Organizational Ambidexterity – Exploring and Exploiting the Role of Business Process and Project Portfolio Management

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„It is not the strongest of the species that survive, nor the most intelligent, but the one that is most responsive to change.“

Charles Darwin

Gracias, merci vilmal, schukran, thanks, hvala vam, diolch, grazie, dankschee, obrigado, děkuju, rahmat, рахмат сага - I would like to thank my family and friends for your continuous support and for exploring all these countries together during this doctoral thesis.

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Abstract

Organizational ambidexterity (OA) is an organization's dual capability to simultaneously engage in exploration and exploitation to sustain corporate success in today's highly dynamic business environment. *Exploration* is an outward-looking activity associated with risk-taking, discovery, and experimentation striving for radical innovation of products, services and processes, whereas *exploitation* is an inward-looking activity associated with risk reduction, problem solving, and control striving for continuous improvement. Even though organizations have already recognized the importance of OA to survive in the face of change, many organizations are still struggling in becoming ambidextrous and the current literature fails to provide guidance on *what* exploration and exploitation activities are required and *how* they can be prioritized. To address this need, this cumulative doctoral thesis consists of five research articles investigating the development of an ambidextrous organization. One the one hand, the thesis examines how OA can be achieved on the *organizational level*, including the required structural, individual, and cultural change. On the other, ideas and principles of OA have been transferred to business process management (BPM) to investigate how OA can be achieved on the *process level*. To structure the development, project portfolio management (PPM) promises to be a sensible option as it helps to determine an appropriate mix of exploration and exploitation activities considering organizational contexts and available resources. Hence, this thesis is located at and contributes to existing knowledge at the intersection of OA, BPM, and PPM.

Addressing the need to identify *what* exploration and exploitation activities help implement OA, the thesis provides models and methods for the effective *identification of exploration and exploitation projects*. On the *organizational level*, the thesis presents a maturity model that comprises actionable practices structured according to capability areas and maturity stages that build the foundation of OA (research article #1). On the *process level*, the thesis highlights the importance of context-aware BPM and proposes a method to assess and select BPM methods in a context-aware manner (research article #2). Following the call for explorative BPM methods, one is presented that assists organizations in identifying and integrating opportunities into new business processes (research article #3). Additionally, the thesis offers a Business Process Design Space to foster the systematic identification of alternative business process designs for exploration and exploitation (research article #4). Addressing the need on *how* to prioritize investments in exploration and exploitation, an economic decision model is presented that assists organizations in *selecting and scheduling exploration and exploitation projects* in an economically reasonable manner (research article #5).

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I. Introduction[1]

Organizational ambidexterity (OA) is an organization's dual capability to simultaneously engage in exploration and exploitation to survive in the face of change and sustain corporate success in today's highly business environment (Junni et al. 2013; Luger et al. 2018; Raisch and Birkinshaw 2008). By adapting and responding to emergent threats and opportunities, such as rapidly changing customer demands, fast adaption of emergent digital technologies, and an increasing competitive pressure, organizations are forced to unceasingly renew and enhance their products, services, and processes (Gimpel et al. 2018; Legner et al. 2017). Hence, organizations explore opportunities to develop innovative products, services, and processes as well as engage in emerging markets to ensure long-term growth. At the same time, organizations exploit their existing products, services, and processes as well as engage in mature markets to ensure efficient operations (O'Reilly and Tushman 2013).

Accordingly, activities related to *exploration* are outward-looking and associated with risk-taking, discovery, and experimentation, while activities related to *exploitation* are inward-looking and associated with risk reduction, problem solving, and control (He and Wong 2004; March 1991). As both modes strive for contrary objectives, build on different capabilities, have conflicting managerial demand, and compete for scarce resources, organizations face the challenge to balance the *tension* between them (O'Reilly and Tushman 2008; O'Reilly and Tushman 2013). Not surprisingly, many organizations struggle in balancing this tension (O'Reilly and Tushman 2013; Turner et al. 2013), as some examples show: *Kodak* and *Blockbuster* focused too much on exploiting their current business and neglected the opportunities of digital technologies and changes in their customers' demands (Gershon 2013; Lucas and Goh 2009), whereas *Intel* and *Microsoft* heavily invested in exploring opportunities such as wearables or smartphones to engage in new markets, but failed in realizing the economic potential (Crompton and Grabham 2019; Sun 2018). By contrast, *BMW* and *Amazon* have been successfully facing the challenge by exploring opportunities to propose novel value propositions and exploiting products and services to enhance existing value propositions (Catlin et al. 2018; Coumau et al. 2015). These examples show that organizations who neglect exploration, may increase operational efficiency and achieve short-term goals, but may be excluded from opportunity spaces and run out of growth prospects in the future (Lavie et al. 2011; O'Reilly and

[1] This Section is partly comprised of content taken from the research articles included in this thesis. To improve the readability of the text, I omit the standard labeling of these citations.

Tushman 2008; Sarkees and Hulland 2009). In contrast, organizations who neglect exploitation may not realize the economic potential and learning curve effects of introducing innovations. In fact, organizations that successfully balance exploration and exploration, i.e., ambidextrous organizations, significantly perform better in the market than those who do not (Gibson and Birkinshaw 2004; He and Wong 2004; O'Reilly and Tushman 2004).

To develop an ambidextrous organization, OA has already been investigated in different disciplines. Disciplines such as organizational design, innovation and technology management, or strategic management investigated how OA can be achieved on the *organizational level* (Raisch and Birkinshaw 2008). Thereby, scholars mainly focused on three types of OA (or combinations of them) – temporal, structural, and contextual ambidexterity – comprising structures or mechanisms that describe how organizations can pursue exploration and exploitation (Lavie et al. 2011; O'Reilly and Tushman 2013; Ossenbrink et al. 2019). *Temporal ambidexterity* refers to the ability to implement exploration and exploitation sequentially and switch between both modes (Klarner and Raisch 2013; Siggelkow and Levinthal 2003; Tushman and Romanelli 1985), whereas *structural ambidexterity* aims to set up dual inter- or intra-organizational structures that specialize in either exploration or exploitation (Duncan 1976; Tushman and O'Reilly 1996). Addressing the tension on the individual level, *contextual ambidexterity* refers to the ability of all individuals in an organization to allocate their time between both modes and think and act ambidextrously (Andriopoulos and Lewis 2009; Gibson and Birkinshaw 2004). Apart from considering each OA type individually, *hybrid forms* require an integrated consideration (Kauppila 2010; O'Reilly and Tushman 2013; Ossenbrink et al. 2019).

Ideas and principles of OA have also been transferred to the field of business process management (BPM) to investigate how OA can be achieved on the *process level* (Benner and Tushman 2003; Grisold et al. 2019; Helbin and van Looy 2019; Moreno-Luzon et al. 2014; van den Bergh et al. 2014; Xie et al. 2011). With process orientation being a central paradigm of organizational design, the importance of a proper alignment between the organization's strategy and its business processes is undisputed (Oliveira et al. 2015; Rosemann and vom Brocke 2015). Accordingly, business processes are a key driver for developing an ambidextrous organization. Business processes affect the way organizations can implement OA and, vice versa, business processes are affected when organizations decide to implement OA within their structures and activities. Hence, organizations aim to deploy *ambidextrous BPM* by exploring and exploiting their business processes to survive in the face of change and drive corporate success (Langley and Tsukas 2017; Rosemann 2014; vom Brocke and Mendling 2018). Over the last decades,

BPM has been focusing on running and incrementally improving business processes striving for operational excellence (Rosemann 2020; Schmiedel and vom Brocke 2015). This is known as *exploitative BPM*, a reactive approach driven by an inside-out logic to ensure the efficiency and effectiveness of business processes (Grisold et al. 2019; Rosemann 2014). Upcoming research investigates the new role of BPM as a driver of innovation (Mendling et al. 2020; Schmiedel and vom Brocke 2015). This is known as *explorative BPM*, a proactive approach driven by an outside-in logic to innovate business processes striving for future revenue (Grisold et al. 2019; Rosemann 2014). Thus, ambidextrous BPM contributes to overcome the trade-off between exploration and exploitation on the organizational level through balancing the tension on the process level (Moreno-Luzon et al. 2014; Rosemann 2014).

Highlighting the importance of OA and investigating positive performance effects in terms of sales growth, profitability, and operational performance (Gibson and Birkinshaw 2004; He and Wong 2004; Lubatkin et al. 2006), it is undisputed in research and practice that OA is at the heart of corporate success and long-term survival (Junni et al. 2013; Luger et al. 2018; Raisch and Birkinshaw 2008). Even though organizations have already recognized the necessity of becoming ambidextrous, many organizations still struggle in balancing the tension between exploration and exploitation as both modes require different objectives, capabilities, managerial demand, and resources (O'Reilly and Tushman 2013; Turner et al. 2013). Aggravatingly, recent academic works have failed to provide guidance on *putting OA into practice* (Linhart et al. 2020; Werder and Heckmann 2019). More precisely, on the *organizational level*, there is a lack of knowledge about *what* exploration and exploitation activities help to implement OA (Asif 2017; Raisch and Birkinshaw 2008; Simsek 2009) and *how* these activities can be prioritized (O'Reilly and Tushman 2013; Pellegrinelli et al. 2015; Röder et al. 2014). On the *process level*, the importance of ambidextrous BPM to facilitate the development of an ambidextrous organization has also been recognized. However, the study of ambidexterity in the field of BPM is still in its infancy (Helbin and van Looy 2019; Rosemann 2014, 2020). As BPM has been traditionally focusing on exploitation, a majority of respective BPM methods has been proposed, while ones for exploration are missing so far (Denner et al. 2018; Gross et al. 2019; Rosemann 2014). Hence, little is known about *what* activities help organizations to proactively integrate opportunities into new business processes to secure success in dynamic business environments. To sum up, a structured approach that helps organizations identifying and prioritizing both exploration and exploitation activities on the *organizational* and the *process level* to develop an ambidextrous organization is missing.

Against this background, project portfolio management (PPM) promises to be a sensible option to structure the development of an ambidextrous organization through the implementation of projects and, thus, helps to determine an appropriate mix of exploration and exploitation activities considering organizational contexts and available resources (Pellegrinelli et al. 2015). In general, PPM comprises the identification, selection and scheduling, implementation, and monitoring of projects to ensure successful implementation of an organizations' strategy (Rad and Levin 2006; Wideman 2004). To achieve an organizations' strategy to become ambidextrous, this thesis defines exploration and exploitation activities or the implementation of explorative and exploitative BPM methods as exploration and exploitation projects. Besides, it focuses on project identification as well as selection and scheduling. *Project identification* aims to derive exploration and exploitation projects that help implementing OA on the organizational and process level, whereas *project selection and scheduling* encompasses activities related to the compilation of project portfolios and the selection of the value-maximizing portfolio.

