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INNOVATION WORK AND ROUTINE DYNAMICS

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Innovation work refers to the process of developing new outcomes, including technologies, products, and services (Garud, Tuertscher, & Van de Ven, 2013). As organizations face pressures to innovate their core offerings at an ever faster pace, many organizations attempt to routinize innovation work (see e.g., Hargadon, 2005). In this chapter, we focus on organizational routines for doing innovation work rather than innovation and change within routines. In what follows, we first discuss why routines and innovation are often considered an unlikely couple. We then conceptualize innovation work and provide a brief overview of the unique characteristics and current debates within this stream of literature, before we review studies of innovation work that adopted a routine dynamics lens. Following this overview, we show how routine dynamics scholars have benefited from studying innovation processes and how innovation scholars have benefited from adopting a routine dynamics perspective. We conclude by identifying opportunities for future research.

1. INNOVATION AND ROUTINES—AN UNLIKELY COUPLE?

Scholars and practitioners alike have often assumed a sharp distinction between ‘routine’ and ‘innovation’ tasks (e.g., Burns & Stalker, 1961; Obstfeld, 2012; Tushman & OReilly, 1996), suggesting that routines are the antithesis of innovation (Amabile, 1997; Ford & Gioia, 2000). This dichotomous view is in line with how organizational scholars have traditionally conceptualized firm behavior, such as by separating exploitation and exploration (March, 1991), stability and change (Farjoun, 2010), and efficiency and flexibility (Adler, Goldoftas, & Levine, 1999). The same distinction has been made for routines and innovation (Becker, 2004) based on the conviction that the flexibility required for innovation is undermined by routinization (Bartunek, Trullen, Immediato, & Schneider, 2007)—and maybe also because the word ‘routine’ connotes ‘inertia (Hannan & Freeman, 1984) and mindlessness (Ashforth & Fried, 1988). Thus, how organizations “get routine things done” is often

juxtaposed with “how [organizations] pursue markedly new things through creative projects” (Obstfeld, 2012: 1571) .

Pointing to the importance of engaging with the relationship of “routine behavior and innovation”, Nelson and Winter (1982: 129) suggested that firms can develop meta-routines (i.e., heuristics and strategies) to enable innovation work. Such meta-routines change and direct other routines, which enhances the overall performance of innovation tasks (Adler et al., 1999: 43), as routinization may free up the cognitive space and provide the stability necessary for innovation work (Becker & Zirpoli, 2009; Ohly, Sonnentag, & Pluntke, 2006). Building on these ideas, several scholars have identified specific standardized processes and procedures for innovation, or what Pavitt (2002) refers to as “innovation routines”, that are meant to systematize innovation work and creative processes. For example, studies in innovation management have reported on specific rules and standard operating procedures (SOPs) that enable firms to effectively develop product and service innovations (e.g., Cooper, 2008; Griffin, 1997).

This line of research has pointed at a more nuanced relationship between routines and innovation, according to which the routinization and systematization of innovation work facilitates, rather than inhibits, the development of innovations. However, we still lack important insight into the inner workings of such routines, because many scholars have treated innovation routines as stable entities—seeing them as univocal and persistent—in their efforts to investigate antecedents of innovation routines and overall effects on innovation tasks. This assumption is challenged by detailed empirical studies on innovation work. For example, Christiansen and Varnes (2009) found that the translation of pre-defined SOPs and rules into daily practices happens in a much more flexible way than previously assumed, and may involve alterations, modifications, and even the abandoning of rules and SOPs altogether.

