017). The Viable System Perspective of Actors in Ecosystems. *TQM Journal*, *29*(6), 783–799. https://doi.org/10.1108/TQM-05-2017-0055

Porter, M. (1980). *Competitive Strategy. Techniques for Analyzing Industries and Competitors*. Free Press.

Porter, M. (1985). *Competitive Advantage: Creating And Sustaining Superior Performance*. Free Press.

Porter, M. (1990). *The Competitive Advantage of Nations*. First Free Press.

Porter, M., & Heppelmann, J. (2014). How Smart, Connected Products are Transforming Competition. *Harvard Business Review*, *92*(11), 64–88. https://doi.org/10.1145/3017680.3022452

Post, D. M., Doyle, M. W., Sabo, J. L., & Finlay, J. C. (2007). The Problem of Boundaries in Defining Ecosystems: A Potential Landmine for Uniting Geomorphology and Ecology. *Geomorphology*, *1-2 SPEC. ISS.*, 111–126. https://doi.org/10.1016/j.geomorph.2006.07.014

PostFinance. (2021). *Geschäftsbericht 2020*. https://www.postfinance.ch/content/dam/pfch/doc/440_459/450_01_2020_de.pdf

Powell, W., & Snellman, K. (2004). The Knowledge Economy. *Annual Review of Sociology*, *30*, 199–220. https://doi.org/10.1146/annurev.soc.29.010202.100037

Powell, W. W. (1990). Neither Market Nor Hiearchy: Network Forms of Organization. *Reseach in Organizational Behavior*, *12*(January 1990), 295–336. https://doi.org/https://doi.org/10.1007/978-3-658-21742-6_108

Prahalad, C. K., & Ramaswamy, V. (2000). Co-Opting Customer Competence. *Harvard Business Review*, *78*, 79–90.

Prahalad, C. K., & Ramaswamy, V. (2004a). Co-Creating Unique Value with Customers. *Strategy & Leadership*, *32*(3), 4–9. https://doi.org/10.1108/10878570410699249

Prahalad, C. K., & Ramaswamy, V. (2004b). Co-Creation Experiences: The Next Practice in Value Creation. *Journal of Interactive Marketing*, *18*(3), 5–14. https://doi.org/10.1002/dir.20015

Prajogo, D. I., McDermott, P., & Goh, M. (2008). Impact of Value Chain Activities on Quality and Innovation. *International Journal of Operations and Production Management*, *28*(7), 615–635. https://doi.org/10.1108/01443570810881785

Priem, R. L. (2007). A Consumer Perspective on Value Creation. *Academy of Management Review*, *32*(1), 219–235. https://doi.org/10.5465/AMR.2007.23464055

Proba, D. (2021). *Technikkompositionen für das situative Methoden-Engineering agiler Methoden*. University of St. Gallen.

Prospero, M. (2021). *The Best Nest Compatible Products in 2021*. Tom's Guide. https://www.tomsguide.com/best-picks/best-nest-compatible-products

Quero, M. J., Ventura, R., & Kelleher, C. (2017). Value-in-Context in Crowdfunding Ecosystems: How Context Frames Value Co-Creation. *Service Business*, *11*(2), 405–425.

https://doi.org/10.1007/s11628-016-0314-5

Ramachandran, S., & Flint, J. (2018). *At Netflix, Radical Transparency and Blunt Firings Unsettle the Ranks*. The Wall Street Journal. wsj.com/articles/at-netflix-radical-transparency-and-blunt-firings-unsettle-the-ranks-1540497174

Ramirez, R., & Mannervik, U. (2016). *Strategy for a Networked World*. Imperial College Press. https://doi.org/https://doi.org/10.1142/p1092

Randhawa, K., West, J., Skellern, K., & Josserand, E. (2021). Evolving a Value Chain to an Open Innovation Ecosystem: Cognitive Engagement of Stakeholders in Customizing Medical Implants. In *California Management Review* (Vol. 63, Issue 2). https://doi.org/10.1177/0008125620974435

Rankin, J. (2015). *Third-Party Sellers and Amazon - A Double-Edged Sword in E-Commerce*. https://www.theguardian.com/technology/2015/jun/23/amazon-marketplace-third-party-seller-faustian-pact

red. (2005). *Eugster Frismag: Die Perle vom Bodensee*. Handelszeitung. https://www.handelszeitung.ch/unternehmen/eugster-frismag-die-perle-vom-bodensee

Reeves, M., Ueda, D., & Chittaro, C. (2017). *Getting Physical: The Rise of Hybrid Ecosystems*. 1–8. https://www.bcg.com/publications/2017/business-model-innovation-technology-digital-getting-physical-rise-hybrid-ecosystems

Ref, R., Heald, M., & Jankelovics, O. (2017). *Your Role in the Ecosystem*.

https://www.accenture.com/t20170908T101844Z__w__/us-en/_acnmedia/PDF-56/Accenture-Strategy-Your-Role-in-the-Ecosystem.pdf

Rivera, A. (2019). *Netflix's Mission Statement & Vision Statement: A Strategic Analysis*. Rancord Society. https://www.rancord.org/netflix-corporate-vision-statement-mission-statement-strategic-analysis

Rong, K., Hou, J., Shi, Y., & Lu, Q. (2010). From Value Chain, Supply Network, Towards Business Ecosystem (BE): Evaluating the BE Concept's Implications to Emerging Industrial Demand. *IEEM2010 - IEEE International Conference on Industrial Engineering and Engineering Management*, 2173–2177. https://doi.org/10.1109/IEEM.2010.5674561

Rong, K., Hu, G., Lin, Y., Shi, Y., & Guo, L. (2014). Understanding Business Ecosystem Using a 6C Framework in Internet-of-Things-Based Sectors. *International Journal of Production Economics*, *159*, 41–55. https://doi.org/DOI: http://dx.doi.org/10.1016/j.ijpe.2014.09.003

Rong, K., Lin, Y., Shi, Y., & Yu, J. (2013). Linking Business Ecosystem Lifecycle with Platform Strategy: a Triple View of Technology, Application and Organisation. *International Journal of Technology Management*, *62*(1), 75–94. http://10.0.5.224/IJTM.2013.053042

Rong, K., Secchi, D., & Shou, Y. (2018). Culture, Trust and Business Ecosystems: The Mediating Role of Online Chat in China. *International Journal of Mobile Communications*, *16*(3), 247–265. http://10.0.5.224/IJMC.2018.10003824

Rumelt, R. P., Schendel, D., & Teece, D. J. (1991). Strategic Management and Economics. *Strategic Management Journal*, *12*, 5–29. https://doi.org/https://doi.org/10.1002/smj.4250121003

Russell, M. G., Huhtamäki, J., Still, K., Rubens, N., & Basole, R. C. (2015). Relational Capital for Shared Vision in Innovation Ecosystems. *Triple Helix*, *2*(8), 1–36. https://doi.org/10.1186/s40604-015-0017-2

Sanz, J. L. C., Nayak, N., & Becker, V. (2006). Business Services as a New Operational Model for Enterprises and Ecosystems. *Proceedings of the 8th IEEE International Conference on E-Commerce Technology and the 3rd IEEE International Conference on Enterprise Computing, E-Commerce, and E-Services*, 1–4. https://doi.org/10.1109/CEC-EEE.2006.101

Sarker, S., & Sarker, S. (2015). A Conceptual Framework for Understanding Crowdfunding. *Communications of the Association for Information Systems*, *37*(1), 33–62. https://doi.org/10.1007/978-3-319-30610-0_3

Schaible, S., Ditsche, J., & Kleipaß, U. (2021). *Für ein Wirtschaftswunder 2.0*.