In light of developing an ambidextrous organization, this cumulative doctoral thesis consists of five research articles located at the intersection of OA, BPM, and PPM. It investigates the development of an ambidextrous organization on the *organizational* and *process level* by presenting models and methods for the effective identification, selection, and scheduling of exploration and exploitation projects. Covering theoretical and practical perspectives on becoming ambidextrous, the thesis is relevant for researchers and practitioners alike.

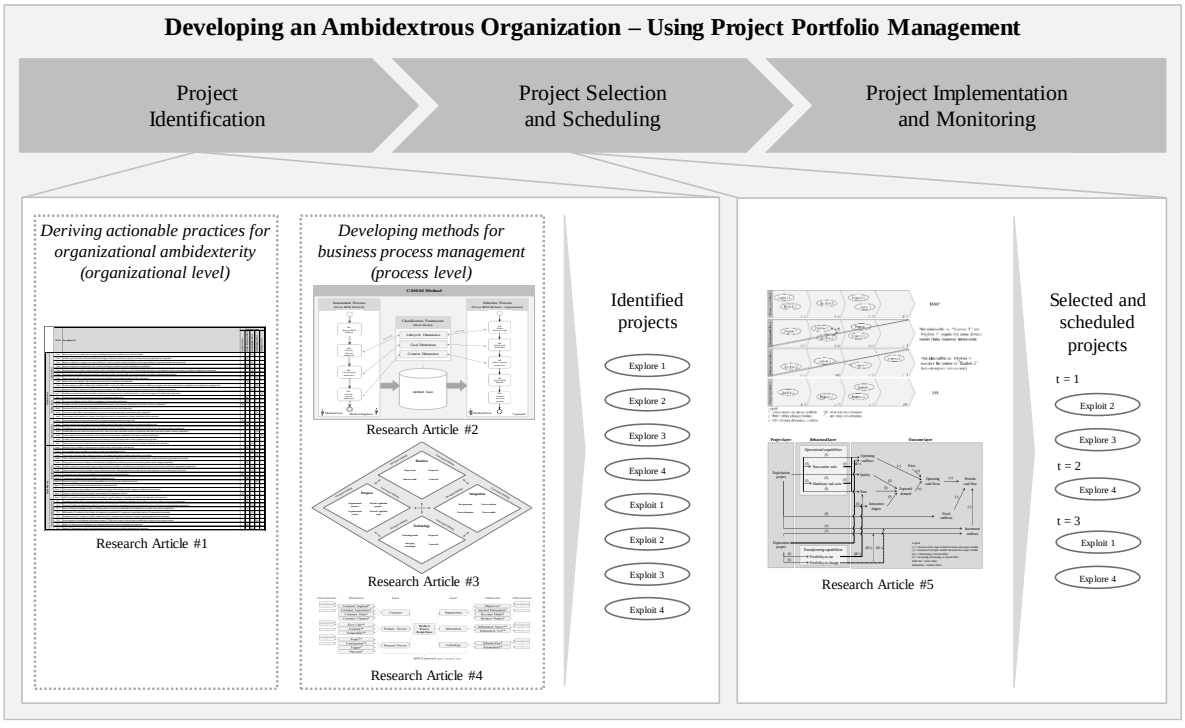

Figure 1. Assignment of the research articles to the topics structuring this doctoral thesis

Figure 1 shows how the individual research articles relate to *project identification* on the *organizational* and the *process level* as well as to *project selecting and scheduling* to develop an ambidextrous organization. The same structure can be found in Section II. Firstly, the thesis presents models and methods for the effective *identification of exploration and exploitation projects* to address the question of *what* exploration and exploitation activities help to implement OA. On the *organizational level*, the thesis presents an Organizational Ambidexterity Maturity Model, which derives actionable practice, i.e., clear actions related to the implementation of OA structured according to five capability areas (culture, strategy, structure, routines, and IT) and five maturity stages (novice, advanced beginner, competent, proficient, and expert) (Section II.1.1 – including research article #1). On the *process level*, methods are developed to assist organizations in realizing the potential of ambidextrous BPM. To effectively explore and exploit business processes, the thesis highlights the importance of context-aware BPM and presents the Context-Aware BPM Method Assessment and Selection Method. Applying the method and investigating the status quo of existing BPM methods revealed a lack of BPM methods for exploration. Against this background, the thesis presents the Five-Diamond-Method, an explorative BPM method that assists organizations in identifying and integrating opportunities into business processes. Additionally, a Business Process Design Space is proposed to foster the systematic identification of alternative business process designs for exploration and exploitation (Section II.1.2 – including research articles #2, #3, and #4).

Secondly, to address the question of *how* to prioritize investments in identified exploration and exploitation projects, the thesis presents an economic decision model that helps organizations *selecting and scheduling exploration and exploitation projects* for distinct planning periods. Therefore, the decision model assesses project portfolios, i.e., unique compilations of exploration and exploitation projects, in terms of their contribution to the organization's long-term firm value. It recommends implementing the value-maximizing portfolio, as it represents the economically most reasonable way for the organization to become ambidextrous (Section II.2 – including research articles #5).

Finally, Section III summarizes the key insights and provides avenues for future research. In addition to the publication bibliography in Section IV, an appendix is attached in Section V, including additional information on all research articles (V.1), my individual contribution (V.2), and the research articles themselves (V.3 – V.7).

II. Overview and Context of the Research Articles[2]

1 Identification of Exploration and Exploitation Projects

1.1 Deriving Actionable Practices for Organizational Ambidexterity

Academics and practitioners agree that, in order to maintain a competitive advantage and survive in today's dynamic business environment, organization are forced to become ambidextrous by balancing exploration and exploitation (Junni et al. 2013; Luger et al. 2018; Raisch and Birkinshaw 2008). Therefore, a mature body of literature has investigated how OA can be attained, focusing on three OA types (or combinations of them): temporal, structural, and contextual ambidexterity (Lavie et al. 2011; O'Reilly and Tushman 2013; Ossenbrink et al. 2019). However, related work is mainly conceptual and empirical, while little is known about how to build an ambidextrous organization in terms of *what* exploration and exploitation activities help implement OA (Asif 2017; Raisch and Birkinshaw 2008; Simsek 2009). To address this need, models and methods for the effective *identification of exploration and exploitation projects* on the *organizational level* (Section II.1.1 – research article #1) and *process level* (Section II.1.1 – research articles #2, #3, and #4) are presented to assist organizations in becoming ambidextrous.

Research article #1 presents an Organizational Ambidexterity Maturity Model (OAMM) to assist organizations in becoming ambidextrous based on *actionable practices* (APs), i.e., clear actions related to the implementation of OA. Accordingly, the target group of the OAMM is any organization (or division with an own business field "independently" operating on the market) that faces the challenge of becoming ambidextrous. As the implementation of OA has strategic implications, the OAMM is useful for senior executives, particularly those engaged in strategy, innovation management, organizational design, or business development.

Drawing from literature on OA types and maturity models (MMs) as an effective management tool for capability development (Blondiau et al. 2016; Santos-Neto and Costa 2019; Schumacher et al. 2016), the matrix structure of the OAMM covers two components: (1) 46 APs structured according to five capability areas on the vertical axis and (2) an assignment of APs to five maturity stages on the horizontal axis. The OAMM is presented in Figure 2, more details on its components and recommendations for its application are provided in the following.

[2] This Section is partly comprised of content taken from the research articles included in this thesis. To improve the readability of the text, I omit the standard labeling of these citations.

To take a holistic perspective on capability development, the OAMM comprises five capability areas – *culture*, *strategy*, *structure*, *routines*, and *information technology* (*IT)* – grounded in socio-technical and organizational culture theory. Accordingly, *culture* comprises the collective values, beliefs, and behaviors of individuals and teams, such as shared ambitions to pursuit an ambidextrous strategy and the role of managers in balancing exploration and exploitation. *Strategy* reflects an organization's vision and mission to become ambidextrous by setting clear goals as well as pursuing growth in the core business and expanding into new area. *Structure* covers organizational units and activities to perform exploration and exploitation sequentially or simultaneously in various business units or teams. Interfaces and information flows are also required to integrate exploration and exploitation. *Routines* encompass the management of processes, the way resources are allocated, and the communication of roles and responsibilities for both modes. *IT* covers technical solutions and IT-skills that support exploration and exploitation within the organization and with business partners.

Assessing the level of experience required to implement APs, the OAMM covers five maturity stages – *novice*, *advanced beginner*, *competent*, *proficient*, and *expert* (Dreyfus and Dreyfus 1980; Kohlegger et al. 2009). Accordingly, each maturity stage represents a specific level of experience that increases from *novice* to *expert* and goes along with how individuals within an organization act and decide (i.e., based on defined rules as a *novice* or intuitively as an *expert*). For example, *novice* organizations implement general requirements of OA, such as communicating roles and responsibilities or composing mixed teams where no specific experience related to OA is required. Gaining experience, *advanced beginner* organizations define an ambidextrous strategy and goals as well as establish basic skill development programs. *Competent* organizations establish internal and external relationships to exchange knowledge and best practices. *Proficient* organizations have wide experience and perform OA on a team level and ensure strategic alignment with external partners. Finally, *expert* organizations established a flexible organizational culture where individuals intuitively switch between both modes.

To evolve from *novice* to *expert*, the OAMM enables organizations assessing their as-is and to-be OA maturity. Therefore, the OAMM serves as a basis for deriving an organization-specific OAMM since the importance of APs and the experience required to implement them may differ among organizations in various contexts. Accordingly, the as-is OA maturity serves as a starting point for defining the to-be OA maturity that can be achieved through the implementation of additional APs. Defining the to-be OA maturity, various decisions referring to the OA type, organizational boundary conditions, and the desired to-be OA maturity need to be made.

