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ORIGINAL ARTICLE



Idea generation in exploitative and explorative business process redesign techniques

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Abstract

Business process redesign has received considerable attention in research and practice. An important task contributing to redesign is idea generation. It has been argued that the choice of technique influences redesign outcomes, but empirical evidence is largely missing. In this paper, we examine the role of idea generation in business process redesign by comparing two different kinds of techniques: exploitative and explorative redesign techniques. Often, exploitative techniques are expected to yield more appropriate solutions, while explorative techniques are associated with more creative outcomes. To investigate such propositions, we consider the Best Practices of Process Redesign as an example of an exploitative redesign technique and the Business Process Design Space as an explorative redesign technique. We conducted a free-simulation experiment to study the empirical impact of the choice of redesign techniques on outcomes. We find that the Business Process Design Space leads to a higher number of redesign ideas, which are also more diverse. These are more creative and novel than ideas produced by the Best Practices of Process Redesign. Against expectation, the best practices as an exploitative approach do not produce more appropriate nor impactful ideas in our task design. Since both approaches cover different areas of improvement, a key implication of our work is that they should not be seen as isolated approaches to redesign; rather, they should be purposefully combined to not only create novel but also operational business process redesigns.

Keywords Business process redesign \cdot Ambidextrous BPM \cdot Explorative BPM \cdot Business process design space \cdot Best practices of process redesign \cdot Idea generation

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1 Introduction

An increasing number of organizations are process-oriented and utilize business process management (BPM) (vom Brocke and Mendling 2018; vom Brocke et al. 2021). At the heart of the BPM approach is the assumption that organizations can gain a competitive advantage through efficient and effective business processes (Baiyere et al. 2020; Recker 2014). Consequently, a large share of BPM studies investigate how organizations can successfully redesign and improve their business processes by means of redesign techniques: well-defined sequences of steps to intentionally change business processes within and beyond organizational boundaries (Dumas et al. 2018; Hammer and Champy 1993; Kettinger et al. 1997; Knorr 1991; Malhotra 1998). Business process redesign is often understood as an analytical activity that centers around the identification and resolution of process-related issues (Dumas et al. 2018; Reijers & Limam Mansar 2005). The general rationale is that when a business process exhibits issues, process analysts identify the associated problem, select the right approach, and generate redesign ideas that solve the problem with respect to well-defined criteria (Bortolotti and Romano 2012; Kettinger et al. 1997; Kwak and Anbari 2006; Reijers & Limam Mansar 2005; Van der Aalst and Van Hee 1996). The resulting redesign ideas are assessed against their fit to solve the given issue. Process redesign techniques implementing this rationale are often said to support *exploitation* (Grisold et al. 2019; Helbin and Van Looy 2021; Rosemann 2014).

However, what about issues that are less specific or even undefined altogether (Von Hippel and Von Krogh 2016)? Recent arguments emphasize that business process redesign should be *explorative* and open-ended to embrace and leverage digital innovation opportunities that emerge through an evolving frontier of digital technologies and data streams (Baiyere et al. 2020; Kerpedzhiev et al. 2020; Mendling et al. 2020). These opportunities are unknown and hard to anticipate (Benbya et al. 2020; Mousavi Baygi et al. 2021; Yoo et al. 2010). Therefore, it has been suggested to place more emphasis on the generation of redesign ideas that are novel, creative, and innovative (Ahmad and Van Looy 2020; Grisold et al. 2021; Rosemann 2020) instead of logical, appropriate, or effective (Harmon and Trends 2010; Kettinger et al. 1997; Van der Aalst and Van Hee 1996). Indeed, recent arguments in the BPM field distinguish between *exploiting* existing business process designs and *exploring* opportunities for new business process redesigns (Ahmad and Van Looy 2021; Kohlborn et al. 2014; Rosemann 2020). The former typically implies that existing business processes are improved based on existing issues; the latter means that redesign ideas establish new or widely enhanced processes, services, products, or even value propositions (Grisold et al. 2019). Exploitation-based techniques, such as 7FE, have an explicit validation step (Dumas et al. 2018), reflecting that exploitation yields more appropriate and optimal solutions while exploring more novel and creative ones. Along these lines, recent literature seems to insinuate that explorative techniques are better and more desirable when organizations seek to find and realize digital innovation opportunities (Baiyere et al. 2020; Bygstad and Øvrelid 2020; Mendling et al. 2020). To date, however, we have no empirical evidence to dissect these claims in any systematic way.

Regardless of whether redesign techniques support exploitation or exploration, they enable *idea generation* by directing one's attention to specific dimensions, aspects, or elements of a business process (Harmon and Trends 2010; Limam Mansar and Reijers 2007; Rosemann 2020). Formally speaking, they impose constraints and narrow down the problem space (Maedche et al. 2019). This occurs, for example, by highlighting common approaches to solving recurrent issues (Kettinger et al. 1997; Limam Mansar and Reijers 2007) or foregrounding specific aspects of digital innovation, such as business trends (Ahmad and Van Looy 2021). Arguably, however, they are expected to lead to different outcomes. Idea generation is typically treated as a relevant yet given by-product that happens in a black box and follows the *ATAMO* principle ("and then a miracle occurs") (Sharp and McDermott 2009), but we argue that it is the missing link to examine and better understand the differences between these techniques. We thus ask: *To what extent does idea generation differ using exploitative and explorative business process redesign techniques*?

We conducted a free simulation experiment (e.g., Recker et al. 2013) in which we compared the use of an explorative redesign technique (Gross et al.'s (2021) *Business Process Design Space*) with an exploitative technique (Reijers and Limam Mansar's (2005) *Best Practices of Process Redesign*). We find that idea generation leads to considerably different outcomes in these two techniques. The Business Process Design Space technique leads to a higher number of redesign ideas, which are more creative and diverse but less concrete from a process implementation point-of-view. The Best Practices of Process Redesign, in contrast, tends to support process design operationalization by generating sequence flow-focused process design alternatives on a more fine granular level. An important key takeaway from our study is that exploitative and explorative redesign techniques should not be seen as two distinct approaches to be used in isolation from one another. Rather, we suggest that redesign initiatives can benefit from an application of both approaches at different stages in the project. This, in turn, can enable organizations not only to identify innovative redesign opportunities but also to realize them in terms of optimal designs.

2 Business process redesign

The BPM field has developed a considerable collection of business process redesign techniques¹: well-defined procedures with the aim of redesigning a business process in order to ensure sustainable and ongoing value creation (Attaran 2003; Gross et al. 2019; Kettinger et al. 1997; Malhotra 1998; Malinova et al. 2022). Business process redesign has received considerable attention in the past decades (Attaran 2003; Kettinger et al. 1997; Malhotra 1998; Malinova et al. 2022). Typically, redesign initiatives involve a thorough analysis of existing processes where analysts need to consider issues, envision potential remedies, and mind economic contingencies while also considering an organization's strategy, IT, organizational structure, and human resources (Kettinger et al. 1997). The BPM field has developed a variety of techniques that can be used for a range of purposes (Malinova et al. 2022). With reference to the concept of organizational ambidexterity (e.g., March 1991), we build on

¹ Note that in the context of business process redesign, the terms method and technique are widely used interchangeably.

recent arguments and divide redesign techniques into two broad groups: exploitative and explorative redesign techniques².