Whereas many organizational routines are oriented at generating consistency in outcomes, innovation routines enable generating novel outcomes time and again. To enable a deeper understanding of how innovation routines enable novel outcomes, we do not only need more research that takes a processual perspective on innovation work in general (e.g., Burgelman, 1983; Garud, Gehman, & Kumaraswamy, 2011; Garud & Rappa, 1994; Van de Ven, Polley, Garud, & Venkataraman, 1999) but also research that accounts for the internal dynamics of routines (Feldman, Pentland, D'Adderio, & Lazaric, 2016). The routine dynamics lens is uniquely suited for this purpose as it provides the conceptual resources for uncovering the inner workings of innovation routines, for studying the interplay of interdependencies between actors and actions over time (Deken, Carlile, Berends, & Lauche, 2016; Sele & Grand, 2016), and for disentangling formal SOPs from actual routines (Booth, 2020; D'Adderio, 2008). By distinguishing the artifact that represents a routine from the actual enactment of that routine (D'Adderio, 2011), we are able to see the interplay between the performative qualities of SOPs; i.e., how SOPs shape enactments of the routine and the agency involved in such enactments. In this sense, SOPs are blueprints for action, but do not equal such actions. A useful analogy is to consider a SOP as a sourdough starter: it is a key ingredient for the act of baking bread and therefore, it does not fully encapsulate the practice (Pentland & Feldman, 2005) nor is it separate from it (D'Adderio, 2008).

2. CHARACTERIZING INNOVATIONS-IN-THE-MAKING

Innovation has often been conceptualized as a particular outcome such as a novel product, process, service, or technology. Instead, we adopt a process view of innovation that focuses on the actions taken to support “the invention, development, and implementation of ideas” in organizations (Garud et al., 2013), which emphasizes that innovation work is

characterized by emergence, dispersed collaboration between heterogeneous actors, and novelty (e.g., Dougherty, 1992; Jelinek & Schoonhoven, 1990).

2.1. Emergence

Innovation work is characterized by emergence because the ‘object of innovation’—the novel service, product, process, or technology—remains ‘in-the-making’ for sustained periods and only gradually becomes manifest over time. Over the course of the innovation process, multiple ‘intermediate outcomes’ are produced that remain incomplete, underspecified, and ambiguous (Bijker, 1995; Garud, Nayyar, & Shapira, 1997). However, through such intermediate outcomes (e.g., sketches, scenarios, prototypes, or simulations) the innovation-in-the-making increasingly materializes (D’Adderio, 2001; Deken & Lauche, 2014; Van de Ven et al., 1999).

The emergent characteristics of innovation-in-the-making can explain why innovation scholars have taken a central role in the development of processual approaches in the field of organization studies (Garud et al., 2013; Van de Ven et al., 1999; Van de Ven & Poole, 1990) and contributed to the broader shift from studying ‘outcomes’ to ‘processes’ (*refer to chapter by Tsoukas*). Innovation process scholars have shown how innovations emerge through sequences of actions and events and found that innovation work progresses in multiple emergent paths and often involves false-starts and dead ends (Van de Ven et al., 1999). Particularly in earlier stages, the envisioned innovation is likely to change multiple times and often even radically so. Process studies on innovation have thus emphasized the innovators’ intentional efforts that are needed to ensure that an early, ill-defined idea materializes and is eventually implemented (Akrich, Callon, & Latour, 2002). Because the properties and structure of innovations are not known in advance, actors need to adapt their course of action over time (Simon, 1973) and rely on experimentation and learning along the way (D’Adderio, 2001; Rerup & Feldman, 2011; Thomke, 1998).

2.2. Dispersed collaboration between heterogeneous actors

Innovation work is typically performed by various heterogeneous actors who come from different knowledge, functional backgrounds, communities, or thought worlds (Adler, 1995; Barley, 1986; Dougherty, 1992). The diversity inherent in such dispersed collaborations provides a fertile ground for making creative recombinations and sparking new ideas for innovation (e.g., Hargadon & Sutton, 1997; Woodman, Sawyer, & Griffin, 1993). Moreover, as various aspects have to be considered for the development process of new products, diverse knowledge from functions such as manufacturing, sales, marketing, and engineering is required (Wheelwright & Clark, 1992).