Schwarz, A., Mehta, M., Johnson, N., & Chin, W. W. (2007). Understanding Frameworks and Reviews: A Commentary to Assist us in Moving Our Field Forward by Analyzing Our Past. *Data Base for Advances in Information Systems*, *38*(3), 29–50. https://doi.org/10.1145/1278253.1278259

Seawright, J., & Gerring, J. (2008). Case Selection Techniques in Case Study Research: A Menu of Qualitative and Quantitative Options. *Political Research Quarterly*, *61*(2), 294–308. https://doi.org/10.1177/1065912907313077

Secundo, G., Toma, A., Schiuma, G., & Passiante, G. (2019). Knowledge Transfer in Open Innovation: A Classification Framework for Healthcare Ecosystems. *Business Process Management Journal*, *25*(1), 144–163.

https://doi.org/10.1108/BPMJ-06-2017-0173

Sein, M. K., Henfridsson, O., Purao, S., Rossi, M., & Lindgren, R. (2011). Action Design Research. *MIS Quarterly: Management Information Systems*, *35*(1), 37–56. https://doi.org/10.2307/23043488

Senger, E., & Österle, H. (2004). *PROMET - Business Engineering Cases Studies*.

Senyo, P. K., Liu, K., & Effah, J. (2019). Digital Business Ecosystem: Literature Review and a Framework for Future Research. *International Journal of Information Management*, *47*(January), 52–64. https://doi.org/10.1016/j.ijinfomgt.2019.01.002

Seppanen, M., Hyrynsalmi, S., Manikas, K., & Suominen, A. (2017). Yet Another Ecosystem Literature Review: 10+1 Research Communities. *Proceedings of the 2017 IEEE European Technology and Engineering Management Summit, E-TEMS 2017*, *2017-Janua*(October), 1–8. https://doi.org/10.1109/E-TEMS.2017.8244229

Siebert, H. (2003). Ökonomische Analyse von Unternehmensnetzwerken. In J. Sydow (Ed.), *Management von Netzwerkorganisationen* (pp. 7–28). Gabler Verlag. https://doi.org/https://doi.org/10.5465/amj.2007.24160882

Sifted. (2021). *German Tech Startups and Scaleups to Watch in 2021*. https://sifted.eu/rankings/german-startups-top-rankings

Siggelkow, N. (2007). Persuasion wtih Case Studies. *Academy of Management Journal*, *50*(1), 20–24.

Singaraju, S. P., Nguyen, Q. A., Niininen, O., & Sullivan-Mort, G. (2016). Social Media and Value Co-Creation in Multi-Stakeholder

Systems: A Resource Integration Approach. *Industrial Marketing Management*, *54*, 44–55. https://doi.org/10.1016/j.indmarman.2015.12.009

Sirmon, D. G., Hitt, M. A., & Ireland, R. D. (2007). Managing Firm Resources in Dynamic Environments to Create Value: Looking Inside the Black Box. *Academy of Management Review*, *32*(1), 273–292. https://doi.org/10.5465/AMR.2007.23466005

Smith, A. (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations*. Forgotten Books.

Smith, J. B., & Colgate, M. (2007). Customer Value Creation: A Practical Framework. *Journal of Marketing Theory and Practice*, *15*(1), 7–23. https://doi.org/10.2753/MTP1069-6679150101

Smith, K. G., Collins, C. J., & Clark, K. D. (2005). Existing Knowledge, Knowledge Creation Capability, and the Rate of New Product Introduction in High-Technology Firms. *Academy of Management Journal*, *48*(2), 346–357. https://doi.org/10.5465/AMJ.2005.16928421

Snell, J., & Cohen, P. (2008, July 9). *Apple Opens iTunes App Store*. https://www.macworld.com/article/191390/app_store.html

Sonnenberg, C., & vom Brocke, J. (2012). Evaluations in the Science of the Artificial – Reconsidering the Build-Evaluate Pattern in Design Science Research. *Advances in Theory and Practice. Proceedings of the 7th DESRIST Conference Las Vegas, NV, USA*, *7286*, 381–397. https://doi.org/10.1007/978-3-642-29863-9

Sorkin, A. R., & Peters, J. W. (2006, October 9). Google to Acquire YouTube for $1.65 Billion. *The New York Times*. https://www.nytimes.com/2006/10/09/business/09cnd-deal.html

Spiro, J. (2009, October 23). *The Great Leaders Series: Jeff Bezos, Founder of Amazon.com*. https://www.inc.com/30years/articles/jeff-bezos.html

Stabell, C. B., & Fjeldstad, Ø. D. (1998). Configuring Value for Competitive Advantage: On Chains, Shops, and Networks. *Strategic Management Journal*, *19*(5), 413–437. https://doi.org/10.1002/(sici)1097-0266(199805)19:5<413::aid-smj946>3.3.co;2-3

Statista. (2021). *Number of Apps Available in Leading App Stores as of 4th Quarter 2020*. https://www.statista.com/statistics/779768/number-of-available-apps-in-the-apple-app-store-quarter/

Statt, N., & Bohn, D. (2019, May 7). Google Nest: Why Google Finally Embraced Nest as its Smart Home Brand. *The Verge*. https://www.theverge.com/2019/5/7/18530609/google-nest-smart-home-brand-merging-hub-max-rebrand-io-2019

Staub, N., Aier, S., & Winter, R. (2021). Taxonomy of Digital Platforms: A Business Model Perspective. *Proceedings of the 54th Hawaii International Conference on System Sciences | 2021 Conceptualizing*, *0*(2013), 6163–6172.

Stone, B. (2013). *The Everything Store: Jeff Bezos and the Age of Amazon*. Little, Brown and Company.

Subramaniam, M. (2020). Digital Ecosystems and Their Implications for Competitive Strategy. *Journal of Organization Design*, *9*(12), 1–10. https://doi.org/10.1186/s41469-020-00073-0

Subramaniam, M., Iyer, B., & Venkatraman, V. (2019). Competing in Digital Ecosystems. *Business Horizons*, *62*(1), 83–94. https://doi.org/10.1016/j.bushor.2018.08.013

Swanson, E. B. (1994). Information Systems Innovation Among Organizations. *Management Science*, *40*(9), 1069–1092. https://doi.org/10.1287/mnsc.40.9.1069

Sydow, J. (2003). Management von Netzwerkorganisationen - Zum Stand der Forschung. In J. Sydow (Ed.), *Management von Netzwerkorganisationen* (3. Auflage, pp. 293–354). Gabler Verlag.