2.1 Exploitative versus explorative redesign techniques

Established business process redesign techniques are typically "analytical", "inwardlooking", and "transactional"; they enable the analysis of existing business processes within the boundaries of a given organization to accomplish incremental improvements and increase efficiency and effectiveness (Baiyere et al. 2020; Dumas et al. 2018; Gross et al. 2019; Mendling et al. 2020). These techniques can be refered to as exploitative redesign techniques; they start from specific issues or problems that are identified within a process in order to increase the efficiency and effectiveness of existing business processes with respect to well-defined KPIs (Bortolotti and Romano 2012; Kwak and Anbari 2006). They have been developed in response to problems with radical transformational approaches, such as business process reengineering, which was found to be prone to failure due to the complexity of change in combination with insufficient change management (Grover et al., 1995) and various types of risks (Clemons et al., 1995). From a more abstract angle, associated approaches support incremental innovation in the sense that focus is placed on enhancing and refining existing systems and processes for gradual improvement (Ritala and Hurmelinna-Laukkanen 2013). Aiming for such smaller improvements has been found to be an appropriate strategy for reducing risks and failure rates of projects that involve information systems and organizational change in one way or another (Heeks, 2002).

Exploitative redesign techniques are, for example, Six Sigma (Schroeder et al., 2008), Lean Management (Bortolotti and Romano 2012), and the Best Practices of Process Redesign (Limam Mansar and Reijers 2005, 2007; Reijers & Limam Mansar 2005). These techniques are grounded in leveraging existing processes and knowledge to yield efficiency and effectiveness. Six Sigma, for instance, enhances process quality by systematically removing defects and variability, showcasing the strength of exploitation in achieving consistency and reliability in outcomes. Similarly, Lean Management emphasizes waste reduction and process optimization, reflecting the cost-effectiveness and efficiency inherent in exploitative approaches. The popularity and success of such techniques in BPM research further highlight the practical and theoretical advantages of adopting an exploitative stance in business process redesign, emphasizing stability, continuity, and predictable, sustainable growth.

The Best Practices of Process Redesign (in short: Best Practices) (Reijers & Liman Mansar 2005) are a particularly illustrative example, not least because of their popularity in BPM research³. The Best Practices describe generic strategies to address recurrent issues in business process work. They are derived from experiences and observations made in companies (e.g., Reijers & Liman Mansar 2005), and they thus

² Mind that this distinction is not binary; rather, business process redesign techniques are located on a continuum that lean towards exploration or exploitation (e.g. Gross et al. 2021). We thus speak of exploitative or explorative redesign techniques.

³ As of November 2023, the three core papers on best practices (Reijers and Liman Mansar 2005; Liman Mansar and Reijers, 2007; Liman Mansar and Reijers 2005) count more than 1.300 citations on Google Scholar.

represent reapplications of proven solutions. They are exploitative as they build on existing processes and capitalize on knowledge gained in past redesign projects. The reliance on past knowledge and experiences underscores how existing knowledge resources foster incremental improvements (Ganguly et al. 2019), which, at the same time, implies path dependency and potentially restricts the potential for generating radically new ideas.

More recent redesign approaches, in contrast, seek to position BPM in the broader context of digital innovation, which is inherently characterized by dynamically emerging and changing business opportunities (Baiyere et al. 2020; Mendling et al. 2020; Pentland et al. 2020). In the language of organizational ambidexterity, these approaches are summarized as "explorative BPM" (Kohlborn et al. 2014; Rosemann 2014). Accordingly, what we refer to as *explorative redesign techniques* seek to develop open-ended business process redesign ideas that consider the potential of new digital technologies, data streams, services, and products (Grisold et al. 2021; Rosemann 2014, 2018; Van Looy 2021b). The associated methods aspire to be "creative", "outward-looking" and "transformational": they promote the generation of original, non-obvious redesign ideas that are inspired by trends outside of organizational boundaries and also involve the transformation of the whole business process or even the value proposition. In contrast to exploitative redesign techniques, the focus is less on optimal fit and rather on developing surprising solutions from different angles. To this end, explorative redesign techniques are considered relevant to cater to the demands of the digital age, which presents unprecedented innovation opportunities (Baskerville et al. 2019; Nambisan et al. 2019; Yoo et al. 2012) that organizations need to respond to by exploring a wide range of these opportunities (Benbya et al. 2020; Mendling et al. 2020). From a more abstract angle, such exploratory approaches resonate with the concept of innovation ecosystems, where the cross-pollination of ideas from diverse external sources, such as start-ups, academia, and tech communities, drives innovation (Adner 2017).

Explorative redesign techniques provide structure and guidance, but they do not prescribe a specific type of solution (Grisold et al. 2021; Gross et al. 2021; Machado and van de Ven 2023). Such techniques are, for example, the process grammar (Lee et al., 2008), the job-centric approach (Bettencourt et al., 2013), and the Business Process Design Space (Gross et al. 2021). The Business Process Design Space (in short, BPD-Space), for instance, has been recently developed to embrace opportunities associated with digital innovation opportunities. It aims to explore a wide range of process redesign alternatives by enabling the configuration of various process elements in novel ways. It defines design dimensions that structure a process design space, possible characteristics (i.e., design manifestations) along these design dimensions, and guiding questions that function as a basis to explore other possible characteristics.

2.2 Idea generation in exploitative and explorative redesign techniques

To examine how redesign techniques lead to different outcomes, we focus on the role of idea generation and how it enables the creation of redesign alternatives. Research on innovation and creativity suggests that a key element of idea generation concerns

the problem space and the solution space that is implied in a given task (Finke et al. 1996; Hélie and Sun 2010; von Thienen et al. 2023). The problem space refers to the comprehensive contextual environment encompassing the issue to be addressed, its constraints, and the conditions under which it exists (Maedche et al. 2019). As one solves a given task, the depth of exploration within the problem space can vary - an observation that underlies open innovation concepts where external ideas and paths are considered alongside internal knowledge (Chesbrough 2003). The solution space, in contrast, denotes the entire spectrum of feasible ideas (e.g., responses, strategies, or interventions) that can be employed to address a particular problem within its defined constraints (von Thienen et al. 2023). If the problem space is assumed to be well-defined and clear, idea generation targets concrete problems that need a suitable solution within a small solution space (Abdulla et al. 2020). This basic difference in idea generation is found in common design principles, like the Double-Diamond (Design Council 2023), which proposes to work through (at least) two rounds of ideation when generating creative solutions: first, elaborate the problem space and pin down the actual design problem, and second, ideate many and broad ideas to select the best fitting solution.

Following this conceptualization, we can derive a number of observations for exploitative and explorative redesign techniques. Exploitative redesign techniques narrow down the problem space by analyzing and resolving specific issues by means of well-defined steps (see, e.g., Gross et al. 2019; von Thienen et al. 2023) with the benefit of a reduction of risk (Heeks, 2002). These methods create guidance and efficiency in redesign endeavors, but arguably, they limit the scope and innovativeness of resulting ideas. To illustrate, consider one of Reijers and Limam Mansar's best practice of *contact reduction*, which advises addressing an issue by "reduc[ing] the number of contacts with customers and third parties" (Reijers & Liman Mansar 2005, p. 295). This is expected to reduce the processing time of the process and improve the resulting quality and process costs (Reijers & Liman Mansar 2005). An explicit focus on recognizing, framing, and analyzing problems enhances the likelihood of identifying the actual issues and then finding appropriate and well-fitting solutions (Baer et al. 2013). The explicit engagement with the overall issues allows for an in-depth assessment of the objectives, allowing one to find, formulate, and define problems beyond obvious ones (Abdulla and Cramond 2018).

Explorative techniques also narrow down the problem space by imposing constraints, but they are concerned with more diffuse, open-ended, or even unclear settings. For example, one design dimension of Gross et al.'s BPD-Space is *outcome*, which is further defined by the guiding questions "What are possible ends of the process? How can we react to negative outcomes?", along with potential characteristics, such as message events, temporal events, conditional events, among others. Such explorative techniques, in contrast, first openly analyze potential problems to further ideate on their potential solutions (Grisold et al. 2021; Rosemann 2020). This generates a broader problem understanding, which leads to wider associations for potential solutions for each of those – compared to an overall more fuzzy or limited problem understanding (Frishammar et al., 2016). In other words, the solution space is kept broad, which leads to different possible redesigns (Cropley 2006). Thus, the key difference between the two techniques pertains to the user guidelines that influence idea generation: these are more or less specific, and users can more or less anticipate the resulting redesign ideas upfront (Reiter-Palmon and Murugavel 2018).