Capability area		ID AP	Description AP	Maturity stages				
				(1) Novice (9%)	(2) Adv. beginner (30%)	(3) Competent (32%)	(4) Proficient (22%)	(5) Expert (7%)
Capability area	Culture (24%)	Cult-1	Make the pursuit of an ambidextrous strategy compelling through shared ambitions and a collective identity.			X		
		Cult-2	Facilitate open discussions in formal and informal meetings to share ideas and foster acceptance of tensions between exploitation and exploration.		X			
		Cult-3	Empower employees to engage in convergent thinking for structured problem solving (exploitation) and divergent thinking for opportunity identification (exploration).			X		
		Cult-4	Empower employees to identify and access external knowledge that stimulates ideas for exploitation and exploration.		X			
		Cult-5	Enable employees to engage in external networks (inside and outside of one's industry) to gain new knowledge and support cross-fertilization of ideas and resources to facilitate exploitation and exploration.			X		
		Cult-6	Hire employees with different levels of experience, high efficacy beliefs, innovative skills, and learning orientation to facilitate exploitation and exploration.			X		
		Cult-7	Employ managers able to switch between transactional (exploitation) and transformational leadership (exploration).				X	
		Cult-8	Employ risk-aware managers who recognize and assess risks for exploitation and exploration.		X			
		Cult-9	Develop manager's conflict resolution and coordination skills as well as their ability in proactive and anticipatory thinking to recognize and resolve tensions between exploitation and exploration on employee level.				X	
		Cult-10	Empower manager's in information sharing, joint decision-making, and collaboration to better manage the tensions between exploitation and exploration.			X		
		Cult-11	Establish an organizational culture that builds on performance management and control (exploitation) as well as social support and collaboration (exploration).					X
	Strategy (13%)	Stra-1	Develop and communicate an integrated strategy for organizational ambidexterity.		X			
		Stra-2	Set clear and ambitious goals for efficiency (exploitation) and innovation (exploration).		X			
		Stra-3	Establish an incentive system that makes individual benefits depend on team outcomes (exploitation) and efforts to innovate (exploration).	X				
		Stra-4	Pursue growth in the core business (exploitation) and expansion into new areas (exploration).				X	
		Stra-5	Strive for strategic alliances with existing and new partners to leverage outsourcing of exploitation and/or exploration.				X	
		Stra-6	Foster mergers and acquisitions to integrate knowledge from outside the organization to facilitate exploitation and/or exploration.					X
	Structure (15%)	Stru-1	Perform exploitation and exploration alternately by temporal sequencing within one business unit.	X				
		Stru-2	Develop switching rules and change processes to facilitate temporal sequencing of exploitation and exploration within one unit.		X			
		Stru-3	Establish large and centralized business units with mechanistic structures (exploitation) as well as small and decentralized units with organic structures (exploration).				X	
		Stru-4	Establish different teams within one business unit where some teams adopt mechanistic structures (exploitation) while other teams adopt organic structures (exploration).				X	
		Stru-5	Enable employees from the same business unit to switch between mechanistic (exploitation) and organic structures (exploration).					X
		Stru-6	Establish collaboration through horizontal and vertical interfaces across all business units to foster exploitation and exploration.				X	
		Stru-7	Define horizontal and vertical information flows to ensure connectedness among all hierarchical levels to integrate exploitation and exploration.			X		

Figure 2. Organizational Ambidexterity Maturity Model (OAMM)

Capability area		ID AP	Description AP	Maturity stages				
				(1) Novice	(2) Adv. beginner	(3) Competent	(4) Proficient	(5) Expert
Capability area	Routines (31%)	Rout-1	Diversify project portfolios by selecting projects with low risk as well as projects with high risk.		X			
		Rout-2	Set up a flexible project portfolio to respond to strategic and environmental change.			X		
		Rout-3	Foster project work that follows both clear processes and defined goals and that facilitates improvisation and creativity.				X	
		Rout-4	Collect and leverage internal data to identify improvement potentials (exploitation) and external data to identify market changes and business opportunities (exploration).			X		
		Rout-5	Deploy processes to increase efficiency and effectiveness (exploitation) as well as processes to sense and respond to market changes (exploration).		X			
		Rout-6	Facilitate continuous change through employee suggestion systems for efficiency and effectiveness (exploitation) and space for new ideas and business opportunities (exploration).			X		
		Rout-7	Impose top-down direction for definitive resource allocation decisions, while imposing bottom-up directions that allow employees to access the resources they need.			X		
		Rout-8	Communicate clear roles and responsibilities for transactional and transformational tasks.	X				
		Rout-9	Communicate requirements and responsibilities of ambidextrous roles.		X			
		Rout-10	Empower employees to switch roles and responsibilities for transactional and transformational tasks.				X	
		Rout-11	Ensure structured handovers from transformational to transactional tasks.		X			
		Rout-12	Share best practices among employees for organizational learning and knowledge transfer to integrate exploitation and exploration.			X		
		Rout-13	Compose mixed teams that share strategic understanding of and experiences with OA.	X				
		Rout-14	Offer job enrichment programs for education and training to upgrade employees' knowledge and skills in both exploitation and exploration.		X			
	Information technology (17%)	IT-1	Strengthen existing IT skills to support existing products and processes (exploitation) and develop new IT skills to create new product and processes (exploration).		X			
		IT-2	Develop IT skills for the utilization of existing IT resources and technologies (exploitation) and the experimentation with new IT resources and technologies (exploration).			X		
		IT-3	Invest in emergent technologies to improve existing products and processes (exploitation) and to develop new products and processes (exploration).		X			
		IT-4	Build modular IT architectures that facilitate the integration of standardized IT components (exploitation) and new IT components (exploration).			X		
		IT-5	Establish inter-firm IT strategies to facilitate collaboration and to coordinate inter-firm business activities regarding exploitation and exploration.			X		
		IT-6	Ensure integration of and alignment with business partners' IT skills and resources when pursuing an ambidextrous strategy among strategic partners.				X	
		IT-7	Build an IT infrastructure that facilitates cross-functional virtual teams to foster exploitation and exploration.		X			
		IT-8	Build an IT infrastructure to collect and leverage internal and external data to facilitate exploitation and exploration.			X		

Figure 2. Organizational Ambidexterity Maturity Model (OAMM) (continued)

Structuring and evaluating the design process of the OAMM, the study followed an established procedure model for maturity model development proposed by Becker et al.'s (2009). In developing the OAMM, the APs were compiled by a structured literature review (vom Brocke et al. 2015; Webster and Watson 2002), refined with industry experts (Myers and Newman 2007), and assigned to maturity stages using card sorting with co-authors and industry experts (Wood and Wood 2008). In evaluating the OAMM, we conducted expert interviews (Myers and Newman 2007) to discuss its comprehensiveness, consistency, and problem adequacy (Becker et al. 2009) and an initial empirical validation (Venable et al. 2012) to evaluate the assignment of APs to maturity stages. Finally, a feature comparison (Venable et al. 2012) helped to assess the extent to which the OAMM addresses the research problem. In sum, the OAMM is an effective management tool, developed *with* and *for* practitioners, responding to the demand for knowledge about *what* exploration and exploitation activities help to implement OA. It extends the descriptive and prescriptive knowledge on OA by taking a holistic view on OA, by shedding light on the interrelation of different OA types, and by enabling the assessment of an organization's as-is and to-be OA maturity based on implemented APs.

1.2 Developing Methods for Ambidextrous Business Process Management

As outlined above, BPM is a holistic and principle-oriented management discipline comprising skills and routines to improve and innovate business processes and, thus, plays a crucial role to survive in the face of change and drive corporate success (Langley and Tsukas 2017; Schmiedel and vom Brocke 2015; vom Brocke and Mendling 2018). Accordingly, BPM has long been recognized as a source of operational excellence and more recently as a key driver for innovation (Dumas et al. 2018; Schmiedel and vom Brocke 2015). Thus, organizations aim for deploying *ambidextrous BPM* by exploring and exploiting their business processes (Helbin and van Looy 2019; Rosemann 2014, 2020). To ensure the efficiency and effectiveness of business processes, *exploitative BPM* focuses on its design, modelling, implementation, improvement, and monitoring, whereas *explorative BPM* focuses on sensing opportunities to design new business processes to foster innovation (Grisold et al. 2019; Rosemann 2014, 2020).

To realize the benefits of BPM, organizations are forced to manage business processes in multiple contexts simultaneously (Harmon and Wolf 2018; Kerpedzhiev et al. 2020). Therefore, scholars have recognized context-awareness as an important principle of successful BPM and started to investigate its concepts (vom Brocke et al. 2014). Hence, various context factors, e.g., location or performance requirements, that affect the management of business processes

have been identified (Melão and Pidd 2000; Ploesser and Recker 2011; Rosemann et al. 2008). One well-known example is vom Brocke et al.'s (2016) BPM context framework, covering four context dimensions (i.e., goal, process, organization, and environment). It investigates the focus of BPM (i.e., exploration or exploitation), the nature of processes (e.g., variability or repetitiveness), the organization itself (e.g., size or industry), and its environment (e.g., competitiveness or uncertainty) that all affect the management of business processes.

Besides investigating relevant context factors for BPM, researchers have already called for *context-aware BPM methods* to successfully implement BPM (Kohlborn et al. 2014; Rosemann et al. 2008; van der Aalst 2013; vom Brocke et al. 2016). Generally, a *method* offers a systematic structure to perform work steps to achieve defined goals (Braun et al. 2005). In the context of BPM, a *BPM method* further comprises techniques and tools that support and enable consistent activities along the BPM lifecycle (Rosemann and vom Brocke 2015). In some cases, the use of general, i.e., context-independent, BPM methods such as Six Sigma or value-added analysis (Dumas et al. 2018) is sufficient. However, in other cases, the application of BPM methods which do not fit the context, may cause an inefficient use of resources (Dumas et al. 2018; Rosemann and vom Brocke 2015) or even the failure of BPM projects (Schmidt et al. 2001).

Even though research has addressed the relevance of context-aware BPM and respective methods (Kohlborn et al. 2014; van der Aalst 2013; vom Brocke et al. 2016), there is a lack of prescriptive knowledge that offers insights into how BPM methods can be assessed and selected in a context-aware manner (Rosemann et al. 2008; vom Brocke et al. 2016; Zelt et al. 2018). In particular, research on the context aware design of BPM methods and the specification of their application possibilities for specific contexts is missing (Dumas et al. 2018; Rosemann and vom Brocke 2015; vom Brocke et al. 2016). Thus, practitioners lack guidance on assessing the applicability of BPM methods currently being used and on selecting appropriate methods for given contexts to avoid an inefficient use of resources or even the failure of an BPM projects.

To address this need, research article #3 proposes the Context-Aware BPM Method Assessment and Selection Method (CAMAS Method) to help BPM method engineers (e.g., BPM researchers, consultants) or users (e.g., BPM researchers, process managers) to assess and select BPM methods in a context-aware manner. Accordingly, it is useful for practitioners to understand the nature of existing BPM methods in a structured and well-founded manner, as-

sessing the applicability of BPM methods currently used in their organization, and select suitable ones that fit their context. Hence, the uncertainty related to the selection of BPM methods may be reduced and transparency of related decisions increased. Moreover, the pre-filled Method Base including 103 assessed BPM methods inspires organizations to use new, perhaps locally unknown BPM methods for exploring and exploiting their business processes.

The CAMAS Method consists of three components: A *Classification Framework* serving as a meta model for the *Assessment Process* and *Selection Process* that, in turn, provide guidelines for its application (Figure 3). The *Classification Framework* provides a multi-dimensional view to facilitate the assessment and selection of BPM methods in specific contexts. It structures context in terms of the BPM lifecycle (Rosemann and vom Brocke 2015) and the BPM context framework (vom Brocke et al. 2016). Hence, five lifecycle stages (lifecycle dimension), an exploration or exploitation focus (goal dimension), as well as process, organizational, and environmental characteristics (context dimension) are differentiated.