Taleb, N. N. (2010). *The Black Swan: The Impact of the Highly Improbable*. Random House Publishing Group.

Tanguy Catlin, Lorenz, J.-T., Nandan, J., Sharma, S., & Waschto, A. (2018). Insurance Beyond Digital: The Rise Of Ecosystems and Platforms. In *mcKinsey & Company Insurance Practice* (Issue January).

Tansley, A. G. (1935). The Use and Abuse of Vegetational Concepts and Terms Ecology. *Ecology*, *16*(3), 284–307. papers2://publication/uuid/57272B22-E9CD-471B-AAE9-4F8136926085

Tapscott, D., & Ticoll, D. (2000). *Digital Capital - Harnessing the Power of Business Webs*. Harvard Business School Press.

Teece, D. J. (2007). Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance. *Strategic Management Journal*, *28*(13), 1319–1350. http://10.0.3.234/smj.640

Teece, D. J. (2018). Profiting from Innovation in the Digital Economy: Enabling Technologies, Standards, and Licensing Models in the Wireless World. *Research Policy*, *47*, 1367–1387. https://doi.org/10.1016/j.respol.2017.01.015

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. *Knowledge and Strategy*, *18*(March), 77–116. https://doi.org/10.1142/9789812796929_0004

Tencent. (2020). *Fourth Quarter Results 2019*. https://static.www.tencent.com/uploads/2020/03/18/7fceaf3d1b264debc61342fc1a27dd18.pdf

Tencent. (2021). *Corporate Overview*. https://www.tencent.com/en-us/about.html#about-con-1

Thomas, L. D. W., & Autio, E. (2020). Innovation Ecosystems in Management: An Organizing Typology. In *Oxford Research Encyclopedia of Business and Management* (Issue May). Oxford University Press. https://doi.org/10.1093/acrefore/9780190224851.013.203

Thompson, J. (1967). *Organizations in Action. Social Science Bases of Administrative Theory*. McGraw-Hill.

Tomer, J. (1987). *Organizational Capital: The Path to Higher Productivity and Well-Being*. Praeger.

Townsend, M. (2013). Finding Value: Using Ecosystem Mapping and Value Network Analysis to Navigate Complexity in Corporations and Communities. *OD Practitioner*, *45*(2), 6–14.

Tsukayama, H. (2011, August 15). Google Agrees to Acquire Motorola Mobility. *The Washington Post*. https://www.washingtonpost.com/blogs/faster-forward/post/google-agrees-to-acquire-motorola-mobility/2011/08/15/gIQABmTkGJ_blog.html

Tudor-Ackroyd, A., & Bray, C. (2020, October 27). What is Jack Ma's Ant Group and How Does it Make Money? *South China Morning*

Post. https://www.scmp.com/business/banking-finance/article/3107294/what-jack-mas-ant-group-and-how-does-it-make-money

Tutuba, N. B. (2019). Business Ecosystems as the Approach to Create Value and Appropriate Value for Small Firms in Emerging Markets. *Journal of Strategic Innovation and Sustainability*, *14*(5), 90–107. https://doi.org/10.33423/jsis.v14i5.2525

Uebernickel, F., Stölzle, W., Lennerts, S., Lampe, K., & Hoffmann, C. P. (2016). Das St. Galler Business-Innovation-Modell. In F. Uebernickel, W. Stölzle, S. Lennerts, K. Lampe, & C. P. Hoffmann (Eds.), *Business Innovation: Das St. Galler Modell* (pp. 3–16). Springer Gabler.

Urmetzer, F., Neely, A., & Martinez, V. (2017). Business Ecosystems: Towards a Classification Model. *5th World Congress on Production and Operations Management (P&OM 2016)*, *September*, 1–8.

Uschold, M., & Gruninger, M. (1996). Ontologies: Principles, Methods and Applications. *Knowledge Engineering Review*, *11*(2). https://doi.org/https://doi.org/10.1017/S0269888900007797

Valdez-De-Leon, O. (2019). How to Develop a Digital Ecosystem – A Practical Framework. *Technology Innovation Management Review*, *9*(8), 43–54. https://doi.org/10.22215/timreview/1260

Valkokari, K. (2015). Business, Innovation, and Knowledge Ecosystems: How They Differ and How to Survive and Thrive within Them. *Technology Innovation Management Review*, *5*(8), 17–24. https://doi.org/10.22215/timreview/919

Valkokari, K., Seppänen, M., Mäntylä, M., & Jylhä-Ollila, S. (2017). Orchestrating Innovation Ecosystems: A Qualitative Analysis of

Ecosystem Positioning Strategies. *Technology Innovation Management Review*, *7*(3), 12–24. https://doi.org/10.22215/timreview/1061

Valuu. (2021a). *Über Valuu*. https://valuu.ch/de/ueber-valuu

Valuu. (2021b). *Valuu Hypothek*. https://valuu.ch/de/hypothek

Valuu. (2021c). *Valuu Ratgeber*. https://valuu.ch/de/ratgeber

Valuu, & Business Engineering Institute Sankt Gallen. (2019). *Deutliche Unterschiede trotz Transparenz*. https://valuu.ch/de/ueber-valuu/news/deutliche-unterschiede-trotz-transparenz

Valuu, & Business Engineering Institute Stankt Gallen. (2019). *Bewegung am Schweizer Hypothekarmarkt*. https://valuu.ch/de/ueber-valuu/news/bewegung-am-schweizer-hypothekarmarkt

Van der Borgh, M., Cloodt, M., & Romme, A. G. L. (2012). Value Creation by Knowledge-Based Ecosystems: Evidence From a Field Study. *R&D Management*, *42*(2), 150–169. http://10.0.4.87/j.1467-9310.2011.00673.x

Vargo, S. L., & Lusch, R. F. (2004). Evolving to a New Dominant Logic for Marketing. *Journal of Marketing*, *68*(1), 1–17. https://doi.org/10.1509/jmkg.68.1.1.24036

Vargo, S. L., & Lusch, R. F. (2008). Service-Dominant Logic: Continuing the Evolution. *Journal of the Academy of Marketing Science*, *36*, 1–10. https://doi.org/https://doi.org/10.1007/s11747-007-0069-6

Vargo, S. L., & Lusch, R. F. (2011). It's all B2B... and Beyond: Toward a Systems Perspective of the Market. *Industrial Marketing Management*, *40*(2), 181–187. https://doi.org/10.1016/j.indmarman.2010.06.026

Vargo, S. L., Maglio, P. P., & Akaka, M. A. (2008). On Value and Value Co-Creation: A Service Systems and Service Logic Perspective. *European Management Journal*, *26*(3), 145–152. https://doi.org/10.1016/j.emj.2008.04.003

Vaz, L. F. H., Nogueira, A. R. R., Rodrigues, M. A. de S., & Chimenti, P. C. P. de S. (2013). A New Conceptual Model for Business Ecosystem Visualization and Analysis. *Revista de Administração Contemporânea*, *17*(1), 1–17. https://doi.org/10.1590/s1415-65552013000100002

vom Brocke, J., Simons, A., Niehaves, B., & Reimer, K. (2009). Reconstructing the Giant: On the Importance of Rigour in Documenting the Literature Search Process. *ECIS 2009 Proceedings. Paper 161.*, 301–318. https://doi.org/10.1108/09600031211269721

Voorberg, W. H., Bekkers, V. J. J. M., & Tummers, L. G. (2014). A Systematic Review of Co-Creation and Co-Production: Embarking on the Social Innovation Journey. *Public Management Review*, *17*(9), 1333–1357. https://doi.org/10.1080/14719037.2014.930505

Wade, M., & Teracino, E. (2020, November 2). Everything You Need to Know About Jack Ma's Ant Group and the Biggest IPO of all Time. *Scroll.In*. https://scroll.in/article/977257/everything-you-need-to-know-about-jack-mas-ant-group-and-the-biggest-ipo-of-all-time$

Wallin, J. (2006). *Business Orchestration: Strategic Leadership in the Era of Digital Convergence*. John Wiley & Sons Ldt.