To what extent, then, do these techniques lead to different redesign ideas? At face value, since the solution space is intentionally kept broad, explorative redesign techniques can be expected to lead to ideas that are less associated with the current status quo (Gross et al. 2021); hence, and in line with conceptual claims in the existing literature, explorative redesign techniques are expected to be more creative (e.g., Gross et al. 2021; Helbin and Van Looy 2021; Rosemann 2020). Less unclear, however, is what we can expect with regard to the quantity of produced ideas. We can assume that due to the broader solution space, explorative redesign techniques may trigger the combination, association, and reconfiguration of various (possible) components of a process, which leads to a high number of redesign ideas. One can also argue, however, that exploitative redesign methods center around a narrower problem space with more specific constraints, which, in turn, can facilitate idea generation (Acar et al. 2019; Arrighi et al. 2015; Rosso 2014). Hence, they might also generate a high number of redesign ideas. Ambiguity also exists in relation to the diversity of ideas. We can expect that explorative redesign techniques promote wide and broad associations and might thus enable a large variety of different redesign ideas. But on the other hand, since exploitative redesign techniques typically use a set of strategies or practices, it may be the case that users systematically go through a number of different perspectives, which can also lead to a broad range of redesign themes. Finally, we know from research on business process reengineering that the openness of explorative techniques might lead to ideas that are less appropriate for being too radical (Dennis et al., 2003), while exploitative techniques encourage smaller but less radical changes (Heeks, 2002). Such claims, however, deserve systematic attention.

3 Research design

3.1 Method

To compare how explorative and exploitative redesign techniques lead to different outcomes, we performed a free simulation experiment. Broadly speaking, a free simulation experiment is a type of experiment where the surrounding conditions and parameters are not strictly controlled (Fromkin and Streufert 1976). Free simulation experiments are often used to examine a phenomenon in close-to-real-world situations. This implies that participants are free to act, interact, and make decisions as they solve a given task. Hence, free simulation experiments allow for exploring a wide range of possible scenarios and conditions. In the context of BPM, free simulation experiments were used to study, for example, process modeling (Recker et al. 2013) or model comprehension (Recker et al. 2014).

Our experimental setting is based on the following treatment (Fig. 1). First, we presented participants with a task to simulate a possible process redesign scenario in practice (see section "Task" below). Subsequently, we exposed participants to an *unguided ideation* phase where they should solve the task by means of brainstorming, i.e., without using a specific redesign technique. Brainstorming plays a major



Fig. 1 Treatment of the free-simulation experiment

role in the generation of process redesign ideas (Gross et al. 2019; Kettinger et al. 1997; Paper 1997) and often precedes the generations of to-be process alternatives (Malinova et al., 2019). Thus, in the first part of the experiment, participants could offload ideas without interference before focusing on the application of a process redesign technique. Then, we initiated a *guided ideation* phase where participants were asked to use one of the two redesign techniques. Some participants were assigned to a group that uses an exploitative redesign technique, i.e., the Best Practices (Reijers & Limam Mansar 2005). Others were assigned to a group that uses an explorative redesign technique, i.e., the Business Process Design Space (Gross et al. 2021) (see below section "Participants").

3.2 Experimental task

The experiment included the task of generating redesign ideas for the start-up TooGoodToGo (*Too Good To Go International*, 2021)⁴. TooGoodToGo aims to connect customers with restaurants and stores to sell the leftovers of the day. We chose the underlying process of this company, as it represents a novel and innovative idea to counter the problem of food waste with no established competing services on the market. Thus, participants could not transfer or imitate ideas of directly competing services. The task description has been kept broad (see Table 1) and differs from more constrained and formal redesign tasks, such as when there is a formal BPMN model with more process-specific information and well-defined issues (Tsakalidis et al. 2019). The task can thus be seen to represent redesign demands associated with the digital age: dynamic, ill-defined, and ill-structured problem contexts that afford open-ended applications of digital technologies and data sources (Ahmad and Van Looy 2020; Mendling et al. 2020; Nambisan et al. 2017).

The design of the experiment implied that participants consider customer experience in their redesign ideas, which is a key ambition of BPM (Ahmad and Van Looy 2021; Dumas et al. 2018; Rosemann and vom Brocke 2015). We presented a textual description of the background, process, and organizational problem of TooGood-ToGo (Table 1). All participants received an introduction to the foundations of business processes and process redesign. Additionally, participants had the option to watch a one-minute video emphasizing the need to reduce food waste and presenting

⁴ The authors of this paper declare to have no affiliation or competing interests with the organization described in the experiment task.

Table 1	Description	of the	experimental	task
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Background	- TooGoodToGo is a start-up that aims to save meals from being wasted at the end of a business day
	- The company connects end customers with shops and restaurants (e.g., bakeries or fast food chains) through a mobile application
	- Vouchers (for leftovers) are bound to a specific time (usually shortly before the store closes)
	- Food options are oftentimes a surprise (the leftovers of the day), while usually heavily discounted
	- A limited amount of vouchers exists per shop and day
Process	 Once registered, users can discover participating restaurants and their offers based on location and time by using the app.
	 The customer selects a meal in the app and pays through PayPal, Google Pay, or a credit card in order to receive a digital voucher within the app. The customer then has to appear at the predefined time and location (the
	restaurant/shop) in order to pick up the food.
	4. The restaurant verifies the purchase through an in-app receipt on the cus- tomer's phone. In case the customer does not show up, the voucher expires.
	5. The customer can eventually rate the quality of the meals received and
	share their purchase on different social media platforms.
Problem	- The start-up wants to enhance the service in order to expand and increase the number of customers.

the underlying idea of TooGoodToGo. For both groups, we explained the respective redesign techniques and presented some examples.

The unguided ideation phase (see Fig. 1) lasted for 12 minutes. We used the data gathered during a pre-test to determine an adequate time limit. We did not provide further guidance for this part. For the second part (i.e., the guided ideation phase), participants were first assigned to one of the two redesign techniques; then, we asked both groups again to provide as many process redesign ideas as possible for TooGoodToGo within another 12-minute timespan.

In both parts of the experiment, we incentivized the creation of redesign ideas with a bonus payment of £0.25 for every high-quality idea and £0.05 for every low-quality idea. Additionally, we explicitly encouraged participants to "be creative", as this has been shown to have a facilitating effect on creativity tasks (Acar and Runco 2019; Chen et al. 2005).

3.3 Participants

We used a crowdsourcing platform to recruit participants for our experiment (e.g., Kummer and Mendling 2021). Crowdsourcing platforms have a diverse pool of research participants (Paolacci and Chandler 2014), and filters can be used to target specific samples (Goodman and Paolacci 2017). Targeting the actual population of interest as compared to a student sample increases the external validity of an experiment (Goodman and Paolacci 2017). Crowdsourcing platforms also have long-term incentive structures in place (e.g., internal ratings) that support the data quality (Goodman and Paolacci 2017).