To provide guidance for BPM method engineers or users on how to assess the applicability of BPM methods to specific contexts, the *Assessment Process* comprises four consecutive activities. BPM method engineers, like consultancies, are guided in specifying application options when developing a new BPM method that, in turn, facilitates the targeted application of their methods. Besides, properly assessed BPM methods may increase adoption in practice. BPM method users, like process managers, are guided in assessing BPM methods currently used in their organizations to challenge their applicability in the given context.

The *Selection Process* helps BPM method users to select suitable BPM methods from the Method Base for specific contexts. Therefore, it comprises four mandatory and one optional activity. The former three activities refer to the Context Framework to specify for which BPM lifecycle stage, goal, and context a BPM method is requested. For example, a process manager can filter all exploitative BPM methods (goal dimension) that are applicable for process analysis (lifecycle dimension) in large organizations (context dimension). The latter two activities actually select the most suitable BPM methods from a single- or a multi-context perspective.

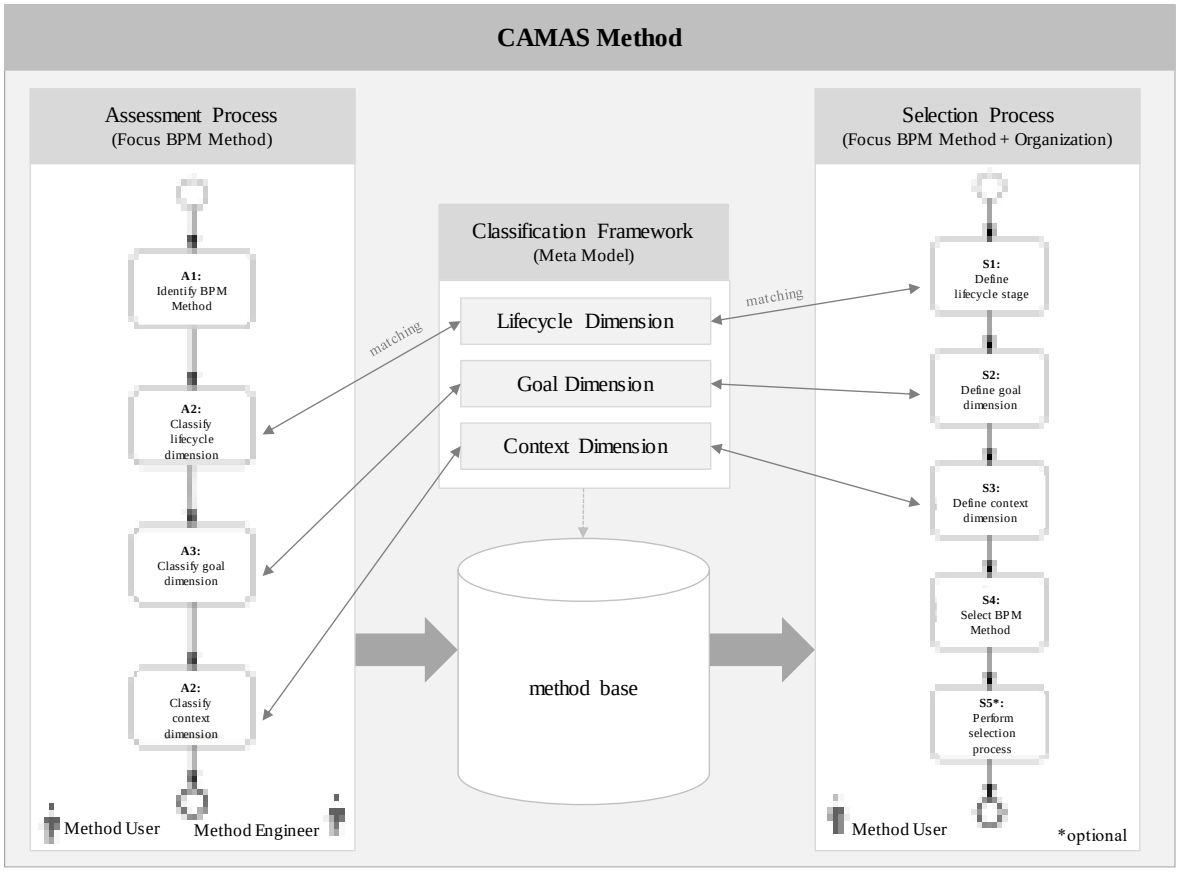

Figure 3. Overview of the CAMAS Method

To structure the development and evaluation of the CAMAS Method, this study follows the design science research (DSR) paradigm (Gregor and Hevner 2013) and situational method engineering (SME), an approach that allows compiling existing method fragments into a new method to account for situational needs (Brinkkemper 1996; Hendersen-Sellers and Ralyté 2010). Against the background of context-aware BPM, the Classification Framework builds on the BPM lifecycle (Rosemann and vom Brocke 2015) and the BPM context framework (vom Brocke et al. 2016). Existing knowledge on classification techniques serve as a basis for the Assessment Process, knowledge on multi-criteria decision analysis for the Selection Process. To evaluate the CAMAS Method, the Assessment and Selection Process were applied by BPM method engineers and users to gain insights into its ease of use, real-world fidelity, effectiveness, and efficiency. Therefore, an Excel prototype with a sample of 103 BPM methods identified in the course of a structured literature review is provided. Hence, two co-authors – being researchers and BPM method engineers – applied the Assessment Process to the sample of extant BPM methods. Moreover, 12 original BPM method engineers assessed 20 BPM methods to get a first-hand classification and additional insights into the ease of use of the Assessment Process. The assessed BPM methods were fed into the Method Base to apply the Selection

Process. On this basis, BPM method users from two organizations selected BPM methods for six of their business processes. The evaluation shows that BPM method engineers and users deem the CAMAS Method as appropriate to assess and select BPM methods in a context-aware manner. Specifically, the Selection Process helped them to identify explorative and exploitative BPM methods that fit their purpose. Summing up, the CAMAS Method contributes to descriptive and prescriptive knowledge on context-aware BPM by explicating relevant context dimensions that help to understand the nature of BPM methods in a structured and well-founded manner, by enabling BPM method engineers and users to develop and select BPM methods that fit specific contexts, and by providing a Method Base comprising 103 assessed BPM methods. However, the findings call for the design of context-specific, especially explorative BPM methods. This is in line with recent studies that highlight the importance of making BPM more explorative to become a key driver of innovation and corporate success (Mendling et al. 2020; Rosemann 2020; Schmiedel and vom Brocke 2015). A key idea of this research towards *explorative BPM* is to ensure the systematic integration of emerging opportunities such as those brought about by digital technologies or changing customer needs (Beverungen et al. 2020; Grisold et al. 2019; Kerpedzhiev et al. 2020; Rosemann 2014). However, BPM methods focusing on exploration are missing (Denner et al. 2018; Gross et al. 2019).

In response, research article #4 provides an explorative BPM method called Five-Diamond-Method. It assists organizations in identifying opportunities arising from business environments and digital technologies and integrating them into new business processes. Thus, the method is especially suitable for medium or large organizations in the product and/or service industry with established business processes that additionally want to sense, seize, and transform emerging opportunities into new business processes. Accordingly, various BPM-related stakeholders (e.g., BPM manager, process consultant) and BPM-unrelated stakeholders (e.g., senior manager, business and market analysts, digitalization experts, innovation manager) should be involved when applying the method.

The Five-Diamond-Method comprises four activities depicted as diamonds, i.e., a purpose, business, technology, and integration diamond. Moreover, one overarching diamond links all underlying diamonds and provides guidance on how to execute them. The diamond shape of these activities reflects the concept of divergent thinking, i.e., identifying various new ideas, and convergent thinking, i.e., selecting the ideas that appear relevant (Cropley 2006). Figure 4 shows the iterative procedure model of the Five-Diamond-Method.