Walls, J. G., Widmeyer, G. R., & El Sawy, O. A. (1992). Building an Information System Design Theory for Vigilant EIS. *Information Systems Research*, *3*(1), 36–59. https://doi.org/10.1287/isre.3.1.36

Wang, J., & De Wilde, P. (2008). A Model for Digital Business Ecosystem and Topological Analysis. *Proceedings - 2008 IEEE International Conference on Services Computing, SCC 2008*, *2*, 603–604. https://doi.org/10.1109/SCC.2008.63

Wang, P. (2021). Connecting the Parts with the Whole: Toward an Information Ecology Theory of Digital Innovation Ecosystems. *MIS Quarterly: Management Information Systems*, *45*(1), 397–422. https://doi.org/10.25300/MISQ/2021/15864

Wassermann, S., & Faust, K. (1994). *Social Network Analysis: Methods and Applications*. Cambridge University Press.

Wayner, P. (2002). *New Economy; DVD's Have Found an Unexpected Route to a Wide Public: Snail Mail*. The New York Times. https://www.nytimes.com/2002/09/23/business/new-economy-dvd-s-have-found-an-unexpected-route-to-a-wide-public-snail-mail.html?scp=2&sq=netflix&st=nyt

Weber, P., Morar, D., & Lasi, H. (2018). Transforming Value Chains into Internet-Based Ecosystems: A Testbed Approach. *PICMET 2018 - Portland International Conference on Management of Engineering and Technology: Managing Technological Entrepreneurship: The Engine for Economic Growth, Proceedings*, 1–10. https://doi.org/10.23919/PICMET.2018.8481829

Webster, J., & Watson, R. T. (2002). Analyzing the Past to Prepare for the Future: Writing a Literature Review. *MIS Quarterly*, *26*(2), xiii–xxiii. https://doi.org/10.2307/4132319

Wei, H. (2021). *WeChat Now an Integral Part of Daily Life in China, Says Survey*. China Daily. http://global.chinadaily.com.cn/a/202101/20/WS600782c2a31024ad0baa3bf2.html

Wernerfelt, B. (1984). A Resource-Based View of the Firm. *Strategic Management Journal*, *5*(2), 171–180. http://onlinelibrary.wiley.com/doi/10.1002/smj.4250050207/abstract

Wieringa, R., Engelsman, W., Gordijn, J., & Ionita, D. (2019). A Business Ecosystem Architecture Modeling Framework. *Proceedings - 21st IEEE Conference on Business Informatics, CBI 2019*, *1*, 147–156. https://doi.org/10.1109/CBI.2019.00024

Wikiström, S. (1996). Value Creation by Company-Consumer Interaction. *Journal of Marketing Management*, *12*(1), 359–374. https://doi.org/10.5465/ambpp.1996.4978175

Williamson, O. E. (1979). Transaction-Cost Economics: The Governance of Contractual Relations. *Journal of Law and Economics*, *22*(3), 233–261.

Williamson, O. E. (1981). The Economics of Organization: The Transaction Cost Approach. *The American Journal of Sociology*, *87*(3), 548–577. https://doi.org/10.1515/9781400873746-007

Williamson, O. E. (2002). The Theory of the Firm as Governance Structure: From Choice to Contract. *Journal of Economic Perspectives*, *16*(3), 171–195. https://doi.org/10.1257/089533002760278776

Williamson, P., & de Meyer, A. (2012). Ecosystem Advantage: How to Sucessfully Harness the Power of Partners. *California Management Review*, *55*(1), 24–47. https://doi.org/10.1525/cmr.2012.55.1.24

Winter, R. (2008). Design Science Research in Europe. *European Journal of Information Systems*, *17*(5), 470–475. https://doi.org/10.1057/ejis.2008.44

Woiceshyn, J., & Falkenberg, L. (2008). Value Creation in Knowledge-Based Firms: Aligning Problems and Resources. *Academy of Management Perspectives*, *22*(2), 85–99. https://doi.org/10.5465/AMP.2008.32739761

Wood, R., & Lenzen, M. (2009). Aggregate Measures of Complex Economic Structure and Evolution a Review and Case Study. *Journal of Industrial Ecology*, *13*(2), 264–283. https://doi.org/10.1111/j.1530-9290.2009.00113.x

Woodall, T. (2003). Conceptualising “Value for the Customer”: An Attributional, Structural and Dispositional Analysis. *Academy of Marketing Science Review*, *2003*(12). https://doi.org/http://www.amsreview.org/articles/woodall12-2003.pdf

Woodruff, R. B. (1997). Customer Value: The Next Source for Competitive Advantage. *Journal of the Academy of Marketing Science*, *25*(2), 139–153. https://doi.org/10.1177/0092070397253006

Woolsey, B. (2018, December 4). Delivery Hero Court Case a Litmus Test for Startup Governance. *Handelsblatt Today*. https://www.handelsblatt.com/english/companies/david-vs-goliath-delivery-hero-court-case-a-litmus-test-for-startup-governance/23581820.html?ticket=ST-12353227-BPfVUFklq5hpsUEdmjhM-ap2

Xue, X., Chen, Z., Wang, S., Feng, Z., Duan, Y., & Zhou, Z. (2020). Value Entropy: A Systematic Evaluation Model of Service Ecosystem Evolution. *IEEE Transactions on Services Computing*. https://doi.org/10.1109/TSC.2020.3016660

Yin, R. K. (2009). *Case Study Research: Design and Methods* (Second Edi). SAGE Publications. https://doi.org/10.1016/0002-

9149(74)90005-8

Yoffie, D. B., Gawer, A., & Cusumano, M. A. (2019). A Study of More Than 250 Platforms Reveals Why Most Fail. *Harvard Business Review*, 2–6.

Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research. *Information Systems Research*, *21*(4), 724–735. https://doi.org/10.1287/isre.1100.0322

Young, S. (2013). Transaction Cost Economics. In S. O. Idowu, N. Capaldi, L. Zu, & A. D. Gupta (Eds.), *Encyclopedia of Corporate Social Responsibility* (pp. 2547–2552). Springer. https://doi.org/10.1007/978-3-642-28036-8_221

Zenger, T. R., & Hesterly, W. S. (1997). The Disaggregation of Corporations: Selective Intervention, High-powered Incentives, and Molecular Units. *Organization Science*, *8*(3), 209–222. https://doi.org/10.1287/orsc.8.3.209

Zott, C., & Amit, R. (2010). Business Model Design: An Activity System Perspective. *Long Range Planning*, *43*, 216–226. https://doi.org/10.1016/j.lrp.2009.07.004

Appendix

Appendix A: Documentation of research methodology

Appendix A.1. This section provides a detailed documentation of the discussed topics as well as the attending company representatives during the CCE workshops (CCEW). The underlying methodological approach is described in 3.2.3. In total, 8 CCEW took place between February 2019 and May 2021. The workshops were conducted for three consecutive days, where other topics (e.g. digital transformation, DLT and blockchain, or artificial intelligence) were discussed. During these workshops, the researcher gave an initial input presentation, during which questions and ideas were discussed with the group. After the presentation, the group was split into three separate focus groups, where in-depth discussions where facilitated. The discussions have been recorded and the summarized, so that the ideas could be used during the design iterations. During CCE3, CCE5, and CCE8, the evaluation surveys have been distributed using the online-tool SurveyMonkey.

Location and date	Content and participants
	CCEW1 (RQ2a)
Filzbach (CH), Feb. 14, 2019	**Input presentation:** Definition of ecosystems and identification of components to describe ecosystems (e.g. central value proposition, different actors, complementarity, orchestration). Description of relationships between single service components. **Focus group interview:** Discussion of the descriptive elements for ecosystems and value creation in ecosystems. Discussion of initial design requirements. Identification of challenges when discussing ecosystems (e.g. actor-perspective versus network perspective). **Participants (organization): Total count 37** Amiet, Tobias (Bank Julius Baer); Auge-Dickhut, Stefanie (CC Ecosystems); Beck, Julius (Bank-Verlag); Biellmann, Sven (Finnova); Celebic, Senad (Bank Julius Baer); Chang, Jennifer (SIX); Dietzmann, Christian (CC Ecosystems); Dorfmann, Alexander (SIX); Eikevaag, Lisa-Sophie (SIX); Gut , Balz (Swisscom); Hattenkofer,

	Christian (Bank-Verlag); Heines, Roger (CC Ecosystems); Higgins, Paul (Commerzbank); Hutter, Ralph (Finnova); Imboden, Georg (SIX); Kiesl, Wolfgang (DXC Technology); Klopsch, Tim (LBBW); Kohli, Michael (Vermögenszentrum); Körber, Achim (PostFinance); Libiseller, Tanja (Voralberger Landes- und Hypothekenbank); Liebermeister, Barbara; Markutt, Sandra (Bank Julius Baer); Meier, Lukas (Vontobel); Meinen, Christoph (BEKB); Mewes, Christian (Raiffeisen); Moser, Stefan (BEKB); Proba, Daniel (CC Ecosystems); Rühl, Roland (Fiducia); Ruwe, Jörg (Voralberger Landes- und Hypothekenbank); Schwaab, Philipp (Commerzbank); Spahr, Thomas (Swisscom); Turner, Edward (SIX Innovation & Digital); Vogt, Patrick (Hypothekarbank Lenzburg); Von Aesch, Adrian (DXC Technology); Weber, Stephan (Hypothekarbank Lenzburg); Zerndt, Thomas (CC Ecosystems); Zihlmann, Olivier (Vermögenszentrum).
CCEW2 (RQ2a)	
Bad Horn (CH), May 20, 2019	**Input presentation:** Summary of intermediary results and presentation of common misconceptions. Presentation of refined approach for ecosystem service model[38] and identification of important value creation components in ecosystems and existing value creation components, e.g. the value chain. Presentation of intermediary design requirements. **Focus group interview:** Discussion of design requirements and conceptualization of value creation components in ecosystems. Discussion of ecosystem service model with complementary building blocks. **Participants (organization): Total count 35** Amiet, Tobias (Bank Julius Baer); Auge-Dickhut, Stefanie (CC Ecosystems); Biellmann, Sven (Finnova); Celebic, Senad (Bank Julius Baer); Chang, Jennifer (SIX); Dietzmann, Christian (CC Ecosystems); Dorfmann, Alexander (SIX); Fischer , Timo (LBBW); Gut, Balz (Swisscom); Gutweniger, Toni (Raiffeisen); Gygax, Werner (CC Ecosystems); Handte, Jens (Fiducia); Heines, Roger (CC Ecosystems); Held, Michael (Postfinance); Hutter, Ralph (Finnova); Imboden, Georg (SIX); Isceri, Enrico (DZ BANK); Kauer, David (Postfinance); Kiesl, Wolfgang (DXC Technology); Klopsch, Tim (LBBW); Kohli, Michael (Vermögenszentrum); Körber, Achim (Postfinance); Libiseller, Tanja (Voralberger Landes- und Hypothekenbank); Markutt, Sandra (Bank Julius Baer); Meinen, Christoph (BEKB);

[38] Ecosystem service model published by Betz & Jung (2021a)

	Mewes, Christian (Raiffeisen); Moser, Stefan (BEKB); Proba, Daniel (CC Ecosystems); Ruwe, Jörg (Voralberger Landes- und Hypothekenbank); Spahr, Thomas (Swisscom); Vogt, Patrick (Hypothekarbank Lenzburg); Von Aesch, Adrian (DXC Technology); Werner, Elmar (Union Investment); Zerndt, Thomas (CC Ecosystems); Zihlmann, Olivier (Vermögenszentrum).
CCEW3 (RQ2a & RQ2b)	
Heidelberg (GER), September 26, 2019	**Input presentation:** Summary of intermediary results and presentation of conceptualization of value creation in ecosystems. Detailed analysis of existing value creation models (e.g. the value chain, value shop, value network). Identification of initial design requirements. Definition of the term strategy and implications of strategic decisions in the ecosystem context. **Focus group interview:** Final discussion of value creation components in ecosystems including design requirements. Discussion of value creation activities for ecosystems from a service provider perspective. **Participants (organization): Total count 39** Amiet, Tobias (Bank Julius Baer); Auge-Dickhut, Stefanie (CC Ecosystems); Bareiss, Daniel (Porsche); Besold, Stephan (Bank Julius Baer); Biellmann, Sven (Finnova); Bihler-Gädke, Monika (DZ BANK); Bont, Erik (Voralberger Landesund Hypothekenbank); Celebic, Senad (Bank Julius Baer); Chang, Jennifer (SIX); Dietzmann, Christian (CC Ecosystems); Fischer , Timo (LBBW); Gut, Balz (Swisscom); Gutweniger, Toni (Raiffeisen); Hasse, Christof (Hypothekarbank Lenzburg); Hattenkofer, Christian (BankVerlag); Heeb, Martin (Graubündner Kantonalbank); Heines, Roger (CC Ecosystems); Heizmann, Thomas (Raiffeisen); Held, Michael (PostFinance); Imboden, Georg (SIX); Isceri, Enrico (DZ BANK); Kauer, David (PostFinance); Kiesl, Wolfgang (DXC Technology); Klopsch, Tim (LBBW); Kohli, Michael (Vermögenszentrum); Körber, Achim (PostFinance); Libiseller, Tanja (Voralberger Landes- und Hypothekenbank); Lingenthal, Thomas (DXC Technology); Lorez, Tiziano (Graubündner Kantonalbank); Medenbach, Stefan (Voralberger Landes- und Hypothekenbank); Meinen, Christoph (BEKB); Moser, Stefan (BEKB); Proba, Daniel (CC Ecosystems); Rühl, Roland (Fiducia); Ruwe, Jörg (Voralberger Landes- und Hypothekenbank); Schache, Katharina (CC Ecosystems); Von Aesch, Adrian (DXC Technology); Zerndt, Thomas (CC Ecosystems).