Specifically, we used the crowdsourcing platform *Prolific* to recruit participants. Workers from Prolific have been found to show more interest in creativity-intensive tasks and are thus more suitable for creativity-oriented research (Oppenlaender et

		BPD- (N=	BPD-Space (N = 58)		BPD-Space (N = 58)		ractices 59)	Statistical test
		Mean/ Count	SD/ pct.	Mean/ Count	SD/ pct.			
	Age	28.33	8.20	29.12	7.76	t(115)=-0.536, p=0.59		
	Gender					$\chi^2(1)=1.443,$ $p=0.23, \varphi = -0.11$		
	-Female	26	44.8%	33	55.9%			
	-Male	32	55.2%	26	44.1%			
General	Highest degree completed					$\chi^2(2)=4.226,$ p=0.12, V=0.19		
Demographics	-High school	6	10.3%	6	10.2%			
	-Bachelor's degree	41	70.7%	32	54.2%			
	-Master's degree	11	19.0%	21	35.5%			
	Currently employed	42	72.4%	46	78.0%	t(115)=-0.691, p=0.49		
	Currently studying	23	39.7%	27	45.8%	t(115)=-0.663, p=0.51		
	Familiarity with TGTG							
Domain-	-TGTG unfamiliar	39	67.2%	39	66.1%	$\chi^2(2)=0.225,$ p=0.89, V=0.04		
related experience	-TGTG familiar/ unused	13	22.4%	15	25.4%	,, ,		
	-TGTG familiar/used	6	10.3%	5	8.5%			
	Number of TGTG usages	0.31	1.05	0.22	0.83	t(115)=0.515, p=0.61		
	Familiarity with process redesign techniques	3.44	1.52	3.63	1.54	<i>t</i> (115)=-0.653, <i>p</i> =0.52		
	Participation in process redesign initiatives					$\chi^2(2)=2.481,$ p=0.29, V=0.15		
	-No experience	26	44.8%	20	33.9%			
	-1-9 participations	24	41.4%	33	55.9%			
	-10-99 participations	7	12.1%	6	10.2%			
Task-related experience	-100 and more	1	1.7%	0	0%	*Participants included in 10- 99 participations' group for statistical analysis to meet requirements of γ^2		
	Experience working with business processes	3.30	1.54	3.56	1.50	t(115)=-0.946, p=0.35		
	BPM education					$\chi^2(1)=1.461, p=0.23, \varphi=0.11$		
	-BPM course	14	24.1%	9	15.3%			
	-No BPM course	44	75.9%	50	84.7%			

Table 2 Demographics of participants

al. 2020). We included participants with an undergraduate or graduate degree in a business-related field who have a basic understanding of business processes and are a potential target group for process redesign techniques. The choice of participants was driven by practical relevance. Business process redesign initiatives often involve a variety of practitioners who may not be directly involved in BPM, such as IT experts or managers, who may have little to no knowledge about business process redesign (Dumas et al. 2018; Kettinger et al. 1997). Their domain knowledge is connected to their role in a given organization, but they have peripheral knowledge about BPM (Dumas et al. 2018). The experiment was conducted in English, and we only included native English speakers to prevent a bias based on language proficiency. The demographics are shown in Table 2.

Participants were incentivized with a fixed compensation of £6 and performancebased compensation in the form of bonus payments throughout the experiment with a maximum of an additional £4 (see Section *experiment task* for further information). All participants needed to enable JavaScript and use a screen with at least 1200 pixels in width. For this reason, we asked participants not to use mobile devices.

3.4 Coding of redesign ideas

We coded all process redesign ideas. We followed previous studies in BPM that examined creative outcomes in business process design (Figl and Recker 2016) to select appropriate dependent variables. Evaluating ideas is a qualitative task and has interpretative features. We thus made the coding procedure transparent and relied on multiple raters. Table 3 presents an overview of all constructs that we used to evaluate the outcomes of our study.

Construct	Variable	Measurement	Definition	Adaptation to
Creativity of ideas	Originality	5-point scale (1=not at all original, 3=medium original, 5=very original)	The degree to which the idea is not only rare but is also inge- nious, imaginative, or surprising (Dean et al., 2006)	How uncommon is the idea in the given context of food pur- chases / a platform service in middle Europe? Is it a stan- dard in this context? How much does it differ from the cur- rent practice? Would it be unexpected for the customer?
	Appropriateness	5-point scale (1=not at all appropriate, 3=medium ap- propriate, 5=very appropriate)	Something that is useful, meets task constraints, and is purposeful (Figl and Recker 2016)	Is it a useful and purposeful change to the current pro- cess and its users? Is it feasible?
	Impact	5-point scale (1=no positive impact, 3=medium positive impact, 5=very posi- tive impact)	The positive tangible and intangible effects (consequences) of one entity's action or influence upon another (Figl and Recker 2016)	Does the change help the start-up expand and increase the number of customers?
Quantity of ideas	Fluency	Continuous scale	The number of rel- evant ideas provided (Cramond et al. 2005; Figl and Recker 2016; Guilford 1956)	Exclusion criteria are in Table A-1 in the appendix.
Diversity of ideas	Flexibility	Continuous scale	The number of dif- ferent categories (or shifts) in responses (Cramond et al. 2005; Guilford 1956)	The number of unique topic clus- ters, i.e., the number of addressed foci of redesign ideas

Table 3 Measurement of quantity, creativity, and diversity of ideas. (adapted from Figl and Recker 2016)

We split the coding of all process redesign ideas into three phases. In the first phase, we evaluated the fluency of redesign ideas, i.e., the number of *relevant* ideas (Figl and Recker 2016). We determined which responses represented process redesign ideas. Therefore, a subset of ideas was evaluated independently by two authors of this paper. In this iteration, we reached an agreement rate of 80%. The researchers discussed the disagreements and formulated clear exclusion criteria. Table A-1 in the appendix lists and describes these exclusion criteria and includes examples from the experiment data. We used the evaluation of fluency to remove participants who did not have at least one process redesign idea in the first or second part of the experiment from the subsequent evaluation (17 out of 134 participants); this indicated that they did not understand the experimental task or the redesign technique, or they did not spend sufficient attention to the experiment.

In the second phase, two authors clustered all remaining redesign ideas. This helped in providing a consistent rating of the following evaluation criteria. Furthermore, the clusters were used to operationalize flexibility (see Table 2). Building on the idea of hierarchical clustering, we followed a bottom-up approach and clustered the redesign ideas into two layers. This is depicted in Fig. 2. In the first step, we grouped similar individual ideas into *idea clusters*, i.e., ideas that are similar in scope. For example, we clustered the two individual ideas "Notify the end-user when they pass a participating business" and "When you walk past a restaurant offering the service, you get a notification" into the topic cluster Provide notifications based on *location (nearby restaurants).* Second, we clustered idea clusters into *topic clusters*, that is, idea clusters that share the same context. For instance, the previously mentioned idea cluster Provide notifications based on location (nearby restaurants), and the idea cluster *Provide notifications based on promotions* are grouped into the topic cluster Notifications. The clustering was exclusive, i.e., every individual idea was assigned to exactly one idea cluster, and every idea cluster was assigned to exactly one topic cluster. In cases where more than one idea/topic cluster were addressed, the predominant cluster was chosen. Table A-2 in the appendix provides examples from our study, and Table A-3 depicts all 25 topic clusters, their underlying rationale, and exemplary idea clusters. Two research assistants validated the resulting coding during the evaluation of creativity (see phase three). In 9.98% of cases, a disagreement had to be discussed and resolved.

In the third phase, we evaluated the creativity of ideas by means of their originality, appropriateness, and impact. Two research assistants and one author of this paper rated all ideas. The research assistants were trained using data gathered during a pre-



Fig. 2 Clustering of ideas into idea clusters and topic clusters

test. The research assistants successfully completed several BPM-related university courses and were purposefully chosen based on their study performance. The research assistants were at the end of their respective undergraduate and graduate studies and conducted process redesign-related research for their theses. The inter-rater reliability percentage score for this round corresponded to 85.62%. Table 4 illustrates the resulting evaluation of the creativity-related variables for solutions from the experiment. We used mean scores in each measure across the ideas to calculate originality, appropriateness, and impact for each participant.