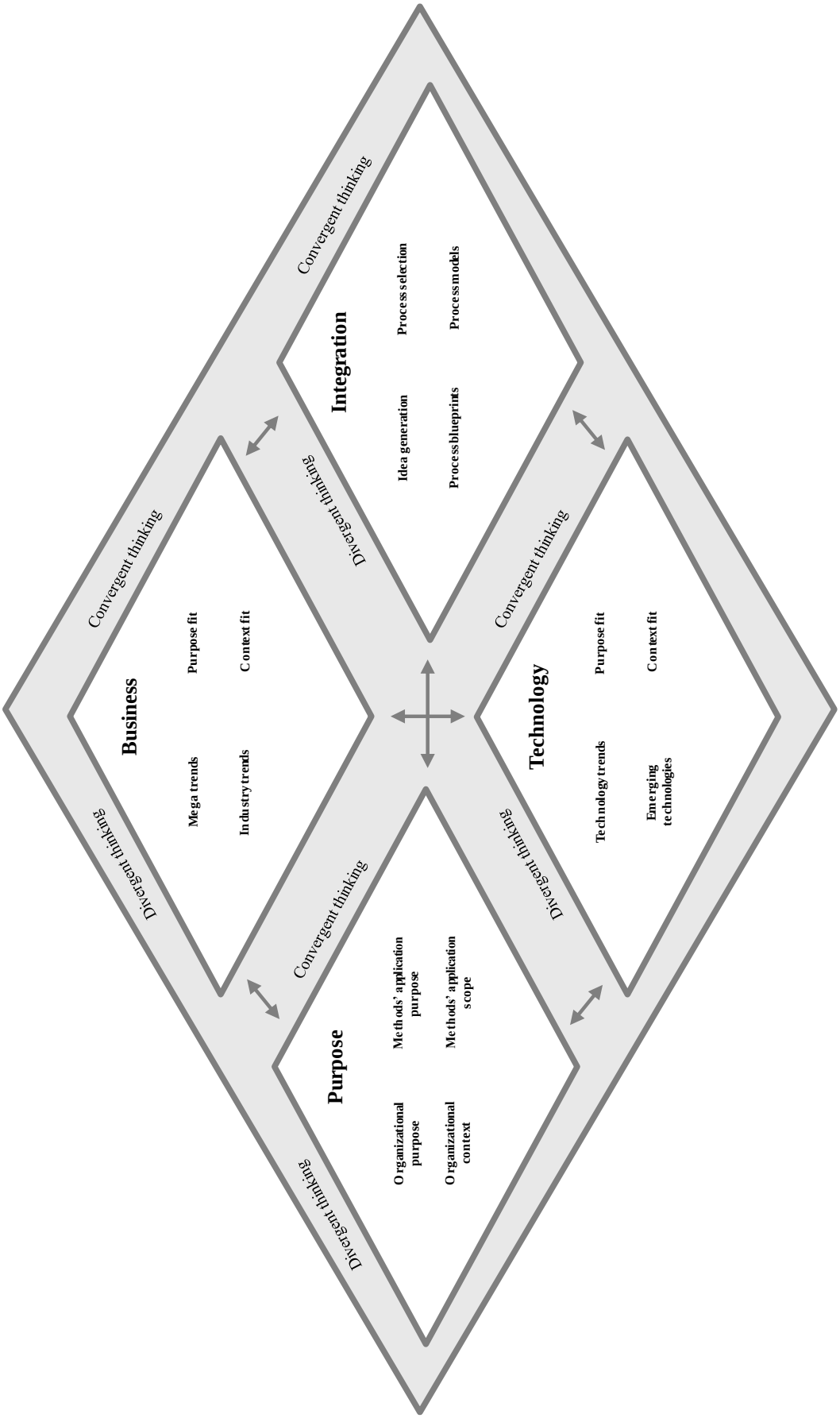

Figure 4. Procedure model of the Five-Diamond-Method

The *purpose diamond* (activity 1) requires to define the purpose and context of the organization (divergent thinking) as well as the purpose and scope of applying the Five-Diamond-Method (convergent thinking). Accordingly, the boundary conditions for all subsequent activities are defined. The *business diamond* (activity 2) aims to identify a variety of mega and industry trends, e.g., by using market research institutes (divergent thinking) and selects the trends that fit the defined purpose best and seem to be the most promising (convergent thinking). The *technology diamond* (activity 3) aims to identify technological trends, e.g., by using the Gartner Hype Cycle (divergent thinking) and selects digital technologies being relevant for the organization (convergent thinking). The *integration diamond* (activity 4) combines the purpose of the organization with arising business and/or technology trends and aims to integrate these opportunities into new business processes. Hence, a variety of innovation ideas are generated, e.g., by using creativity techniques, and translated into concrete process blueprints (divergent thinking). These blueprints are evaluated based on criteria such as feasibility, costs, expected value, and strategic alignment, the most promising processes are then selected (convergent thinking). As a result, one or more process blueprints are generated to create a new business process that offers a new value proposition for customers. Finally, the *overarching diamond* intends to execute activity 1 to 4 in the proposed order. However, an organization may choose different starting points and/or omit activities/techniques depending on the specific need.

Our study followed the DSR paradigm (Gregor and Hevner 2013), supplemented by SME (Hendersen-Sellers and Ralyté 2010), to develop and evaluate the Five-Diamond-Method. Following SME, we composed existing method fragments from BPM and innovation management to develop an explorative BPM method. To ensure real-world fidelity, understandability, applicability, and usefulness of the Five-Diamond-Method, we chose various ex-ante/ex-post and artificial/naturalistic evaluation activities (Venable et al. 2012). Accordingly, we discussed the method against literature-backed design objectives (Venable et al. 2012) and competing artefacts from BPM and innovation management (Siau and Rossi 1998). Moreover, we conducted expert interviews (Myers and Newman 2007) with eight industry experts to challenge the methods' real-world fidelity and understandability. Finally, we validated the methods' applicability and usefulness by applying it with a real case organization and a group of 22 students. The evaluation showed that the Five-Diamond-Method is applicable in real-world settings and useful to identify and integrate opportunities into new business processes. To sum up, the Five-Diamond-Method provides a comprehensive, explorative BPM approach that broadens the scope of BPM by integrating methodologies from innovation management. It is unique in its

supports of capturing emerging opportunities arising from business environments and digital technologies for BPM purposes. However, the real-world application showed that the generation of innovative process ideas was challenging. Existing research provides a plethora of methods, e.g., redesign methods (Gross et al. 2019; Zellner 2011) or BPM modelling patterns and anti-patterns (Falk et al. 2013; Frank et al. 2020; Koschmider et al. 2019; Reijers and Liman Mansar 2005) that intend to support the systematic redesign of BPs. However, they lack structured support for the actual design of new business processes.

To enhance the generation of ideas, for example within the integration diamond of the Five-Diamond-Method, research article #5 presents a Business Process Design Space. It aims to foster the systematic identification of alternative business process designs for exploration and exploitation. Thus, it is especially helpful for practitioners to explore, question, and rethink business processes in various aspects by explicating redesign options. Therefore, the Business Process Design Space comprises six layers (Reijers and Liman Mansar 2005), each of which comprises further dimensions and characteristics. By combining different manifestations, alternative process designs can be generated. Figure 5 depicts the Business Process Design Space.

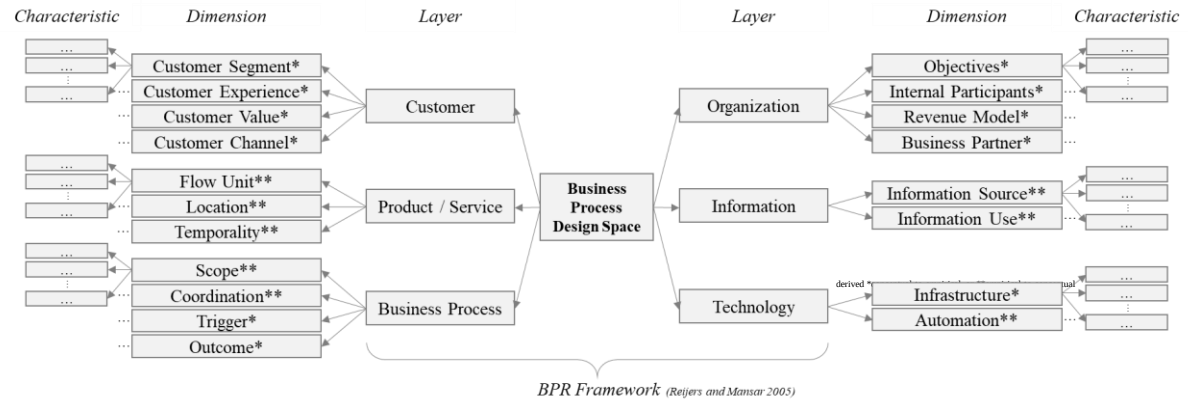

Figure 5. Derived Business Process Design Space with layers, dimensions, and characteristics

The layer *Customer* includes various *Customer Segments* (e.g., based on demographic or behavioral characteristics) and *Customer Experiences* along a process (e.g., real vs. virtual or mass-produced vs. customized) (Kotler et al. 2012; Meyer and Schwager 2007). Moreover, it aims to identify alternative process designs to create new or enhanced *Customer Value* (e.g., based on functional or emotional characteristics) and to design various *Customer Channels* to interact with customers (e.g., social media or email) (Almquist et al. 2016; Straker et al. 2015).

The layer *Product/Service* comprises the *Flow Unit* defining what runs through the process (e.g., customer or raw material), the *Location* determining where the process is executed/ available (e.g., stationary at the airport or mobile), and the *Temporality* referring to the time the process is executed/ available (e.g., time of the day or season) (Laguna and Marklund 2013; Nivala and Sarjakoski 2003; Zhu et al. 2014).

The layer *Business Process* includes the *Scope* of redesigning a process based on boundary conditions (e.g., narrow or broad functionalities) (Dumas et al. 2018). The *Coordination* describes how the process is structured and accounts for process variants (e.g., routine or non-routine processes), the *Trigger* starts the process execution (e.g., through message or temporal events), and the *Outcome* refers to positive or negative endings of the process (e.g., through conditional or error events) (Dumas et al. 2018; Koutsopoulos and Bider 2018; Lillrank 2003).

The layer *Organization* comprises the *Objective* that should be achieved (e.g., return on capital or reputation) and the *Internal Participants* being involved (e.g., with process or disciplinary responsibilities) (Dumas et al. 2018; Kaplan and Norton 1993; Lohmann and Zur Muehlen 2015). The *Revenue Model* refers to the business logic to turn customer value into revenues (e.g., advertising- or licensing-based) and the *Business Partners* being external partners (e.g., suppliers or alliance partners) (Dumas et al. 2018; Veit et al. 2014).

The layer *Information* refers to the *Information Source,* the origin of integrated data (e.g., internal or external data) and *Information Usage,* which refers to the way the collected data is used (e.g., analytics or visualization) (Hartmann et al. 2014; Reijers and Liman Mansar 2005).

The layer *Technology* includes the *Infrastructure* such as software and hardware used to support process execution (e.g., for storing, distributing, or searching relevant information) and *Automation* purposes of technology (e.g., automated activity execution or information exchange) (Jaakonmäki et al. 2018; van der Aalst et al. 2018).

To systematically derive the Business Process Design Space, we build on the design space concept (Maclean et al. 1991) and used its similarities to taxonomies. Hence, we followed the method for taxonomy development by Nickerson et al. (2013) to derive design dimensions and characteristics. First of all, we conducted a literature review and included relevant scientific articles from the service and process redesign domain (conceptual-to-empirical approach). After that, we conducted a workshop with five BPM researchers and six semi-structured interviews with professional process experts (empirical-to-conceptual approach). The latter were

also used to evaluate the Business Process Design Space with respect to its usefulness, understandability, and completeness. Overall, the professional process experts deemed the Business Process Design Space as valuable during process redesign projects. Summing up, the Business Process Design Space provides a systematic view on process redesign by making specific dimensions and underlying characteristics explicit. This informs research and supports practitioners to explore, question, and rethink business processes in various respects and contexts as well as serve as a starting point to realize explorative BPM.

To conclude Section II.1, research articles #1 to #4 help to address the need for guidance on how to put OA into practice by focusing on *what* exploration and exploitation activities help implement OA. More specifically, research article #1 provides knowledge about *what* APs need to be implemented to become ambidextrous on the *organizational level*, whereas research articles #2, #3, and #4 provide knowledge about *what* BPM methods help to implement exploration and exploitation activities on the *process level*. Therefore, the CAMAS Method (research article #2) helps to assess and select BPM methods in a context-aware manner. Addressing the call for explorative BPM methods, the Five-Diamond-Method (research articles #3) is developed which, in turn, feed into the Method Base of the CAMAS Method (research article #2). Besides, the Business Process Design Space (research article #4) is not competing with, but complementing existing BPM methods and can, for example, be used when applying the Five-Diamond-Method (research article #3). Finally, research articles #1 to #4 provide APs and BPM methods that can be implemented via exploration and exploitation projects. With this, Section II.1, the *identification of exploration and exploitation projects*, is concluded (Figure 1).