<table>
<tr><th colspan="2">CCEW4 (RQ2b)</th></tr>
<tr><td>Wildhaus (CH), February 13, 2020</td><td>Input presentation: Definition of ecosystems and summary of ecosystem value creation components. Presentation of refined ecosystem service model (detailed description of model components and explanation) and introduction to orchestration in ecosystems.

Focus group interview: Discussion of ecosystem service model and its application as well as design requirements of value creation model including identification of value creation activities based on the value creation components from RQ2a.

Participants (organization): Total count 39
Auge-Dickhut, Stefanie (CC Ecosystems); Besold, Stephan (Bank Julius Baer); Biellmann, Sven (Finnova); Brogle, Marc (DXC Technology); Celebic, Senad (Bank Julius Baer); Chang, Jennifer (SIX); Fedier, Aline (Bank Julius Baer); Hayes, Jonathan (Bank Julius Baer); Dietzmann, Christian (CC Ecosystems); Fischer, Timo (LBBW); Heeb, Martin (Graubündner Kantonalbank); Heines, Roger (CC Ecosystems); Held, Michael (PostFinance); Hutter, Ralph (Finnova); Imboden, Georg (SIX); Isceri, Enrico (DZ BANK); Jeker, Stefan (Raiffeisenbank); Kauer, David (PostFinance); Klopsch, Tim (LBBW); Kohli, Michael (Vermögenszentrum); Koller, Alexandra (Vermögenszentrum); Lavanchy, Cyril (DXC Technology); Lazic, Milica (Bank Julius Baer); Mayer, Markus (Swisscom); Mayr, Dominik (Finnova); Medenbach, Stefan (Voralberger Landes- und Hypothekenbank); Meinen, Christoph (BEKB); Moser, Stefan (BEKB); Möller, Nicole (Voralberger Landes- und Hypothekenbank); Moser, Stefan (BEKB); Plazibat (Noumena Digital); Rühl, Roland (Fiducia); Ruwe, Jörg (Voralberger Landes- und Hypothekenbank); Schache, Katharina (CC Ecosystems); Spahr, Thomas (Swisscom); Strasser, Robert (DZ Bank); Töpfer, Jochen (CC Ecosystems); Vogt, Patrick (Hypothekarank Lenzburg); Zerndt, Thomas (CC Ecosystems); Zihlmann, Oliver (Vermögenszentrum)</td></tr>
<tr><th colspan="2">CCEW5 (RQ2b)</th></tr>
<tr><td>St. Gallen (CH), May 13, 2020

Romanshorn (CH), June 26, 2020</td><td>Note: This workshop was split into two separate events due to the Corona virus pandemic. The Input presentation was given on May 13, 2020 in a virtual meeting via Microsoft Teams. The Focus group interview was conducted in Romanshorn on June 26 with physical presence of all participants.</td></tr>
</table>

	Input presentation: Definition of ecosystem and connection with previous research activities (e.g. business model design in ecosystems) and continuous comparison of idiosyncratic and allocentric perspectives on value creation. Deep dive on value creation components and corresponding value creation activities and orchestration activities. **Focus group interview:** Discussion of ecosystem value creation characteristics and value creation components. Identification and discussion of orchestration and means-to-interaction activities in ecosystems. **Participants (organization): Total count 43** Amiet, Tobias (*only May 13)* (Bank Julius Baer); Auge-Dickhut, Stefanie (CC Ecosystems); Beising, Ulrich (*only May 13)* (Commerzbank); Besold, Stephan (*only May 13)* (Bank Julius Baer); Biellmann, Sven (Finnova); Bont, Erik (Voralberger Landes- und Hypothekenbank); Brogle, Marc (*only May 13)* (DXC Technology); Büchi, Ivan (*only May 13)* (Swisscom); Chang, Jennifer (SIX); D'Onofrio, Sara (*only May 13)* (CC Ecosystems); Dietzmann, Christian (CC Ecosystems); Esteban, Lea (*only May 13)* (Bank Julius Baer); Fischer, Timo (*only May 13)* (LBBW); Gut, Balz (Swisscom); Hasse, Christof (Hypothekarbank Lenzburg); Hattenkofer, Christian (*only May 13)* (Bank-Verlag); Heeb, Martin (Graubündner Kantonalbank); Heil, Torsten (*only May 13)* (Fiducia); Heines, Roger (CC Ecosystems); Hutter, Ralph (Finnova); Imboden, Georg (SIX); Isceri, Enrico (*only May 13)* (DZ BANK); Johansson Stefania (*only May 13)* (SIX); Kauer, David (PostFinance); Klopsch, Tim (*only May 13)* (LBBW); Ketan, Sheth (*only May 13)* (DXC Technology); Kohli, Michael (Vermögenszentrum); Koller, Alexandra (*only May 13)* (Vermögenszentrum); Lauener, Martina (*only May 13)* (SIX); Le, Daniel (Commerzbank); Markutt, Sandra (*only May 13)* (Bank Julius Baer); Medenbach, Stefan (Voralberger Landes- und Hypothekenbank); Meinen, Christoph (BEKB); Moser, Stefan (BEKB); Rühl, Roland (*only May 13)* (Fiducia); Ruwe, Jörg (*only May 13)* (Voralberger Landes- und Hypothekenbank); Schache, Katharina (CC Ecosystems); Spahr, Thomas (Swisscom); Strasser, Robert (*only June 26*) (DZ Bank); Vogt Patrick (*only May 13)* (Hypothekarbank Lenzburg); Von Aesch, Adrian (*only May 13)* (DXC Technology); Weber, Stephan (Hypothekarbank Lenzburg); Zerndt, Thomas (CC Ecosystems); Zihlmann, Oliver (Vermögenszentrum)