The involvement of heterogeneous actors, however, implies that different thought worlds and practices come into play that may complicate collaboration (Carlile, 2002, 2004; Dougherty, 1992; Harvey, 2013). Actors will have different perceptions of the innovation and all of them will hold an incomplete view of the innovation (Deken & Lauche, 2014; Van de Ven, 1986). Any source of difference between actors may become—often unexpectedly—consequential for performing the innovation work and may result in breakdowns of the collaboration (Carlile, 2002, 2004). Innovation scholars who adopt a practice perspective (*refer to Chapter by Feldman*) have shown the intricate complexities of collaborating across boundaries and the resulting need for translation work (Bechky, 2003; Brown & Duguid, 1991; Carlile, 2002, 2004; Dougherty, 1992; Nicolini, 2010; Nicolini, Mengis, & Swan, 2012). In such collaborations routines play a central part in coordinating the involvement of diverse actors; for example, by providing a shared means to engage over and strive for (Adler, 1995; Jarzabkowski, Lê, & Feldman, 2012; Okhuysen & Bechky, 2009).

2.3. Novelty

The novelty associated with innovation-in-the-making often renders innovation work illegitimate (Dougherty & Heller, 1994; Kannan-Narasimhan, 2014; Van Dijk, Berends,

Jelinek, Romme, & Weggeman, 2011). Actors' intentional efforts are needed to resolve and push the innovation-in-the-making from an early, ill-defined idea to becoming materialized and accepted by internal and external audiences (Hargadon & Douglas, 2001; Kannan-Narasimhan & Lawrence, 2018). For that reason, Bartel and Garud (2009) stress the importance of communicative actions in creating legitimacy for what is considered new.

To address the challenges associated with these characteristics of innovation work, many firms have developed extensive SOPs that are meant to coordinate innovation work (Cooper, 2008; Griffin, 1997; Kahn, Kay, Slotegraaf, & Uban, 2013). These SOPs have been identified as important capabilities for firms that enable innovation over time (e.g., Cooper, 1996; Eisenhardt & Martin, 2000). SOPs have become widespread as exemplified by various generations of gated development processes (Cohendet & Simon, 2016; Cooper, 2008) and are often seen as codified "best" practices for organizing innovation work (D'Adderio, 2008). The extent to which SOPs are important for successful innovation and whether the level of detail in SOPs and the rigidity of application hampers or facilitates coordinating innovation work have been subject to debate in the innovation management literature (Cooper & Kleinschmidt, 1991; Griffin, 1997; Shaw, Burgess, Hwarng, & De Mattos, 2001).

3. A ROUTINE DYNAMICS PERSPECTIVE ON INNOVATION WORK

The routine dynamics lens has provided fertile ground to study the relationship between routines and innovation work. With the reconceptualization of routines as endogenously dynamic, Feldman and Pentland (2003) not only opened the space to consider the possibility of change but also of innovation. This possibility emerges from the notion of multiplicity, which implies that routines not only "occur in multiples" (i.e., in networks) but they "entail multiple actions (performative aspect), multiple patterns (ostensive aspect), and multiple human and non-human actants" (Feldman et al., 2016: 507). In Table 1 we summarize the key differences between studies on innovation routines rooted in the routine dynamics tradition

(Feldman & Pentland, 2003) and those building on an evolutionary economics perspective (Nelson & Winter, 1982). Whereas the exemplar references of the latter are introduced in section 1, the routine dynamics studies will be summarized in section 3.1.