4 Results

We recruited 134 participants, out of which 17 were excluded as no redesign ideas were provided in the first or second part of the experiment. 117 participants (BPD-Space: N=58; Best Practices: N=59) generated a total of 1,807 ideas, out of which

1		1 8 5
	Evaluation	Sample solutions from the experiment (individual ideas)
Originality	1 (low)	- Notifications from the app, things such as 'what are you having for tea tonight'
		- Allow customers to pay with cash instead of pre-pay
	3 (medium)	- Create a customer chat robot that will try and sort customer issues by common topics
		- Option to reserve a table in a restaurant at the end of the day for whatever is left
	5 (high)	 When a restaurant posts its food, a bidding process for vouchers could begin Users could form "Teams" to "compete" on metrics such as
		most food waste saved", "most new locations reviewed"
Appropriateness	1 (low)	 In-app advertisements Create your own purchasing system, i.e., Apple introduced Apple Pay to use instead of PayPal, etc.
	3 (medium)	- Add a one-touch feature so the customer does not have to go through a bunch of steps to order
		- Let voucher expire if customer is too far away to be on time
	5 (high)	 App remembers your history and makes suggested picks based on customer preferences, personalizes a lot more for individuals Do not let the voucher expire; give it to the homeless if the customer does not show up
Impact	1 (low)	 The restaurant should be able to ban customers who consistently do not show up as they are not helping to solve the problem At a designated time of the day, orders can be placed and sent over
	3 (medium)	- Option to reserve a Table in a restaurant at the end of the day for whatever is left
		- QR code to scan at restaurant to check availability of vouchers/ food
	5 (high)	 Lockers so staff can go home, but customers can be more flex- ible with time, like Amazon locker with a QR or code A free voucher to use off the customer's first order when they download the app

Table 4 Sample solutions from the experiment and their evaluation for originality

1,228 were evaluated as process redesign ideas. These ideas were clustered into 200 idea clusters, which were further clustered into 25 topic clusters. We screened the data for differences among the experimental groups. We conducted appropriate statistical tests for general demographics, domain-related experience (familiarity and usage of the service), and task-related experience (BPM and process redesign knowledge). For the data analysis in this and the following sections, we used SPSS (version 26). No significant differences among the two groups were found. An overview of the descriptive statistics can be found in Table A-2 in the appendix.

We conducted a one-way ANCOVA to determine the differences between the two groups (BPD-Space and Best Practices) regarding creativity (originality), quantity (fluency), and diversity of ideas (flexibility).

4.1 Explorative redesign leads to more creative ideas

Our findings show that the use of the BPD-Space (i.e., explorative redesign technique) leads to more creative redesign ideas than the use of the Best Practices (i.e., exploitative redesign technique).

In terms of originality, results of the experiment (see Table 5) indicate that users of the BPD-Space created more uncommon process redesign ideas than users of the Best Practices ($M_{\text{BPD}_{\text{Space}}}=2.04$, $SD_{\text{BPD}_{\text{Space}}}=0.67$; $M_{\text{best}_{\text{practices}}}=1.73$, $SD_{\text{best}_{\text{practices}}}=0.65$). There is also a tendency of design space users they achieved, on average, more appropriate process redesign ideas, meaning that these ideas appeared useful and realizable ($M_{\text{BPD}_{\text{Space}}}=3.34$, $SD_{\text{BPD}_{\text{Space}}}=0.51$; $M_{\text{best}_{\text{practices}}}=3.15$, $SD_{\text{best}_{\text{practices}}}=0.73$). However, this difference is not statistically significant F(1, 115)=2.605, p=0.109, partial $\eta^2=0.022$. Our analysis indicated heteroscedasticity through a significant Levene's test. We additionally ran a Welch's t-test, which did not indicate significance t(103.920)=1.619, p=0.109, $d_z=0.30$.

We further observe a tendency that users of the BPD-space created more impactful redesign ideas, that is, ideas that are considered to help the organization achieve its goal ($M_{\text{BPD}_\text{Space}}=2.81$, $SD_{\text{BPD}_\text{Space}}=0.61$; $M_{\text{best}_\text{practices}}=2.65$, $SD_{\text{best}_\text{practices}}=0.78$). This difference, however, was not statistically significant F(1, 115)=1.544, p=0.217, partial $\eta^2=0.013$. Again, we also ran Welch's t-test as our analysis indicated heteroscedasticity through a significant Levene's test. Welch's t-test did not indicate significance t(109.078)=1.245, p=0.216, $d_r=0.23$.

			F	р	η²	Mean score
			(df _{Num} ,			
			df _{Den})			
Originality	Between-subject	Redesign	6.749	0.011*	0.055	BPD-
		technique	(1, 115)			Space>Best
						Practices
Appropriateness	Between-subject	Redesign	2.605	0.109	0.022	BPD-Space>best
		technique	(1, 115)			practices
Impact	Between-subject	Redesign	1.544	0.217	0.013	BPD-Space>best
-	-	technique	(1, 115)			practices

 Table 5
 Analysis of the originality of the redesign ideas by means of their originality

Note: *Correlations with $p \le 0.05$, **Correlations with $p \le 0.01$

Furthermore, we used the mean scores for the evaluation of originality, appropriateness, and impact for each participant. While this is a common approach for the evaluation of ideation tasks, it comes with the disadvantage that it penalizes the generation of outstanding ideas by averaging them with low-rated ideas (Silvia et al. 2008). For instance, when a participant generates two highly original ideas and two less original ones, the participant has a mean originality score similar to another participant with four mediocre ideas. However, in the context of process redesign, it is the best-rated ideas that are selected for implementation and prove useful eventually.

Building on the idea of *top-scoring* (Silvia et al. 2009, 2012), we thus further assessed the originality of process redesign ideas using the top-1 scoring approach (i.e., using the highest rating in a measure for a participant solely) and the top-2 scoring approach (i.e., using the mean of the two highest ratings in a measure for a participant or the top-1 score if only one redesign idea was provided). For instance, if a participant generated three redesign ideas in the unguided ideation phase that were rated with originality scores of 1, 2, and 4, respectively, the top-1 originality score for this participant in unguided ideation is 4, while the top-2 score is 3. We conducted an unpaired t-test to test for statistically significant differences. Shapiro-Wilk tests for the dependent variables were significant (at the p=0.05 level), indicating non-normal distributions. However, simulations have found the t-test to be fairly robust to this type of violation, especially for larger sample sizes (Edgell & Noon, 1984). Table 6 summarizes the results of our analysis.

We see a statistically significant difference between users of the BPD-Space (G1) and Best Practices (G2) for originality using top-1 scoring ($M_{\text{Top1}_{G1}}=3.5$, $SD_{\text{Top1}_{G1}}=1.37$; $M_{\text{Top1}_{G2}}=2.64$, $SD_{\text{Top1}_{G2}}=1.23$), with mean scores for Best Practices lower by 0.86 (95%-CI [0.38, 1.33]), t(113.271)=3.56, p=0.001, $d_z=0.66$ as well as for top-2 scoring ($M_{\text{Top1}_{G1}}=3.02$, $SD_{\text{Top1}_{G1}}=1.21$; $M_{\text{Top1}_{G2}}=2.28$, $SD_{\text{Top1}_{G2}}=1.03$) with mean scores for Best Practices lower by 0.74 (95%-CI [0.33, 1.15]), t(111.653)=3.552, p=0.001, $d_z=0.66$.