CCEW6 (RQ1)	
Säntis (CH), September 02, 2020	**Input presentation:** Short introduction to ecosystems. Detailed description of value creation characteristics and orchestration requirements because of their location on the organizational spectrum. Overview of available classificatory frameworks for ecosystems. Recapitulation: system-perspective of value creation in ecosystems. **Focus group interview:** Discussion of definitions general understanding of ecosystems and recapitulation of value creation characteristics. Discussion of available classificatory approaches and their applicability. Discussion of initial design requirements for a classification. **Participants (organization): Total count 39** Auge-Dickhut, Stefanie (CC Ecosystems); Biellmann, Sven (Finnova); Bühler, Markus (SIX); Celebic, Senad (Bank Julius Baer); Dietzmann, Christian (CC Ecosystems); Fischer, Timo (LBBW); Gut, Balz (Swisscom); Hasse, Christof (Hypothekarbank Lenzburg); Hayes, Jonathan (Bank Julius Baer); Heeb, Martin (Graubündner Kantonalbank); Heil, Torsten (Fiducia); Heines, Roger (CC Ecosystems); Held, Michael (PostFinance); Hofer, Andreas (Yapeal); Hutter, Ralph (Finnova); Imboden, Georg (SIX); Isceri, Enrico (DZ BANK); Siebert, Jens (Kapilendo); Kauer, David (PostFinance); Kersting, Friedrich (PostFinance); Klopsch, Tim (LBBW); Kohli, Michael (Vermögenszentrum); Levanchy, Cyril (DXC Technology); Le, Daniel (Commerzbank); Markutt, Sandra (Bank Julius Baer); Medenbach, Stefan (Voralberger Landes- und Hypothekenbank); Meyer, Christian (Yapeal); Meinen, Christoph (BEKB); Moser, Stefan (BEKB); Prillmann, Franziska (LBBW); Proba, Daniel (Scrambl.); Rühl, Roland (*only May 13)* (Fiducia); Ruwe, Jörg (Voralberger Landes- und Hypothekenbank); Schache, Katharina (CC Ecosystems); Schmuck, Matthias (Commerzbank); Strasser, Robert (DZ Bank); Vogt Patrick (Hypothekarbank Lenzburg); Walker, Nicole (BEKB); Zerndt, Thomas (CC Ecosystems); Zihlmann, Oliver (Vermögenszentrum)
CCEW7 (RQ1)	
St. Gallen (CH), February 10, 2021	Note: This workshop was conducted in a virtual format via Microsoft teams due to the Corona virus pandemic. **Input presentation:** Finalization of ecosystem value creation characteristics and application with examples. Analysis and

	comparison of existing classificatory frameworks for ecosystems. Discussion of cases and how these can be classified. Introduction of initial typology dimensions and theoretical grounding, for example by leveraging the typology of consumer value (Holbrook, 1999). **Focus group interview:** Open discussion regarding the initial dimensions of a typology of ecosystems. Recapitulation of existing design requirements and discussion of additional design requirements. Real cases (e.g. Uber, Airbnb, Apple networks) were used to discuss the design approach. **Participants (organization): Total count 25** Auge-Dickhut, Stefanie (CC Ecosystems); Biellmann, Sven (Finnova); Beising, Ulrich (Commerzbank); Berentzen, Christoph (Commerzbank); Büchi, Ivan (Swisscom); Dietzmann, Christian (CC Ecosystems); Gut, Balz (Swisscom); Hattenkofer, Christian (Bank-Verlag); Häusler, Michael (BEKB); Heines Roger (CC Ecosystems); Hörler, Tobias (VP Bank); Hutter, Ralph (Finnova); Imboden, Georg (SIX); Isceri, Enrico (DZ BANK); Käser, Thomas (PostFinance); Klopsch, Tim (LBBW); Mitrovska, Sanja (Commerzbank); Pombo, Jorge (Esprit); Rühl, Roland (*only May 13)* (Fiducia); Ruwe, Jörg (Voralberger Landes- und Hypothekenbank); Schache, Katharina (CC Ecosystems); Schmuck, Matthias (Commerzbank); Spahr, Thomas (Swisscom); von Aesch, Adrian (DXC Technology); Walker, Nicole (BEKB); Zerndt, Thomas (CC Ecosystems)
CCEW8 (RQ1)	
St. Gallen (virtual) (CH), May 20, 2021	Note: This workshop was conducted in a virtual format via Microsoft teams due to the Corona virus pandemic. **Input presentation:** Short introduction and definitions of ecosystems, presentation of value creation characteristics, and recapitulation of research artifact from RQ2. Presentation of design results for the typology including theoretical grounding and application of typology using real life cases. **Focus group interview:** Discussion of design requirements and design results, specifically for the two dimensions of the typology. Application of the four types with real life cases (e.g. Airbnb, Apple, Amazon). **Participants (organization): Total count 39**

	Auge-Dickhut, Stefanie (CC Ecosystems); Berentzen, Christoph (Commerzbank); Berner, Katharina (Commerzbank); Biellmann, Sven (Finnova); Bucherer, Stefan (VP Bank); Buschmann, Robin (Commerzbank); Däsler, Sascha (PPI); Dietzmann, Christian (CC Ecosystems); Dittmer, Jens (PPI); Gut, Balz (Swisscom); Hasse, Christof (Hypothekarbank Lenzburg); Hattenkofer, Christian (Bank-Verlag); Häusler, Michael (BEKB); Heeb, Martin (Graubündner Kantonalbank); Heil, Torsten (DZ Bank); Heines Roger (CC Eco-systems); Hörler, Tobias (VP Bank); Henrich, Patrick (Com-merzbank); Holliger, Marco (SIX); Hörler, Tobias (VP Bank); Hut-ter, Ralph (Finnova); Imboden, Georg (SIX); Isceri, Enrico (DZ BANK); Kauer, David (PostFinance); Kistl, Matthias (Com-merzbank); Kohler, Daniel (Voralberger Landes- und Hypotheken-bank); Leber, Tobias (MSG); Libiseller, Tanja (PPI); Medenbach, Stefan (Voralberger Landes- und Hypothekenbank); Meinen, Christoph (BEKB); Pombo, Jorge (Esprit); Ruwe, Jörg (Voralberger Landes- und Hypothekenbank); Schache, Katharina (CC Ecosys-tems); Spahr, Thomas (Swisscom); Übleis, Gabriel (VP Bank); Vetterling, Dennis (CC Ecosystems); Vogt, Patrick (Hypothekar-bank Lenzburg); von Aesch, Adrian (DXC Technology); Walker, Ni-cole (BEKB); Zerndt, Thomas (CC Ecosystems)

Appendix A.2 Additionally to the CCEW, ecosystem working group (EWG) meetings were conducted, see section 3.2.3. Six EWGs were conducted between February 2019 and May 2021 in which the research activities and the design decisions were discussed.