2 Selection and Scheduling of Exploration and Exploitation Projects

As outlined in Section I, developing an ambidextrous organization requires identifying and prioritizing investments in exploration and exploitation. While Section II.1 dealt with the identification of exploration and exploitation projects, this Section focuses on the *selection and scheduling of these projects* in an economically reasonable manner (Figure 1). Today, research on PPM has sufficiently investigated the selection and scheduling of projects, while balancing multiple objectives, accounting for constraints, and building on project types with specific effects (Pellegrinelli et al. 2015; Röder et al. 2014). Therefore, PPM has been combined with value-based management (VBM) as it provides objective functions for the comparison of decision alternatives, i.e., project portfolios, by integrating project effects into a single economic value judgment (Bolsinger 2015). Even though PPM has been shown to be a useful lens for balancing exploration and exploitation (Pellegrinelli et al. 2015), related work is rare and remains conceptual. Hence, there is a lack of prescriptive knowledge on *how* organization can prioritize investments in exploration and exploitation to become ambidextrous economically reasonable (O'Reilly and Tushman 2013; Pellegrinelli et al. 2015; Röder et al. 2014).

Against this backdrop, research article #2 presents an economic decision model that assists organizations in selecting and scheduling exploration and exploitation projects for distinct planning periods. Exploration projects strive for innovation and developing transforming capabilities that facilitate change, whereas exploitation projects aim for efficient operations and developing operational capabilities that ensure daily operations. On this basis, the decision model prioritizes project portfolios, i.e., unique compilations of exploration and exploitation projects, in terms of their contribution to the organization's long-term firm value. It recommends implementing the value-maximizing portfolio, as it represents the economically most reasonable way for the organization to become ambidextrous, based on the project candidates at hand. Thus, the decision model is useful for senior executives involved in corporate decision-making.

The decision model is applied for *project selection and scheduling* within the PPM approach, while the results of *project identification* serve as input. For example, APs of the OAMM (research article #1), the implementation of BPM methods (research articles #2 to #4), or ideas for improving or innovating products and services are potential project candidates. All of them are checked for strategy alignment, before performance effects of all remaining project candidates are estimated. Subsequently, the decision model valuates project portfolios based on their

contribution to the long-term firm value and in line with project interactions (e.g., predecessor/successor) and constraints (e.g., earliest beginning date) (Kundisch and Meier 2011; Lehnert et al. 2016). Finally, the optimal project portfolio can be adjusted to optimize the balance among the selected projects (e.g., in terms of project risk or size). Figure 6 shows four exemplary project portfolios covering exploration and exploitation projects. Portfolios 2 and 3 are not admissible due to violated inter- and intra-temporal interactions, while portfolios 1 and 4 are admissible and, finally, portfolio 1 is the value-maximizing portfolio that should be implemented. With OA being vital in dynamic business environments, the identification, selection, and scheduling of exploration and exploitation projects is not a one-time task at the beginning of the planning horizon. It should rather be an iterative process of constant re-evaluation of the portfolio to account for internal and external changes by adjusting, cancelling, or deleting projects, by adding new ones, or by re-assessing project effects.

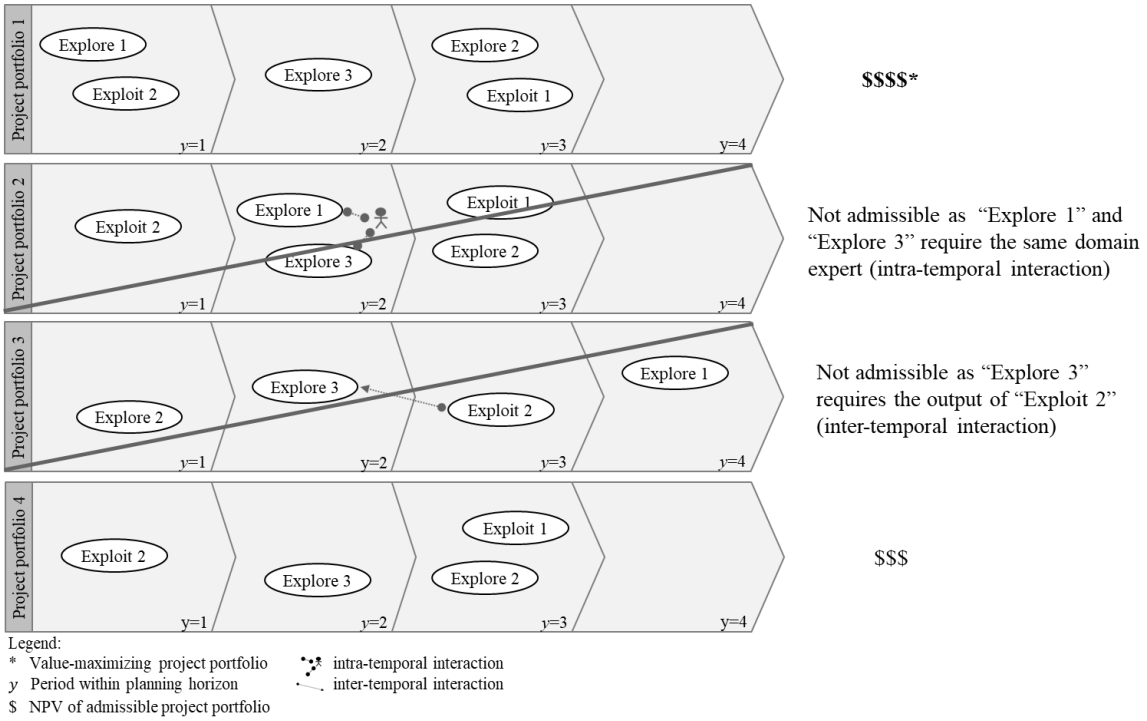

Figure 6. Example of the project selection and scheduling phase

To compare project portfolios, the decision model calculates the risk-adjusted expected net present value (NPV) as an acknowledged performance metric and proxy of the firm value (Buhl et al. 2011; vom Brocke and Sonnenberg 2015). Finally, the implementation of the value-maximizing portfolio, representing the economically most reasonable way for the organization to become ambidextrous, is recommended. To calculate the risk-adjusted expected NPV of a pro-

ject portfolio, effects of exploration and exploitation projects are linked across multiple planning periods. To transfer effects of these projects stepwise into the value contribution of a portfolio, the decision model is structured according to three layers: *project*, *behavioral*, and *outcome layer*. Figure 7 shows the decision models' conceptual architecture for a single period.

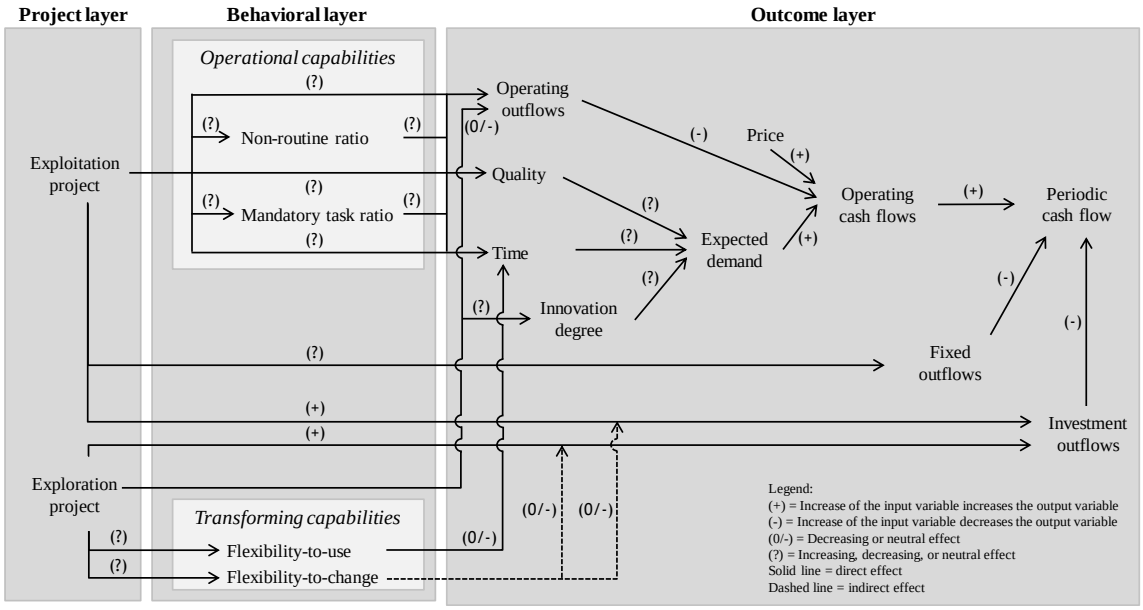

Figure 7. Conceptual architecture of the decision model (single-period view)

The *project layer* covers exploration and exploitation projects, representing both OA modes. *Exploitation projects* strive for efficient operations by either directly affecting various performance indicators, e.g., time (outcome layer) (Dumas et al. 2013; Winter 2003) or by affecting operational capabilities, e.g., non-routine ratio (behavioral layer) (Linhart et al. 2015). *Exploration projects* strive for innovation and developing capabilities to transform an organization by either affecting the organization's innovativeness perceived by its customers, i.e., innovation degree (outcome layer) (He and Wong 2004) or by strengthening an organization's transforming capabilities, e.g., flexibility-to-use (behavioral layer) (Gebauer and Schober 2006; Lehnert et al. 2016). To cover hybrid forms of both project types that occur in real-world settings, exploration and exploitation projects can be linked by project interactions.

The *behavioral layer* covers operational and transforming capabilities. *Operational capabilities* express the ability to effectively and efficiently perform work (Winter 2003; Zollo and Winter 2002) by combining routine operations to handle processes with well-defined inputs and outputs as well as nonroutine operations to handle activities that require special treatment (Lillrank 2003). Hence, the nonroutine ratio captures the fraction of activities that require special treatment, while the mandatory task ratio indicates which fraction of routine activities are

also included in nonroutine operations. *Transforming capabilities* express the ability to reconfigure operational capabilities and facilitate change (Teece 2007). Hence, flexibility-to-use makes nonroutine operations more time-efficient, whereas flexibility-to-change makes the implementation of projects more cost-efficient (Gebauer and Schober 2006; Lehnert et al. 2016).

The *outcome layer* covers monetary, e.g., operating outflows, and non-monetary performance criteria, e.g., innovation degree or time, for exploration and exploitation that are successively aggregated to the periodic cash flow for a single period (Bolsinger 2015). Accordingly, a periodic cash flow splits into investment outflows, fixed outflows, and operating cash flows (Lehnert et al. 2016). The latter depends on the expected demand, sales price, and operating outflows. From a multi-periodic perspective, all periodic cash flows influence the risk-adjusted expected NPV, which is the decision model's objective function that is used to compare and select the value-maximizing project portfolio (Copeland et al. 2005; Damodaran 2012).