No statistically significant differences between the two approaches were found for appropriateness, with top-1 scoring ($M_{\text{Top1}_{G1}}=4.34$, $SD_{\text{Top1}_{G1}}=0.58$; $M_{\text{Top1}_{G2}}=4.15$, $SD_{\text{Top1}_{G2}}=0.76$), t(108.198)=1.539, p=0.127, $d_z=0.29$ and top-2 scoring ($M_{\text{Top1}_{G1}}=4.09$, $SD_{\text{Top1}_{G1}}=0.62$; $M_{\text{Top1}_{G2}}=3.84$, $SD_{\text{Top1}_{G2}}=0.84$), t(106.741)=1.807, p=0.074, $d_z=0.33$. This relates to the results of the hypothesis testing, in which no statistically significant differences were found for appropriateness using mean scores.

Table 6 Analysis of the originality of the redesign ideas using top 1 and top 2 scoring

		Top score	t (df)	р	dz
Top 1 scoring	Originality	BDP-Space>Best Practices	3.560 (113.271)	0.001**	0.658
	Appropriateness	BDP-Space>best practices	1.539 (108.198)	0.127	0.285
	Impact	BDP-Space>best practices	2.731 (109.453)	0.007**	0.505
Top 2 scoring	Originality	BDP-Space>Best Practices	3.552 (111.653)	0.001**	0.657
	Appropriateness	BDP-Space>best practices	1.807 (106.741)	0.074	0.334
	Impact	BDP-Space>best practices	2.862 (144.071)	0.005**	0.529

Note: *Correlations with $p \le 0.05$, **Correlations with $p \le 0.01$

Statistically significant differences were found using top-1 scoring for impact $(M_{\text{Top1}_G1}=3.95, SD_{\text{Top1}_G1}=0.76; M_{\text{Top1}_G2}=3.51, SD_{\text{Top1}_G2}=0.97)$, with mean scores for best practices lower by 0.44 (95%-CI [0.12, 0.76]), $t(109.453)=2.731, p=0.007, d_z=0.51$ as well as for top-2 scoring $(M_{\text{Top1}_G1}=3.67, SD_{\text{Top1}_G1}=0.79; M_{\text{Top1}_G2}=3.23, SD_{\text{Top1}_G2}=0.88)$ with mean scores for best practices lower by 0.44 (95%-CI [0.14, 0.75]), $t(144.071)=2.862, p=0.005, d_z=0.53$. In conclusion, changing the evaluation approach from mean scores to top-1 and top-2 scores confirms the significant results regarding originality. In turn, no statistically significant differences were found regarding appropriateness when changing the evaluation approach. However, we gathered further evidence that the BPD-Space is more impactful compared to the best practices when looking at the best-rated ideas (for both the top-1 and top-2 scoring approaches), but not when taking mean scores (see Table 5).

4.2 Explorative redesign leads to a higher number of ideas

Our findings suggest that using an explorative process redesign technique will create a *higher quantity* of process redesign ideas than using an exploitative process redesign technique. This is expressed through the fluency of process redesign ideas. The results show that participants using the BPD-Space created more relevant ideas than participants using the Best Practices. We found this difference to be statistically significant F(1, 115)=9.762, p=0.002, with partial $\eta^2=0.078$ indicating a medium effect size. The results are depicted in Table 7.

Further analyzing the resulting redesign ideas, we analyzed if the higher quantity can be associated with a wider range of covered redesign topics. As described before, we clustered all ideas into idea and topic clusters (see Table A-3 in the appendix). Our analysis shows that the individual ideas created by the participants using the different approaches were not equally distributed across the different clusters. Figure 3 lists all 25 topic clusters with the number of comprising individual ideas (bar chart, left y-axes) and the cumulative percentage of individual ideas in topic clusters (line graph, right y-axes) for the unguided ideation and the two redesign techniques. Notably, for unguided ideation (a), the total number of comprising individual ideas includes ideas from all participants in the first phase. The slope of the cumulative percentage curve is similarly steep for (a) the unguided ideation and (c) the Best Practices. For both, 10 topic clusters comprise more than 80% of individual ideas. The cumulative percentage curve is flatter for the BPD-Space. In this case, 14 topic clusters comprise more than 80% of individual ideas. This means that users of the BPD-space covered together a wider range of totally available topic clusters compared to users of the Best Practices and unguided ideation.

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$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Mean sco	η²	р	F					
Fluency Between-subject Redesign 9.762 0.002** 0.078 BPD- technique (1, 115) Space: Practic			n)	(df _{Num} , df _{Den}					
	BPD- Space>E Practices	0.078	0.002**	9.762 (1, 115)	Redesign technique	xt	tween-subjec	Betw	Fluency
	>E	Mean s BPD- Space > Practic	η ² Mean s 0.078 BPD- Space 2 Practic	p η² Mean s) 0.002** 0.078 BPD-Spaces Practic Practic	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{cccc} F & p & \eta^2 & \text{Mean s}\\ \hline & & & & \\ & & & & \\ & & & & \\ \text{veen-subject} & \text{Redesign} & 9.762 & 0.002^{**} & 0.078 & \text{BPD-}\\ & & & & & \\ & & & \\ & & & & \\ & & & \\ & & & & \\ & & & & \\ & & & & \\ &$	$\begin{array}{c ccccc} F & p & \eta^2 & \text{Mean s} \\ \hline & & & & \\ \hline & & & & \\ \hline & & & & \\ \hline & & & &$

Table 7 Analysis of the quantity of redesign ideas using the fluency of ideas



Fig. 3 Distribution of individual process redesign ideas across topic clusters for different approaches

In summary, our findings suggest that the use of the BPD-Space as an explorative redesign technique leads to a higher number of generated ideas. The higher quantity is related to a wider range of covered topic clusters.

4.3 Explorative redesign leads to more diverse redesign ideas while exploitative redesign leads to more operationalizable ideas

Our results suggest that using an explorative redesign technique will create *more* diverse ideas than using an exploitative process redesign technique (see Table 8). Diversity is expressed through the flexibility of the ideas, that is, the number of unique topics and themes that are covered by means of redesign ideas. The BPD-space led, on average, to more diverse process redesign ideas ($M_{\text{BPD}_{\text{Space}}}$ =4.56, $SD_{\text{BPD}_{\text{Space}}}$ =0.24; $M_{\text{best}_{\text{practices}}}$ =3.27, $SD_{\text{best}_{\text{practices}}}$ =0.23). After adjusting for creative attitude (preference for ideation), the results differed statistically significant F(1, 114)=14.987,

Table 8 Analy	Fable 8 Analysis of the diversity of redesign ideas using the fluency of ideas								
			F (df _{Num} , df)	р	η^2	Mean score			
Flexibility	Between-subject	Redesign technique	14.987 (1,114)	<0.001**	0.116	BPD- Space>Best			

Table 8	Analysis of the diversity of redesign ideas using the flue	ncy of idea	S	
	F	р	η^2	Mea

Note: *Correlations with $p \le 0.05$, **Correlations with $p \le 0.01$

p < 0.001, with partial $n^2 = 0.116$ indicating a large effect size. For the dependent variable *flexibility*, the Shapiro-Wilk test was significant, indicating that residuals are not normally distributed, and a significant Levene's test indicated heteroscedasticity of the data. While ANCOVA is fairly robust to a violation of either of these parametric assumptions in isolation, it is less robust to a simultaneous combination of both violations (Olejnik & Algina, 1984). For this reason, we calculated a Mann-Whitney-U test to gather further evidence. According to this test, there was a statistically significant difference in flexibility between both groups with U=1114.000, Z=-3.311, p=0.001. Based on this evidence, we find support for hypothesis 3.