Expert interviews	**Content and participants**
	EWG 1 (RQ2a)
Via Microsoft Teams, 10.05.2019	**Content:** Discussion of value creation components and requirements for a model to conceptualize value creation. **Participants (organization): Total count 8** Biellmann, Sven (Finnova); Chang, Jennifer (SIX); Imboden, Georg (SIX); Kauer, David (PostFinance); Klopsch, Tim (LBBW); Kohli, Michael (Vermögenszentrum); Moser, Stefan (BEKB); Zihlmann, Oliver (Vermögenszentrum)

EWG 2 (RQ2a)	
Via Microsoft Teams, 23.08.2019 and 30.08.2019 (2nd option)	**Content:** Discussion of value creation components and feedback regarding initial design decisions. **Participants (organization): Total count 7** Biellmann, Sven (Finnova); Chang, Jennifer (SIX); Imboden, Georg (SIX); Isceri, Enrico (DZ BANK); Kauer, David (PostFinance); Klopsch, Tim (LBBW); Kohli, Michael (Vermögenszentrum)
EWG 3 (RQ2b)	
Via Microsoft Teams, 24.01.2020	**Content:** Discussion of value creation activities for offering assembly and orchestration. **Participants (organization): Total count 5** Biellmann, Sven (Finnova); Chang, Jennifer (SIX); Imboden, Georg (SIX); Isceri, Enrico (DZ BANK); Klopsch, Tim (LBBW)
EWG 4 (RQ2b)	
Via Microsoft Teams, 15.05.2020 and 08.05.2020 (2nd option)	**Content:** Discussion of value creation activities in the value sphere and brief evaluation against design requirements. **Participants (organization): Total count 7** Auge-Dickhut, Stefanie (CC Ecosystems); Biellmann, Sven (Finnova); Imboden, Georg (SIX); Isceri, Enrico (DZ BANK); Klopsch, Tim (LBBW); Le, Daniel (Commerzbank); Meinen, Christoph (BEKB)
EWG 5 (RQ1)	
Via Microsoft Teams, 22.01.2021 and 29.01.2021 (2nd option)	**Content:** Discussion of existing ecosystem classifications and requirements for a new solution, discussion of initial typology dimensions. **Participants (organization): Total count 8** Biellmann, Sven (Finnova); Beising, Ulrich (Commerzbank); Imboden, Georg (SIX); Isceri, Enrico (DZ BANK); Kauer, David (PostFinance); Klopsch, Tim (LBBW); Le, Daniel (Commerzbank); Meinen, Christoph (BEKB)

EWG 6 (RQ1)	
Via Microsoft Teams, 09.04.2021	**Content:** Discussion of the typology of the shared value purpose including its application with real life examples. **Participants (organization): Total count 6** Biellmann, Sven (Finnova); Imboden, Georg (SIX); Isceri, Enrico (DZ BANK); Klopsch, Tim (LBBW); Le, Daniel (Commerzbank); Meinen, Christoph (BEKB)

Appendix B: Full list of search strings from literature review

AB: abstract search
FT: Full text search
TI: title search

#	Database	Complete Search String
a	EBSCO	AB ecosystem AND AB shared purpose
	ABI/Inform	ab(ecosystem) AND ab("Shared purpose")
	AISeL	abstract: Ecosystem AND abstract:shared purpose
	IEEE explore	("All Metadata":ecosystem) AND ("Abstract":shared purpose)
b	EBSCO	AB ecosystem AND AB shared vision
	ABI/Inform	ti(Ecosystem) AND ft("Shared vision")
	AISeL	abstract:Ecosystem AND abstract:shared vision
	IEEE explore	("All Metadata":Ecosystem) AND ("Abstract":Shared vision)
c	EBSCO	AB shared purpose AND AB classification
	ABI/Inform	ab(Shared purpose) AND ab(classification) AND ft(business)
	AISeL	abstract:(Shared purpose) AND abstract:classification
	IEEE explore	("Abstract":shared purpose) AND ("Document Title":classification)

d	EBSCO	AB shared vision AND AB classification
	ABI/Inform	ab(Shared vision) AND ab(classification) AND ft(business)
	AISeL	abstract:(Shared vision) AND abstract:classification
	IEEE explore	("Abstract":shared vision) AND ("Document Title":classification)
e	EBSCO	AB ecosystem AND AB classification
	ABI/Inform	ti(ecosystem) AND ti(classification)
	AISeL	abstract:Ecosystem AND abstract:classification
	IEEE explore	("Document Title":ecosystem) AND ("Abstract":classification)
f	EBSCO	AB ecosystem AND AB typology
	ABI/Inform	ti(Ecosystem) AND ab(Typology)
	AISeL	abstract:Ecosystem AND typology
	IEEE explore	("Document Title":Ecosystem) AND ("Full Text Only":typology)
g	EBSCO	AB ecosystem AND AB taxonomy
	ABI/Inform	ti(Ecosystem) AND ab(taxonomy)
	AISeL	abstract:Ecosystem AND taxonomy
	IEEE explore	("Document Title":ecosystem) AND ("Abstract":taxonomy)
h	EBSCO	TI ecosystem AND AB value creation
	ABI/Inform	(ti(ecosystem) AND Ti(value creation))
	AISeL	abstract Ecosystem AND abstract value creation
	IEEE explore	("Document Title":ecosystem) AND ("Abstract":value creation)
i	EBSCO	TI ecosystem AND TI model
	ABI/Inform	(ti(ecosystem) AND Ti(model)) AND ft(business)
	AISeL	title ecosystem AND abstract model
	IEEE explore	("Document Title":ecosystem) AND ("Document Title":model)
j	EBSCO	TI ecosystem AND TI framework
	ABI/Inform	ti(ecosystem) AND Ti(Framework) AND FT(Business)
	AISeL	abstract ecosystem AND abstract framework
	IEEE explore	("Document Title":ecosystem) AND ("Abstract":Framework) AND ("Full Text Only":business)

k	EBSCO	TI ecosystem AND AB value chain
	ABI/Inform	ti(ecosystem) AND ab(value chain)
	AISeL	abstract ecosystem AND All Fields value chain
	IEEE explore	("Document Title":ecosystem) AND ("Abstract":value chain) AND ("Full Text Only":business)
l	EBSCO	TI ecosystem AND AB value network
	ABI/Inform	ti(ecosystem) AND ab(value network) AND AB(business)
	AISeL	abstract ecosystem AND abstract value network
	IEEE explore	("Document Title":ecosystem) AND ("Abstract":value network) AND ("Full Text Only":business)

About the Author

Name: Christian Joachim Betz
Date & Place of Birth: 01.06.1988, Offenbach (Germany)
E-Mail: christian.jo.betz@gmail.com

Work Experience

Scrambl. Chief commercial officer & co-owner	08/2021-05/2022 (Zürich, Switzerland)
Business Engineering Institute SG Research associate & doctoral candidate	07/2018-12/2021 (St. Gallen, Switzerland)
Accenture Strategy consultant, banking	07/2014-01/2022 (Kronberg, Germany)
Accenture Internship, banking & capital markets	06/2013-09/2013 (Kronberg, Germany)
Driving Growth International Internship	08/2011-09/2011 (Frankfurt, Germany)
Sempora Consulting Internship	06/2010-08/2010 (Frankfurt, Germany)

Education

University of St.Gallen PhD program in management (PMA)	09/2018-08/2022 (St.Gallen, Switzerland)
EBS Business School Master of science program	08/2012 - 01/2014 (Oestrich-W., Germany)
Tsinghua University Semester abroad	09/2013 - 06/2012 (Beijing, China)
EBS Business School Bachelor of science program	08/2009 - 01/2014 (Oestrich-W., Germany)
Peking University Semester abroad	02/2011 - 06/2011 (Beijing, China)
Spessart-Gymnasium Abitur	09/1999-06/2008 (Alzenau, Germany)