	Evolutionary Econ perspective (Nelson/Winter 1982)	Routine Dynamics perspective (Feldman and Pentland 2003)
Main interest	Which routines lead to innovation outcomes and how best to design innovation routines	How routines facilitate innovating
Focal level of analysis	Innovation outcomes	Innovation-in-the-making (processes and practices)
Empirical attention to	Differences between routines (e.g. routine tasks vs. creative tasks)	Routines enactments
Assumptions on routines for innovation	<ul style="list-style-type: none"> - Only specific routines (i.e. meta-routines) implicated in innovation work - Routines free space for innovation tasks and might get into the way of flexibility/creativity 	<ul style="list-style-type: none"> - Routines performed in networks enable innovation to occur, mundaness not in contradiction with innovation/creativity - Routines as integral part of innovation work, inseparable from the actions
Relationship between innovation and routines	<ul style="list-style-type: none"> - Seen as dichotomous - Innovation work and creative processes can be systematized, routinization through stable SOPs 	<ul style="list-style-type: none"> - Seen as two sides of the same coin - Creating potentialities for action through an emerging repertoire of patterns
Nature of SOPs and relationship with routines	<ul style="list-style-type: none"> - Innovation routines as stable and persistent entities - Prescriptive tools for action 	<ul style="list-style-type: none"> - Dynamic and generative with different degrees of performativity - Mutual adaptation between SOPs and routines
Key references	<ul style="list-style-type: none"> - Adler et al. (1999) - Bartunek et al. (2007) - Becker and Zirpoli (2009) - Obstfeld (2012) - Ohly et al. (2006) - Pavitt (2002) 	<ul style="list-style-type: none"> - D’Adderio (2008, 2011) - Deken et al. (2016) - Cohendet and Simon (2016) - Salvato (2009) - Sele and Grand (2016) - Sonenshein (2016)

Table 1: Key differences between evolutionary economics and routine dynamics studies on innovation routines (adopted from Parmigiani & Howard-Grenville, 2011: 418)

3.1. Empirical studies of innovation routines

A growing body of routine dynamics research dealing with innovation routines has emerged since. D’Adderio’s work (2001, 2008) has been influential in launching and shaping research on innovation work within routine dynamics literature. Her studies squarely focus on

innovation work and address its central aspects, including the role of technology, artifacts, and SOPs to organize the involvement of heterogeneous actors in innovation work. Several other routine dynamics scholars followed suit in studying the role of routines in innovation work. Salvato (2009) conducted a longitudinal study of the Italian design company Alessi and how their innovation capability in terms of its new product development process is adaptively renewed over time. He emphasized the role that everyday individual actions and local experimentation play in the continuous strategic renewal of the company. Cohendet and Simon (2016) studied the video game company Ubisoft and how a creativity crisis led them to overturn their traditional innovation process by recombining existing routines. Similarly, in their study of digital innovation in an automotive company, Deken et al., (2016) investigated how the development of a radical innovation shaped the performances of traditional innovation routines and studied consequences of alterations for downstream routine performances. Sele and Grand (2016) studied an Artificial Intelligence and robotics laboratory at the University of Zurich, Switzerland, and showed how the situated enactments of routine networks (i.e. routine interactions) led to more or less innovative outcomes. Their findings suggest that interactions between human and non-human actors and, hence, the internal dynamics of networks are an important source for generativity. Finally, in their study on new venture creation, Schmidt et al., (2019) looked at the relationship between routine replication and entrepreneurial innovation and showed how the recursive process of “unburdening” acts as a key mechanism between innovating routines (e.g., prototyping) and accelerating routines (e.g., legal setup).

These studies not only share a common focus on innovation work, they also reveal the strong routinization of it. Importantly, they point to the important role of mundane actions—as opposed to grand creative acts—in driving the development of innovations-in-the-making. As Sele and Grand (2016: 726) put it when describing their own analytical approach: “while we were looking for flexibility and change—factors that are commonly attributed to an

organization's capacity to innovate—we found recurring action patterns". Indeed, many of the recurrent actions in innovation are mundane and might even seem irrelevant at first sight. This is an impression shared by many scholars who research innovation. Important recurring actions in and for innovation work include, for example, mundane actions as freezing the so-called Bill of Materials (D'Adderio, 2008), contacting internal and external designers (Salvato, 2009), ranking partners (Deken et al., 2016), presenting to senior management (Cohendet & Simon, 2016), creating displays for merchandise in fashion stores (Sonenshein, 2016), or drinking beer (Sele & Grand, 2016).