We further analyzed how many clusters a participant *newly* addressed in the second part of the experiment, which were not previously addressed in the first part of the experiment (in the unguided ideation part). We found that users of the BPD-Space addressed, on average, a higher number of new topic clusters than users of the Best Practices (M_{BPD Space}=3.02, SD_{BPD Space}=1.58; M_{best practices}=2.12, SD_{best practices}=1.33). The results of the unpaired t-test indicate that this difference is statistically significant t(115)=3.398, p=0.001, $d_z=0.63$. This means that users of the BPD-space covered, on average, more *new* topic clusters (i.e., topic clusters not covered in the first part of the experiment) than users of the Best Practices. The mean number of new topic clusters created in the second part of the experiment was 0.90 new topic clusters lower (95%-CI[0.38,1.42]) for users of the Best Practices compared to users of the BPD-Space.

We further investigated the extent to which the process redesign techniques (second part of the experiment) covered the different topic clusters. Figure 4 depicts topic clusters (left y-axis), the total number of participants covering a topic cluster in experiment part 2 (right y-axis), and the percentage of participants covering a topic cluster through a corresponding technique in relation to the total number of participants covering the topic cluster in experiment part 2 (x-axis). For instance, 30 participants created at least one idea, which was allocated to the topic cluster *Notifications*. Out of these 30 participants, 23 participants (about 77%) were using the BPD-Space, and 7 participants (about 23%) were using the Best Practices. To increase validity, we only included topic clusters that were covered by at least 10 participants in the second part of the experiment. In Fig. 3, we indicated which topic clusters were dominated through the BPD-Space or Best Practices (i.e., the proportional difference within a topic cluster between the two techniques is 10% or more). 10 topic clusters were dominated through the BPD-Space with the greatest proportional difference in the



<sup>BPD-Space Best Practices
Percentage of participants covering topic cluster with corresponding technique in
relation to total number of participants covering topic cluster in experiment part 2</sup>

Fig. 4 Topic clusters and their coverage through the different redesign approaches

topic clusters: *Customer engagement*, *Social/Environmental purpose*, and *Onboarding*. Ideas from the most dominant BPD-Space cluster (*Customer engagement*) are, for instance, "Engage with customer in restaurant" and "Provide customer award badges". We notice that while these ideas provide some direction, they are less concrete when it comes to the actual operationalization of these ideas, i.e., they do not provide concrete guidance at the process model level.

Four topic clusters were dominated through the Best Practices with the greatest difference in *Restaurant work organization*, *Added support*, and *Payment*. The cluster with the most pronounces dominance of the best practices (*Restaurant work organization*), for instance, dealt with the definition or specification of restaurant work activities. Examples of sub-categories falling into this cluster are "Have restaurant employees designated for TGTG activities" or "Separate tasks to different employees in a restaurant". These ideas deal specifically with the operationalization of restaurant activities on a lower level of abstraction (at the process model level). No significant difference (i.e., the proportional difference within a topic cluster between the two groups was smaller than 10%) was found for the clusters *Purchase*, *Range of offerings*, and *delivery*.

To sum up, our findings suggest that the use of the BPD-Space as an explorative redesign technique leads to more novel redesign ideas, as expressed through the unique topics and themes that are covered. However, the best practices of process redesign provide more concrete guidance when it comes to the process flow-related operationalization of the resulting ideas.

5 Discussion

5.1 Implications for Research

5.1.1 The complementarity of exploitative and explorative redesign techniques

First and foremost, our study provides evidence that different forms of process redesign techniques—i.e., explorative and exploitative redesign techniques—lead to different outcomes in terms of process redesign ideas. Explorative redesign leads to a higher number of ideas that are more creative and diverse. Exploitative redesign leads to more process flow-related redesign ideas, focusing on the implementation level of business processes.

At face value, our findings support what is suggested in the primarily conceptual literature: Explorative redesign is more suitable when organizations seek to explore a wide range of opportunities that are triggered by new digital technologies, data, or services. Exploitative redesign techniques should be used for other contexts, such as when organizations need to resolve specific issues within defined constraints. The use of an exploitative technique will likely lead to a lower number of redesign ideas; these ideas, however, may better consider the actual problem context by providing more concrete guidance at the operationalization level of business processes. Along these lines, our analysis confirms that the different techniques can indeed trigger different areas of change.

From a more abstract point of view, our findings suggest that both approaches vield different strengths and can be used complementarily in business process redesign initiatives. For example, when an organization seeks to leverage new opportunities for processes and services on the grounds of new digital technologies and data sources (e.g., Lehrer et al. 2018; Nambisan et al. 2017), it can first use explorative redesign techniques, and later refine them by means of exploitative redesign techniques. This refinement through exploitation is vital, as it ensures that the innovative ideas generated through exploration are grounded in the practicalities and realities of the organization's existing capabilities and resources, thereby enhancing their feasibility and likelihood of successful implementation. In other words, process managers, analysts, and designers should not approach business process redesign projects in terms of using either one or the other approach; rather, they should utilize both at different stages of the project. This helps to achieve a delicate balance that is at the core of ambidextrous BPM: one can pioneer radical innovations, venturing into new, promising, yet inherently risky domains while at the same time making incremental improvements to established business operations, enhancing efficiency and effectiveness within known parameters (Helbin and Van Looy 2021; Kerpedzhiev et al. 2020; Reilly and Tushman 2004; Rosemann 2014). Future research can investigate, for example, when one should switch from one approach to another or how both approaches can be combined in the same redesign method. Particularly, the timing and sequencing of exploitative methods post-exploration could be pivotal in maximizing the benefits of both approaches in a synergistic manner.

As redesign techniques are constantly changed and adapted (Gross et al. 2021; Malinova et al. 2022), our results further suggest how process redesign techniques can be further developed. Based on the findings of our study, one key question that emerges is how and to what extent techniques for explorative BPM can enable the development of ideas that are not only novel and creative but also consider the constraints of a given context. Along these lines, it would be interesting to study how both approaches can be designed within overarching redesign methods, considering the use of the respective techniques at specific stages and in light of the goal of a redesign initiative.

5.1.2 Acknowledging the role of idea generation in business process redesign techniques

Furthermore, our study highlights the role of idea generation in business process redesign. Idea generation is a necessary part of process redesign to map, for example, a suitable solution to a given process issue (e.g., Kettinger et al. 1997). The BPM literature, however, has not explicitly paid attention to idea generation in redesign techniques. Overall, the implicit assumption is that ideas emerge as the user is guided through sequences to steps; to this end, they represent an optimal fit to a given process issue. Interestingly, the methodological structure inherent in many exploitative methods can facilitate this idea-generation process, providing a more streamlined and structured approach that can enhance the ease and effectiveness of generating suitable solutions. More recent explorative redesign techniques (e.g., Grisold et al. 2021; Gross et al. 2021; Machado and van de Ven 2023; Rosemann 2020; Van Looy 2021a), place their focus on innovation (Kohlborn et al. 2014; Malinova et al. 2022), which in turn, is inherently based on idea generation. Our comparison of two techniques-the Best Practices as an exploitation and the Business Process Design Space as an explorative redesign technique-provides the first empirical indicators of how they enable idea generation to different extents.

Future research can build on our findings in two ways. First, more empirical work can be done to examine the role of idea generation in redesign techniques further. To this end, one may not only analyze the outcome (i.e., the resulting redesign ideas) but also how idea generation is enabled by means of different cognitive processes. Insights obtained through neuroscience-related methods can be used to study the underlying mechanisms of idea generation (Benedek 2018; vom Brocke et al. 2013).

Second, future research can explicitly capitalize on the role of idea generation when developing new redesign techniques. In light of the increasing interest in explorative techniques, for example, one could explicitly build on elements to promote idea generation in desired ways. Research on creativity and innovation indicates, for example, that emergent thinking describes the match-making process between technological potentials and problems that can be solved with them (Cromwell, Haase et al. 2023; Von Hippel and Von Krogh 2016). Applied to redesign, this process does not start within the problem space but within the solution space of a certain fundamental technology. In the context of digital technology developments, this enables the development of a concrete understanding of the potential of how companies can evolve further and adjust their business processes through technology integration (e.g., for ChatGPT, see Cromwell et al. 2023).