To structure the development of the decision model and ensure its real-world fidelity and understandability as well as applicability and usefulness for practitioners, the decision model was developed following the DSR paradigm (Gregor and Hevner 2013) and evaluated from an ex-ante/ex-post and artificial/naturalistic perspective (Pries-Heje et al. 2008; Venable et al. 2012). Accordingly, we discussed the decision model against literature-backed design objectives and with industry experts to assess whether the decision model addresses the research problem, covers various real-world settings, and is understandable for practitioners. Moreover, a software prototype is developed as the number of project portfolios usually is such high that they cannot be valued manually. Finally, the prototype is applied to real world data to test whether the model leads to sensible results, to gain experience in data collection, and to get insights into the decision model's applicability and usefulness. The evaluation showed that the decision model is applicable in real-world settings and useful for corporate decision-maker to decide which exploration and exploitation projects should be implemented to become ambidextrous in an economically reasonably manner. Hence, the decision model adds to prescriptive knowledge on OA by tackling the exploration/exploitation trade-off analytcally using project portfolio selection and scheduling.

To conclude Section II.2, the *selection and scheduling of exploration and exploitation projects*, research articles #5 help to address the need for guidance on how to put OA into practice by focusing on *how* investments in exploration and exploitation activities can be prioritized to become ambidextrous economically reasonable.

III. Summary and Future Research[3]

1 Summary

Developing an ambidextrous organization that is able to simultaneously engage in exploration and exploitation is indispensable to survive in today's highly dynamic business environment. Over the last decades, knowledge on organizational ambidexterity (OA) has been continuously maturing, however many organizations are still struggling in becoming ambidextrous. In particular, there is a growing need for knowledge about *what* exploration and exploitation activities help implement OA and *how* these activities can be prioritized. Given the increasing importance of OA and a lack of guidance that helps organizations putting OA into practice, the thesis contributes to the development of an ambidextrous organization at the intersection of OA, business process management (BPM), and project portfolio management (PPM). Firstly, the thesis examines various ways to achieve OA on the organizational level, including required structural, individual, and cultural change. Secondly, the thesis recognizes the potential of BPM to overcome the trade-off between exploration and exploitation on the organizational level through balancing the tension on a process level. Thirdly, the thesis helps organizations implementing OA in an economically reasonable manner by using PPM, i.e., by focusing on the effective identification, selection, and scheduling of exploration and exploitation projects.

Addressing the need to identify *what* exploration and exploitation activities help implement OA, Section II.1 provides models and methods for the effective *identification of exploration and exploitation projects* on an organizational and process level. Research article #1 presents an Organizational Ambidexterity Maturity Model (OAMM) comprising 46 actionable practices (APs), i.e., clear actions related to the implementation of OA structured according to five capability areas – culture, strategy, structure, routines, and information technology (IT) – that build the foundation of becoming ambidextrous on the *organizational level*. To assess the level of experience required to implement the APs, the OAMM covers five maturity stages – novice, advanced beginner, competent, proficient, and expert. To mature from novice to expert, additional APs need to be implemented. Therefore, the OAMM serves as a basis for deriving an organization-specific OAMM and, thus, helps organization to identify required APs and become ambidextrous depending on the context at hand.

[3] This Section is partly comprised of content taken from the research articles included in this thesis. To improve the readability of the text, I omit the standard labeling of these citations.

On the *process level*, methods are proposed to help organizations realize the potential of ambidextrous BPM. To effectively explore and exploit business processes, research article #2 highlights the importance of context-aware BPM and proposes a Context-Aware BPM Method Assessment and Selection Method (CAMAS Method), taking an exploration or exploitation goal, various context dimensions, and the BPM lifecycle into consideration. Hence, the CAMAS Method assists BPM method engineers to assess the context in which their developed BPM methods are applicable. Besides, BPM method users are supported by challenging the applicability of BPM methods currently used in their organization as well as by selecting the most suitable options for specific contexts. Applying the CAMAS Method to a sample of 103 BPM methods and investigating the status quo of existing ones revealed a lack of explorative BPM methods. Addressing this gap, research article #3 provides one called Five-Diamond-Method that assists organizations in identifying opportunities arising from business environments and digital technologies and integrating them into new business processes. Additionally, to foster the systematic identification of alternative business process designs by breaking out of conventional thinking, research article #4 presents a Business Process Design Space. The Business Process Design Space is not competing with, but complements existing BPM methods to foster exploration and exploitation. Therefore, it comprises six layers – customer, product/ service, business process, organization, information, and technology – each of which comprises further dimensions and characteristics.

Addressing the need on *how* to prioritize investments in exploration and exploitation, research article #5 presents an economic decision model that assists organizations in *selecting and scheduling exploration and exploitation projects* for distinct planning periods. Therefore, the decision model prioritizes project portfolios, i.e., unique compilations of exploration and exploitation projects, based on their contribution to the long-term firm value. Finally, the implementation of the value-maximizing portfolio, representing the economically most reasonable way for the organization to become ambidextrous, is recommended. Moreover, to account for internal and external changes influencing the development of an ambidextrous organization, an iterative process of constant re-evaluation of the value-maximizing project portfolio is required.

2 Future Research

Like any research endeavor, the results of this thesis are subject to limitations which may serve as starting points for future research. While all individual research articles already address respective limitations (see Appendix V.3-V.5), this Section focuses on an aggregated overview of the thesis' limitations and provides ideas for future research at the intersection of OA, BPM, and PPM to advance the development of ambidextrous organizations.

First, on the *organizational level*, the thesis takes a holistic view on OA by deriving and structuring APs related to the implementation of OA. On this basis, future research should investigate APs in light of context. For example, the importance of each AP in different contexts or performance effects of implementing portfolios of APs in various contexts can be analyzed to guide organizations in becoming ambidextrous depending on their specific context. Besides, to account for changing environmental and business conditions, outdated APs should be dropped and new APs should be included on a regular basis. Therefore, a continuous scanning of OA literature, including upcoming research fields, such as IT ambidexterity (Heckmann and Maedche 2018), individual ambidexterity (Papachroni and Heracleous 2020), or leadership ambidexterity (Baškarada et al. 2016), as well as gaining insights from practitioners is recommended.

Second, on the *process level*, the thesis underpins the role of ambidextrous BPM to overcome the trade-off between exploration and exploitation on the organizational level through balancing the tension on the process level. However, there is a lack of context-specific, especially of explorative BPM methods that help to implement ambidextrous BPM. By assessing existing (i.e., the Method Based with 103 BPM methods) and developing new BPM methods (i.e., the Five-Diamond-Method), the thesis started to address this gap. Hence, future research should provide a public Method Base that enables researcher and practitioners to contribute to extending our compilation of existing BPM methods out of which practitioners could select ones for their daily use. The underlying meta model, i.e., the Classification Framework, could also be extended by additional context dimensions (e.g., a customer dimension) to account for emerging context requirements when assessing and selecting BPM methods. Additionally, new BPM methods should be developed, especially for exploration to benefit from integrating emerging opportunities into new business processes. This could also be done by adopting and adjusting existing methods from other disciplines, such as innovation management, that may serve as a basis to derive explorative BPM methods. Finally, future research should not only investigate context-aware BPM with focus on BPM methods as one out of six core elements of BPM

(Rosemann and vom Brocke 2015) – strategic alignment, governance, methods, IT, people, and culture – but rather with respect to other core elements being relevant for successful BPM. Thereby, a focus should be put on ambidextrous BPM, complementing the traditional exploitation goal by an exploration goal to be the source of operational excellence and a key driver for innovation which, in turn, drive corporate success in dynamic business environments.

Third, from a *PPM perspective*, the thesis investigated the identification, selection, and scheduling of exploration and exploitation projects. However, it does not provide any guidance for the implementation and monitoring of these projects. Hence, further research might investigate differences in success factors of implementing and monitoring exploration and exploitation projects. This is the basis to fully realize all project benefits and, in turn, ensure the successful implementation of an organizations' strategy to become ambidextrous. Additionally, to adapt and respond to emerging opportunities and threats in the digital age, further research should provide a comprehensive PPM approach that addresses the resulting need to continuously adapt project portfolios by adjusting, cancelling, or deleting projects, by adding new ones, or by re-assessing project effects.

In sum, the thesis contributes to the existing body of knowledge at the intersection of OA, BPM, and PPM by introducing models and methods that structure the development of an ambidextrous organization on the organizational and process level. I hope this thesis shed light on how to put OA into practice and, thus, supports researchers and practitioners in balancing the tensions between exploration and exploitation to survive in the face of change and sustain corporate success in today's highly dynamic business environment.

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V. Appendix

1 Index of Research Articles

Research Article #1: Building an Ambidextrous Organization – A Maturity Model for Organizational Ambidexterity

Stelzl K, Röglinger M, Wyrtki K (2020): Building an Ambidextrous Organization – A Maturity Model for Organizational Ambidexterity. In: *Business Research* (in press). Earlier version published in *Proceedings of the 16th Conference on Business Process Management (BPM Forum 2018), Sydney, Australia, 2018.*

Research Article #2: Context-Aware Business Process Management – Method Assessment and Selection

Vom Brocke J, Denner M-S, Röglinger M, Schmiedel T, Stelzl K, Wehking C (2020): Context-Aware Business Process Management – Method Assessment and Selection. In: *Business & Information System Engineering* (in press). Earlier version published in *Proceedings of the 16th Conference on Business Process Management (BPM Conference 2018), Sydney, Australia, 2018.*

Research Article #3: Towards a Systematic Integration of Opportunities into Business Processes – A Method for Explorative Business Process Management

Grisold T, Gross S, Stelzl K, vom Brocke J, Mendling J, Röglinger M, Rosemann M: Towards a Systematic Integration of Opportunities into Business Processes – A Method for Explorative Business Process Management. *Submitted working paper*.

Research Article #4: The Business Process Design Space for Explicating Process Redesign Options

Gross S, Stelzl K, Grisold T, Mendling J, Röglinger M, vom Brocke J: The Business Process Design Space for Explicating Process Redesign Options. *Submitted working paper*.

Research Article #5: A Project Portfolio Management Approach to Tackling the Exploration/Exploitation Trade-off

Linhart A, Röglinger M, Stelzl K (2020) A Project Portfolio Management Approach to Tackling the Exploration/Exploitation Trade-off. In: *Business & Information System Engineering*, 62:103–119.

2 Individual Contribution to the Included Research Articles

This cumulative thesis consists of five research articles that build the main body of this work. All included research articles were written in teams with multiple co-authors. Thus, this Section is to detail respective project settings and my individual contribution to each research article.

Research article #1 (Stelzl et al. 2020) was written with two co-authors. After a former version of the article has been presented at the 16th International Conference on Business Process Management (BPM Forum 2018), Sydney, Australia, one co-author left the team and another co-author joined instead. Being the leading author, I had a main role in further developing a maturity model, the Organizational Ambidexterity Maturity Model, by extending the structured literature review and conducting a card sorting with several industry experts. Moreover, I was primarily responsible for evaluating the maturity model covering an empirical and theoretical perspective. Although the research article represents, to a large extent, my work, the two co-authors were involved in all parts of the project and helped to advance our contribution.