These activities seem, at first sight, unrelated to the often considered highly creative process of innovating but nevertheless are a generative motor behind innovation work. While mundane routines are important drivers of innovation, they are so in their connecting as actants travel from one routine to another (Sele & Grand, 2016). Depending on how the actants (e.g. research proposals, robots, visitors) are mobilized as the routine is performed, novelty may emerge. Thus, adopting a routine dynamics lens helps to overcome the clear-cut distinction between 'routine' versus 'innovation' activities and helps explain the generativity of such mundane actions; an aspect which is underdeveloped in research focusing on creativity and innovation (Rahman & Barley, 2017).

3.2. Understanding innovation through actors and their actions

Various routine dynamics scholars have studied innovation work by focusing on the formalized structures for coordinating innovation work in organizations, or, in other words, the roles of SOPs for innovation. Such formalized innovation routines enable connections between actions performed by dispersed and heterogeneous actors across innovation settings (i.e., from different departments and functional backgrounds).

D'Adderio (2001, 2008) showed how “the SOP [innovation routine] can provide a common reference point to coordinate heterogeneous knowledge and views across different communities” (2008: 782) and that adaptations are a source of conflict between communities. Her 2001 study unpacks how different organizational communities shape “the co-evolution between different aspects of routines” (781) and that changes introduced in any action are likely to have unexpected consequences for other actions. For example, she showed that introducing new technologies in innovation SOPs had far-reaching consequences for up- and downstream actions. It required creating new routines to effectively translate physical into digital prototypes (and vice-versa). The implementation of a new technology surfaced the sometimes conflicting interests of routine participants (i.e., designers, engineers).

Zooming in on the generative properties of routines, D'Adderio (2008) showed that even in innovation SOPs that feature strong control mechanisms, performances of innovation processes often varied. In her study of a complex set of vehicle development projects, she found that the actual performances of the ‘Bill of Materials (BoM) freeze’ deviated from the associated SOP. For example, some actions that were usually part of the freezing routine were delayed, thereby bypassing the rule codified in the SOP (D'Adderio, 2008). This provides a more nuanced view on the relation between SOPs and actual performances which emphasizes that SOPs and formal rules do not determine actual performances of innovation routines but do often shape performances. Particularly when SOPs and formal rules are embedded in artifacts, such as software tools, they become more difficult to deviate from. These insights clarified the complex relation between formal SOPs and actual routines which D'Adderio (2008) outlined in her degrees of performativity framework. Based on MacKenzie's (2006) work this framework maps the strength of the interrelation between SOPs and routines. At the extreme ends of the spectrum, SOPs can be seen as mere descriptions or complete prescriptions of

routines; but the extremes are rare and most often, instead, SOPs are performative in that they shape enactments ranging from low to strong influence.

Salvato (2009) furthered our understanding of the evolution of product innovation routines over a longer time period. Through a historical analysis of event sequences, he studied 90 performances of NPD processes. His study showed that variations were introduced through the mundane, daily activities of individuals engaged in the product development routine. Of the 90 NPD performances, some 40% closely resembled the prescribed SOP. However, about one-third of the performances were adapted by internal or external people through everyday actions, and about one-fourth of the variations were driven by managers' intentional attempts to adapt routine performances. This concerned especially projects that could be considered as more 'novel', i.e. different from past product development projects, such as projects that involved new collaboration partners or that regarded new topics. Based on his findings, Salvato suggested that more radical product innovations are associated with performances that diverge more from the SOP. Adaptations introduced also increased the need for coordination between actors, specifically in the form of ad hoc approval. Finally, Salvato observed how managers shaped the retention of specific routine variations over time. Therefore, his findings help explain how some variations introduced in performances become retained over time and shed light on the process of how routines are being renewed over time.