5.1.3 The role of business process management in the digital age

Our findings are also relevant in light of the claims that digital technologies offer unprecedented opportunities for innovation and change in business processes (Baiyere et al. 2020; Mendling et al. 2020; Nambisan et al. 2017; Yoo et al. 2012). The key assumption here is that many of the emerging potentials cannot be predicted or anticipated (Baygi et al., 2021; Feldman & Sengupta, 2020); rather, there are many potential benefits for process redesigns that need to be gradually discovered (Du et al., 2019; Glaser 2017). Companies strive to get the most out of emerging opportunities in order to sustain competitive advantage (Faraj & Pachidi, 2021). Many organizations are BPM-driven, and any (digital) innovation needs to play out on the level of processes (Ahmad and Van Looy 2021; Van Looy 2021b; vom Brocke and Mendling 2018). Against this background, explorative redesign techniques reveal a broad range of possible redesign scenarios. Explorative redesign techniques not only lead to more diverse and original ideas but there is also evidence that the best-rated ideas challenge existing assumptions. In addition, it is important that organizations break out of their established beliefs and routines to fully recognize how digital technologies can provide new business models and processes (Rezazade Mehrizi and Lashkarbolouki 2016). As our results show, explorative redesign techniques promote the development of a wide range of ideas (as presented in terms of the number of topics) and are thus useful for organizations to explore a wide range of ideas that are potentially unrelated to the organization's state of the art (Rezazade Mehrizi et al. 2022). Future research can examine how organizations can initiate unlearning processes to ensure that novel redesign ideas are not only considered but also effectively implemented (Klammer and Gueldenberg 2019).

5.2 Implications for practice

The results of this study have several implications for practice. First, our experiment gives empirical evidence that the selection of a process redesign technique has an impact on the quantity, creativity, and diversity of resulting process redesign ideas. Thus, organizations should purposefully select an adequate technique. When originality or flexibility of resulting process redesign ideas is pursued, organizations should capitalize on explorative redesign techniques. Furthermore, considering the vast array of exploitative BPM methods known for their structured approach and ease of use, organizations should also integrate these methods into their selection process. Our analysis regarding the diversity of ideas indicates that the different techniques address different areas for improvement. Taking this into account, a combination of explorative and exploitative redesign techniques can support the diversification of resulting process redesign ideas. This combination leverages the strengths of both approaches, where exploitation techniques can enhance and refine the creative ideas generated through exploratory techniques, ensuring practicality and alignment with organizational capabilities. This diversification is further enhanced by the structured and user-friendly nature of many exploitative BPM methods, making them accessible and effective for a wide range of users.

Second, the distribution of ideas suggests that it is worth creating a large number of ideas to address a wide spectrum of potential changes. Covering a wide and diverse spectrum of ideas can help an organization outperform another through a more efficient and effective identification of redesign ideas (Dumas et al. 2018). Besides the use of process redesign techniques, organizations could also seek external support to capture a wide range of process redesign ideas, e.g., through crowdsourcing. In this endeavor, exploitative BPM methods, with their structured frameworks and ease of implementation, can play a crucial role in synthesizing and refining these diverse inputs.

Third, our research reveals that while exploitative redesign approaches enhance incremental improvements in established processes, exploratory approaches are key to driving radical innovation into new and unchartered areas. The synergy of these approaches is essential; while exploratory methods bring forth groundbreaking ideas, exploitative methods are instrumental in refining these ideas for practical, efficient implementation. Effective innovation management requires aligning strategies for market potential, and customer needs alongside fostering an adaptive organizational culture. Balancing these approaches allows companies to optimize existing operations while exploring new opportunities, combining the strengths of both strategies for comprehensive innovation success (De Brentani 2001).

5.3 Limitations

This study comes with limitations. First and foremost, it is important that our study design has boundary conditions that limit its applicability to other contexts. First, the redesign task was broad, and the problem context was described (as text) in a rather abstract way, reflecting ill-defined and ill-structured problem contexts that can be said to characterize the digital age (Ahmad and Van Looy 2020; Leonardi and Neeley 2022; Mendling et al. 2020; Nambisan et al. 2017). In contrast, redesign initiatives may also be based on detailed process models with specific and well-defined problems in mind (e.g., issues in throughput time and costs). Furthermore, when ideating new redesign ideas, one might have in mind that TooGoodToGo is a young, entrepreneurial organization that is receptive to new ideas (for example, the branding presents the company as young and open-minded). Hence, when ideating ideas for more traditional companies that might even be known for bureaucratic structures, designers might be biased and come up with less radical ideas (assuming, for example, that they cannot be realized anyway). In addition to that, redesign tasks can be more specific in terms of expectations, resources, and other constraints. Finally, the internal strategic orientation, as well as organizational capabilities, might have a strong effect on the redesign process and the resulting redesign ideas. Taken together, our findings need to be put into the context of the specific task features and their associated assumptions. Other contexts with more specific problem descriptions might lead to different results, especially as compared to an exploitative technique's appropriateness and impact.

Furthermore, there are differences between process redesign projects in organizations and our study design. For instance, the application of process redesign techniques in organizations is often guided by experienced facilitators (Dumas et al. 2018; Jeston 2014), and it is regarded as a success factor in training users in a certain redesign technique (Kwak and Anbari 2006). In contrast, participants of the experiment were only introduced to the corresponding redesign techniques and no facilitator who assisted during the ideation process. This raises questions about the replicability of our results in real-world settings where facilitator expertise and extensive training in redesign techniques, particularly exploitative techniques, play a crucial role. While ideation processes in organizations are also limited in time (e.g., to the time span of a meeting or a workshop), the allocated time in the experiment (12 minutes for the unguided ideation phase and the guided ideation phase, respectively) can be considered short. Research indicates that performing creative tasks under strict conditions may limit predictability in real-life situations and thus lead to high internal validity but limited ecological validity (Acar and Runco 2019; Zeng et al. 2011). We see this as a natural limitation of laboratory experiments. The limited time frame also poses a particular challenge for the application of exploitative techniques, which often require deeper analysis and familiarity with existing processes. Thus, ecological validity has to be further assessed in future research.

An obvious limitation is a restriction to two process redesign techniques. Methods for process redesign have been continuously proposed, refined, and adapted in the last decades (Gross et al. 2021; Malinova et al. 2022). Our key conceptual move to differentiate between exploitative and explorative process redesign techniques aimed to provide a structure to these techniques, and we purposefully chose two representative approaches that represent the characteristics of exploration and exploitative redesign techniques. As for the coding of any qualitative data, the evaluation of redesign ideas is subjective in nature. We used independent raters when evaluating the ideas, and raters were trained using data gathered during a pre-test. The subjective nature of this evaluation could particularly impact the assessment of ideas generated through exploitative methods, which might be less immediately striking but could offer substantial incremental value.

6 Conclusion

In this study, we compare idea generation in exploitative (Best Practices of Process Redesign) and an explorative redesign technique (Business Process Design Space). Comparing the outcomes of these two techniques, we find that the use of an explorative redesign technique leads to a higher quantity of process redesign ideas that are more creative and novel. The best-rated ideas of explorative process redesign techniques are also more impactful. However, both approaches cover different areas of improvement and should thus be purposefully combined. Our results indicate that idea generation plays an important role in process redesign techniques. Particularly, the integration of structured methodologies from exploitative methods can enhance the effectiveness of idea generation in process redesign, ensuring that the creative potential of exploration is effectively harnessed and applied in a practical, efficient manner.

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