Research article #2 (vom Brocke et al. 2020) was developed with a team of six co-authors – three of whom work at other international research institutions. A former version of the article was presented at the 16th International Conference on Business Process Management (BPM 2018), Sydney, Australia after which we incorporated corresponding feedback to significantly advance our work. All co-authors jointly developed a method, the CAMAS Method, for assessing and selecting BPM methods in a context-aware manner. Personally, I had a key role in developing the three components of the method by conceptualizing a Classification Framework, an Assessment Process, and a Selection Process. Besides, I was mainly responsible for evaluating the CAMAS method by conducting the structured literature review to identify extant BPM methods, which were then classified according to the method. Finally, I evaluated the CAMAS method by applying at with industry experts from two different organizations. In sum, I had a main role in each part of the project.

Research article #3 (Grisold et al.) was written with seven co-authors – five of whom work at other international research institutions. The team jointly conceptualized and elaborated the article's content. Together, we developed a BPM method, the Five-Diamond-Method, to identify and integrate opportunities into new business processes. I was primarily responsible for elaborating the research method as well as for specifying and evaluating the Five-Diamond-

Method. Regarding the latter, I conducted a feature comparison and competing artefact analysis, expert interviews, and a real-world application with a real case organization. Throughout, I was substantially involved in all parts of the project.

Research article #4 (Gross et al.) was developed with a team of six co-authors. Four of whom work at other international research institutions and one of whom was the leading author of the article. However, I had a main role in developing the Business Process Design Space to foster a systematic identification of alternative process designs. I was involved in conceptualizing, developing, and reworking text sections throughout the article. Overall, I was involved in each part of the project.

Research article #5 (Linhart et al. 2020) was written with two co-authors. All co-authors jointly developed an economic decision model to prioritize exploration and exploitation projects and elaborated the content together. I was particularly involved in developing as well as evaluating the decision model by conducting several interviews with industry experts. Furthermore, I was responsible for developing and implementing a software prototype as well as for conducting a scenario analysis and analyzing the results. During the whole research process, the article benefitted significantly from the feedback of the experienced co-authors. Overall, I was substantially involved in all parts of the project.

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3 Research Article #1: Building an Ambidextrous Organization – A Maturity Model for Organizational Ambidexterity

Authors: Stelzl K, Röglinger M, Wyrtki K

Published in: Business Research, 2020 (in press)

Earlier version published in *Proceedings of the 16th Conference on Business Process Management (BPM Forum 2018), Sydney, Australia, 2018*

Abstract: Organizational ambidexterity (OA) is an essential capability for organizations in turbulent environments, as it facilitates the simultaneous pursuit of exploitation and exploration. Over the last years, knowledge on OA has continuously matured, covering outcomes, moderators, and types of OA. However, little is known about how to build an ambidextrous organization in terms of what capabilities are needed and how they can be developed. To address this gap, we developed an organizational ambidexterity maturity model (OAMM) that assists organizations in becoming ambidextrous based on actionable practices (APs) structured according to five capability areas. In developing the OAMM, we conducted a structured literature review to compile APs and used card sorting to assign APs to maturity stages. We evaluated the OAMM based on literature-backed design objectives and discussions with practitioners. We also conducted an initial empirical validation of the APs' assignment to maturity stages. The OAMM extends the descriptive and prescriptive knowledge on OA by taking a holistic view on OA, by shedding light on the interrelation of different OA types, and by enabling the assessment of an organization's as-is and to-be OA maturity based on implemented APs.

Keywords: Organizational Ambidexterity, Exploitation, Exploration, Maturity Model, Capability Development, Literature Review, Card Sorting

4 Research Article #2: Context-Aware Business Process Management – Method Assessment and Selection

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Abstract: Context awareness is essential for successful business process management (BPM). So far, research has covered relevant BPM context factors and context-aware process design, but little is known about how to assess and select BPM methods in a context-aware manner. As BPM methods are involved in all stages of the BPM lifecycle, it is key to apply appropriate methods to efficiently use organizational resources. Following the design science paradigm, the study at hand addresses this gap by developing and evaluating the Context-Aware BPM Method Assessment and Selection (CAMAS) Method. This method assists method engineers in assessing in which contexts their BPM methods can be applied and method users in selecting appropriate BPM methods for given contexts. The findings of this study call for more context awareness in BPM method design and for a stronger focus on explorative BPM. They also provide insights into the status quo of existing BPM methods.

Keywords: Business process management, BPM methods, Context-aware BPM, BPM lifecycle, Method selection, Design science research

5 Research Article #3: Towards a Systematic Integration of Opportunities into Business Processes – A Method for Explorative Business Process Management

Authors: Grisold T, Gross S, Stelzl K, vom Brocke J, Mendling J, Röglinger M, Rosemann M

Submitted working paper

Extend Abstract

Identifying opportunities arising from business environments and digital technologies and integrating them into business processes is a key challenge for organization to secure success in dynamic business environments. Business process management (BPM) has long been recognized as a source of operational excellence and more recently as a key driver for innovation. With BPM traditionally being exploitative in nature to ensure the efficiency and effectiveness of business processes, numerous respective BPM methods has been proposed. However, current literature does not provide appropriate guidance for explorative BPM to foster innovation. Against this backdrop, the research article asks the following question: *How can BPM integrate opportunities to explore business processes?*

Thus, organizations aim for deploying ambidextrous BPM by exploring and exploiting their business processes (Helbin and van Looy 2019; Rosemann 2014, 2020). To ensure the efficiency and effectiveness of business processes, exploitative BPM focuses on its design, modelling, implementation, improvement, and monitoring, whereas explorative BPM focus-es on sensing opportunities to design new business processes to foster innovation (Grisold et al. 2019; Rosemann 2014, 2020).

To answer this question, the research article introduces the Five-Diamond-Method, an explorative BPM method that assists organizations in identifying opportunities arising from business environments and digital technologies and in integrating them into new business processes. To build and evaluate the proposed artifact, we adopted the design science research (DSR) paradigm (Gregor und Hevner 2013) and followed situational method engineering (SME) (Henderssen-Sellers and Ralyté 2010). According to SME, we composed existing method fragments from BPM and innovation management to develop an explorative BPM method. Hence, the Five-Diamond-Method entails various activities depicted as one overarching diamond and four

underlying diamonds: a purpose, business, technology, and integration diamond. The diamond shape of these activities reflects the concept of divergent thinking, i.e., identifying various new ideas, and convergent thinking, i.e., selecting the ideas that appear relevant (Cropley 2006).

To evaluate the Five-Diamond-Method in terms of its real-world fidelity, understandability, applicability, and usefulness, we discussed the method against literature-backed design objectives and competing artefacts from BPM and IM, conducted eight expert interviews, and applied it in two real-world applications (Myers and Newman 2007; Siau and Rossi 1998; Venable et al. 2012).

Overall, our work contributes to prescriptive knowledge on BPM by broadening the scope of BPM through the integrating methodologies from IM. Hence, the Five-Diamond-Method provides methodological guidance for business process exploration. Besides, it is unique in its support of capturing emerging business and technology opportunities for BPM purposes.

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6 Research Article #4: The Business Process Design Space for Explicating Process Redesign Options

Authors: Gross S, Stelzl K, Grisold T, Mendling J, Röglinger M, vom Brocke J

Submitted working paper

Extend Abstract

Redesigning business processes within and between organizations is essential for organizations to change the way work is accomplished and value is delivered in a fast-changing environment. To structure the redesign of business processes through logical sequence of steps, a plethora of methods and techniques exist. However, ontological guidance, focusing on *what* can be changed from a process design perspective, is missing so far. Hence, the creation of to-be process designs largely remains the result of a creative process. Supporting organizations in realizing the full potential of process redesign projects, the research question is as follows: *What are relevant redesign options of business processes?*

To answer this question, we propose the Business Process Design Space to foster the systematic identification of alternative business process designs for exploration and exploitation. Developing the artefact, we rely on the design space concept (Maclean et al. 1991) and used the taxonomy development method by Nickerson et al. (2013). The provided Business Process Design Space comprises 19 business process design dimensions that are grouped into different layers and specified by underlying characteristics. Guiding questions and illustrative real-world examples help to deploy these design dimensions in practice.

Following the taxonomy development by Nickerson et al. (2013), we first conducted a literature review and included relevant scientific articles from the service- and process redesign domain to deductively derive process design dimensions (conceptual-to-empirical approach). Subsequently, to enrich our conceptual understanding, we inductively derived process design dimensions by conducting a workshop with five academic and semi-structured interviews with six professional process experts (empirical-to-conceptual approach). We conducted interviews until we did not add new design dimensions, nor change the allocation of dimensions to layers.

The Business Process Design Space was evaluated in two phases. First, we validated its usefulness, understandability, and completeness by six semi-structured interviews. Second, we validated its applicability and usefulness by performing three real-world applications. Overall,

the professional process experts deemed the Business Process Design Space and its underlying idea to be a novel and stimulating approach for process redesign. The practitioners from all real-world applications found the Business Process Design Space suitable for the generation of redesign alternatives as it helps to break out of normal thought patterns and constraints.

Summing up, the Business Process Design Space provides comprehensive ontological guidance during the to-be process creation by making specific dimensions and underlying characteristics explicit. Thereby, it is not competing with but complementing existing process redesign approaches. Hence, it informs research and supports practitioners to explore, question, and rethink business processes in various respects and contexts as well as serve as a starting point to realize explorative BPM.

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7 Research Article #5: A Project Portfolio Management Approach to Tackling the Exploration/Exploitation Trade-off

Authors: Linhart A, Röglinger M, Stelzl K

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Abstract: Organizational ambidexterity (OA) is an essential capability for surviving in dynamic business environments that advocates the simultaneous engagement in exploration and exploitation. Over the last decades, knowledge on OA has substantially matured, covering insights into antecedents, outcomes, and moderators of OA. However, there is little prescriptive knowledge that offers guidance on how to put OA into practice and to tackle the trade-off between exploration and exploitation. To address this gap, we adopted the design science research paradigm and proposed an economic decision model as artefact. The decision model assists organizations in selecting and scheduling exploration and exploitation projects to become ambidextrous in an economically reasonable manner. As for justificatory knowledge, the decision model draws from prescriptive knowledge on project portfolio management and value-based management, and from descriptive knowledge related to OA to structure the field of action. To evaluate the decision model, we discussed its design specification against theory-backed design objectives and with industry experts. We also instantiated the decision model as a software prototype and applied the prototype to a case based on real-world data.

Keywords: Organizational ambidexterity, Exploration, Exploitation, Project portfolio management, Value-based management, Decision model