Cohendet and Simon (2016) further unraveled the role of routines as sources of connections between different actors in the organization. Particularly, they studied the role of innovation routines in connecting senior management and innovation project teams at Ubisoft within the process of renewing innovation routines and uncovered that the divergent interests of different groups of actors involved in innovation work resurfaced during this reconfiguration process. The Ubisoft senior managers focused on efficiency in their gated development process, whereas game designers were mostly focused on the creativity that poured into their

games-in-the-making. The reconfiguration process broke the truce between senior managers and game designers and had to be restored in the novel routines. The study shows the skillful maneuvering of a game producer to restore the truce, which involved both appealing to existing ostensive patterns and introducing a broad range of novel performative actions.

Deken et al. (2016) studied the development of data-driven services, which were radically novel for the focal organization, by analyzing how heterogeneous actors from various departments performed interdependent routines to generate such novel outcomes. The novelty associated with the innovation-in-the-making required innovators to adapt their enactments of the standardized innovation processes at the firm. However, such adapted enactments were often not recognized by other actors in the organization as legitimate, which triggered coordination breakdowns in the innovation work. The authors identified three practices (flexing, stretching, and inventing) that innovators engaged in to simultaneously realize novelty while ensuring that innovation work across boundaries between heterogeneous actors in the organizations did not break down. Even seemingly straightforward changes in actions within the innovation routines could significantly affect downstream actions due to existing interdependencies with other SOPs. Accordingly, the likeliness of breakdowns increased.

Picking up on the role of artifacts and non-human actors in innovation work, D'Adderio (2011) called for a turn to artifacts and materiality within the study of routine dynamics (*refer to chapter by D'Adderio*). She highlighted that artifacts had been portrayed as too simplistic and deterministic, and that scholars had mainly focused on human agency. Arguing for a post-constructivist approach, she introduced sociomateriality (e.g., Orlikowski & Scott, 2008) and actor-network theory (e.g., Latour, 2005) as meaningful perspectives to study the relational, emergent, and distributed nature of routine performance equally involving human and non-human actors.

This insight is taken up by Sonenshein (2016) in his study of the continuous recreation of ‘familiar novelty’ within fashion retailers stores. He shows how routines and creativity are mutually endemic. Artifacts in the studied ‘merchandising routine’ were driving forces for store managers who continually tried producing novelty for their customers. Not only did the visual merchandising manual provide room for interpretation, but also different fixtures such as mannequins, tables and other displays allowed for personal creativity. The inherent openness and flexibility of these artifacts enabled creative outcomes.

Sele and Grand (2016) in their study of a research laboratory focus on the importance of routines for their ability to continuously innovate. By comparing different research projects, they showed how the same actants may act as intermediaries or mediators depending on the way they are enacted in the same routine, but in different projects. Focusing on the connecting of routines through traveling actants, they neither distinguish between human and non-human actors nor conceptualize actants as pre-defined entities. As suggested by actor-network theory (*refer to chapter by Sele*) the power of human and material agency lies in performance and not in their inherent characteristics (Latour, 2005). Particularly, how actants are appropriated created the necessary generative dynamics for novelty to emerge.

4. TOWARD A RESEARCH AGENDA

As the summary of empirical research showed, studies from a routine dynamics perspective have begun to unpack how innovation work takes place through everyday actions. These studies looked at the generative dynamics of routines and how these enable or constrain the performance of innovation work in organizations. Taken together, they have established the central role of innovation routines for connecting heterogeneous and dispersed actors involved in innovation work—contributing to our understanding of routines for coordinating (Adler et al., 1999; Jarzabkowski et al., 2012)—and have emphasized the importance of studying both human and non-human actors (i.e. actants).

We hope this chapter will inspire future research to study innovation work from a routine dynamics perspective, as this stream of research is still in its infancy. Indeed, there is a wide range of routines that may be implicated in innovation work in various empirical settings that maybe fruitfully studied from a routine dynamics lens. Given the strategic importance of innovation for the longevity of established organizations and the birth of new ventures, routine dynamics studies of innovation work are an important topic in organization studies. And as most research has focused on operational work (e.g., routines for hiring, garbage collection, technical customer support), there is ample opportunity for routine dynamics scholars to develop new theoretical insight by studying innovation work. In what follows, we provide a number of specific suggestions for future routine dynamics research on innovation work that we feel would provide opportunities for theoretical development. We conclude with suggestions on how innovation scholars may mobilize a routine dynamics lens to address important questions in the field of innovation management.

We see ample opportunities for developing new insights that advance a relational perspective on routine dynamics. Relationality has been a core aspect of a practice perspective (Feldman & Orlikowski, 2011; refer to chapter by Feldman). Routine dynamics scholars have stressed that the connections between actors made through routines enable developing shared understanding of *what* actions to take and *why* such actions are appropriate in particular situations facilitating thus the coordinating work between actors (Dionysiou & Tsoukas, 2013; Feldman & Rafaeli, 2002). Studies have shown that shared understanding may help stabilizing performances as a form of “balancing act” (Turner & Rindova, 2012). More research is needed, however, to understand how shared understanding is achieved and maintained in the context of innovation work and how this informs ostensive patterns. We thus echo Dionysiou and Tsoukas’ (2013) call for research on how shared understanding develops in contexts where a large number of actors collaborate and where performances extend over longer time periods,

such as in innovation work. Because innovation work is often highly dispersed across different organizational communities (e.g., marketing, engineering, product development, sales, manufacturing, senior management), it provides an excellent context for studying the development of shared understanding (Bechky, 2003).

Such research could also deepen our understanding of how truces between various groups in organizations are formed (Nelson & Winter, 1982; Salvato & Rerup, 2018). The involvement of heterogeneous actors makes that innovation work is often associated with breakdowns (Carlile, 2002, 2004) and conflicts (Harvey, 2013), but simultaneously enables creativity and recombination. Such an empirical context is fruitful for studying how truces are dynamically enacted over time as part of the innovation process and how this shapes innovation outcomes. Moreover, since innovation work is oriented at ill-defined, highly novel tasks, it provides interesting opportunities for furthering our understanding of how shared intentionality develops over time. In absence of a clear-cut starting point for joint action, innovation work provides an extreme setting where actors' ability to develop joint understanding is limited and needs to be seen as a constantly moving target. Such research could thus draw on insights from studies on emerging intentionality through routine performances (Dittrich & Seidl, 2018).

Second, we advocate for more research on the generative properties of routines in the context of innovation work in order to better understand why and how some interactions between routines break down while others facilitate renewal. Past studies have shed light on the different processes through which SOPs become renewed or reconfigured over time (e.g., Cohendet & Simon, 2016; Salvato, 2009), which contributed to our understanding of capability evolution (*refer to chapter by Salvato*). However, studies on dynamic capabilities and other meta-routines oriented toward flexibility still have a very static understanding of their dynamism (Wenzel, Danner-Schröder, & Spee, 2020). Because innovation work is oriented at generating novel outcomes, variation and flexibility in the enactment of routines is likely

needed. Thereby, managerial agency (Salvato, 2009), the agentic orientations of routine participants (Howard-Grenville, 2005), and the design of artifacts such as SOPs (D'Adderio, 2008) all play a role in the flexible performance of innovation routines.

When it comes to interdependencies between routines (*refer to chapter by Rosa, Kremser, Bulgacov*), scholars have focused on different aspects of interdependency (Hoekzema, 2020). Some studies on innovation work have emphasized generative properties of interrelated routines, suggesting that novelty emerges from recombining (Cohendet & Simon, 2016) and through their interacting (Sele & Grand, 2016), whereas others have pointed at the increased potential of breakdowns caused by interdependencies with other routine enactments (D'Adderio, 2008; Deken et al., 2016). This suggests a need to better understand when and why routine interdependencies enable and constraint generating novelty.

Finally, we see potential in further developing insights on materiality and the interplay between human and non-human actors in innovation work. Several routine dynamics studies have prepared the ground to see human and material agency on equal footing (D'Adderio, 2008, 2011; Sele & Grand, 2016). These studies have not only provided the necessary empirical evidence for the role of sociomaterial assemblages in enacting routines, but have also engaged in introducing the necessary theoretical armor to allow for this shift. Seeing the current rise of search algorithms and robotics in organizations and their everyday functioning, we believe that post-constructivist approaches are helpful tools in understanding such emerging phenomena (see also D'Adderio, 2011). A routine dynamics perspective is well-suited as with these digital tools the design and enactment of routines is becoming increasingly conflated (*refer to chapter by Glaser*).

For innovation management scholars, a routine dynamics lens can enable conceptualizing routines not as monolithic 'things' but as a generative system within which interactive parts drive both stability and change in actual performances. The limitations of

equaling routines as SOPs are increasingly voiced in the literature on innovation management (e.g., Christiansen & Varnes, 2009) but have only recently been taken on in empirical studies in this domain (notably, Booth, 2020).

Literature on innovation work has been studying the consequences of rigid and flexible implementation of innovation SOPs. Work by D’Adderio (2008), Pentland and Feldman (2008), Cacciatori (2012), and Jazabkowski et al., (2012) provide a useful starting point for exploring this relation. D’Adderio (2008) showed that when the SOP is inscribed in software, it shielded actors from conflicting interests of other organizational groups (in her case, by preventing excessive changes in the design of vehicles while preparing manufacturing). However, she also showed that *even* when SOPs are inscribed in rigid software, deviations are possible or even prevalent. Knowing that the emphasis of strict rules will inevitably result in innovators breaking these rules as they seek the flexibility required for innovation work is an important insight for managers responsible for SOPs. Yet, software inscribed SOPs can make workarounds visible and therefore facilitate enforcing specific action patterns. In this context, the routine dynamics lens could enable studying and tracing wider effects of workarounds and local deviations from formally described SOPs. As D’Adderio (2008: 780) showed, although a workaround “may be feasible, it always entails a degree of disruption”, which “will generate confusion later in the process” and go against the logic underlying the design of the SOP and its purpose.

Routine dynamics research provides the conceptual apparatus to improve our understanding of the process of designing innovation routines, which has been a key theme in innovation management research. Pentland and Feldman (2008) unravel the complex relation between routines and SOPs, asserting that no SOP—no matter how carefully designed—will guarantee a particular action pattern. Because actors’ understanding and experiences are

invoked in enactments of innovation processes and because actors always have the opportunity to perform novel actions, SOPs are, at best, guiding actual action patterns.

Any attempt to implement a new or to alter an existing SOP for innovation will require extensive interactions between the actors involved in the day-to-day enactments so to develop the shared understandings needed to perform the routine together (Pentland & Feldman, 2008). Existing studies provide promising starting points for such research. For example, both Jazabkowski et al. (2012) and Cohendet and Simon (2016) show that actors who aim to change SOPs may benefit from first disrupting existing patterns to then start the process of creating new action patterns. The process of enacting new patterns was studied by Deken et al. (2016), who found that consequences of performing new action patterns significantly affected downstream actions, suggesting that such interdependencies should be considered when designing new innovation routines. Moreover, Cacciatori (2012) points to the need to connect new tools to the existing artifacts that actors use in routine enactments, based on her study of the development of a new bidding routine in a design company. She also nuances our understanding of different kinds of artifacts, suggesting that some kinds are better attuned to bring the “flexibility needed for problem-solving” or the “rigidity necessary to funnel action” (1575). Overall such studies suggest that designing SOPs requires a more systemic view on how innovation processes interrelate with other SOPs in an organization (e.g., routines at manufacturing, purchasing, marketing). Innovation scholars could benefit from the detailed analyses of the consequences of adaptations—as is typically done in routine dynamics research—to elaborate specific sub-SOPs that allow for more predictable variations (e.g., Cooper & Sommer, 2016), and to better understand in which artifacts SOPs should be embedded.

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