



# **The Future Is Now: Non-Linear Temporality in Blockchain Organizing**

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## SUMMARY

This cumulative dissertation advances management scholarship by studying the novel phenomenon of Blockchain organizing. Blockchain is an emerging technology that facilitates the maintenance of data across networks of computers, as opposed to more traditional central servers. These distributed data maintenance capabilities may have wide-ranging consequences. Ever since Blockchain's inception in 2008, a discourse identifying this technology as an enabler of radically new and decentralized modes of collective and societal coordination has gained traction. "Blockchain organizing" refers to practices in which such Blockchain technology artefacts are being developed, implemented, and/or utilized by organizations.

Studying these practices presents a unique opportunity to further management scholarship; particularly subjective time research following the neo-institutional tradition. Blockchain is not only an emerging technology associated with significant future expectations, but further a meta-organizational technology whose very *raison d'être* is the transformation of entrenched organizational structures. When organizational actors develop, implement, and/or utilize Blockchain technology, bureaucratic ways of organizing that have been established in the past and continue to be legitimized in the present may become reevaluated in light of bold visions for an organizational and societal future that looks radically different.

The dissertation at hand utilizes this Blockchain context as an exemplary case to develop theory on how transformative future visions and expectations associated with emerging technologies may become instantiated *within* the present, and conceptualizes this phenomenon as "present-future convergence". Developed based on a field-level pilot study that led to an 18-month ethnographic engagement with one Blockchain start-up, the three papers gathered in the dissertation utilize an interpretivist approach to explain how present-future convergence is rooted in conjoined processes of intra- and inter-subjective temporal experience. Furthermore, the papers highlight the counterintuitive consequences that present-future convergence may have for processes of technological, organizational, and societal change. In doing so, the dissertation opens promising research avenues at the intersection of temporality, performativity, and sociomateriality, and contributes to scholarly understanding of Blockchain organizing.

Practically speaking, the dissertation helps answer the question of how actors may "pull" the future into the present to realize transformative future visions like those associated with emerging technologies.

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## CHAPTER ONE

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### (1) PREAMBLE

*“A new language has come into currency. To the public, it is a language of the future. To the scientist, a language of the present. This, then, is a report on our present future.”* (O’Reilly, 1955)

The 1955 documentary “The Future Is Now” (O’Reilly, 1955) presents the audience with black-and-white images of United States government research facilities. As low-resolution video recordings show nuclear reactors, photovoltaic cells, and computer-automated manufacturing lines, distorted narration touts the devices’ wondrous capabilities. These technological marvels, the narrator attests, are not wild imaginings but real manifestations of the “present future” in which the United States had already arrived.

At first glance, constructions like “present future” and “the future is now” may seem like nothing more than vapid metaphors. Management scholarship, however, increasingly suggests that there is more to them. In recent decades, organization theory research has developed a sophisticated understanding of how time becomes enacted by people in their organizational practices (Orlikowski & Yates, 2002; Kaplan & Orlikowski, 2013; Schultz & Hernes, 2013). According to this stream of research, individuals’ intra-subjective and groups’ inter-subjective experience of time – as a mélange of memories from the past, concerns of the present, and expectations for the future – seems to be as important for their actions as time’s more objective physical dimensions (Bluedorn, 2002; Shipp & Jansen, 2021; Beckert, 2021). An objective understanding of time describes the movement from the past to the present and future in terms of a clear-cut, unidirectional progression. A subjective understanding of time, on the other hand, acknowledges the possibility also for more idiosyncratic, non-linear patterns (Kunisch et al., 2021), such as the overlapping of present and future times one may experience when faced with technological marvels characterized as the manifestations of one’s “present future” (O’Reilly, 1955).

In few places are subjective temporal experience and non-linear temporality more relevant than in the field of emerging technology. By common definition, emerging



technologies are technologies which are novel and fast-growing, but whose most significant impacts are understood to lie “in the future” (Rotolo et al., 2015, p. 13). Where emerging technologies enter organizational practices, these practices take on an important temporal dimension: in the development, implementation, and/or eventual use of emerging technologies, the organizationally enacted present becomes suffused with future expectations constituting the technology’s identity and purpose (see also Beckert, 2021).

A striking example is presented by Blockchain technology. Blockchain is an emerging technology that facilitates the maintenance of data across networks of computers, as opposed to more traditional central servers (Nakamoto, 2008; Swan, 2015; Tapscott & Tapscott, 2016). Since its origins in the Cypherpunks movement of the early 2000s (Nakamoto, 2008; Hellegren, 2017), the technology has been designed to enable and drive organizational and even societal decentralization. Middlemen profiting from the obstruction of people’s freedom and self-determination, so the Blockchain vision goes, could be replaced through peer-to-peer networks of computers verifying data flows in a safe, distributed manner and without any need for interpersonal trust (Nakamoto, 2008; Tapscott & Tapscott, 2016; Buterin, 2018; Seidel, 2018). Originally focused on the coordination of the financial system, during the last decade, further innovations such as Ethereum expanded Blockchain technology’s decentralizing potential to all aspects of society (Buterin, 2018). Along this trend, the Blockchain vision of distributed organizational and social coordination increasingly picked up steam, becoming a touchstone for start-ups, incumbent businesses, and even government organizations. As these organizations and their members engage with Blockchain by developing, implementing, and/or using solutions, they have to intra- and inter-subjectively navigate a nexus of present time – constituted of long-held assumptions, established and dominant identities, practices and institutions – and future time – constituted rather of transformative visions and expectations for a Blockchain-enabled future.

The interaction of present and future times that actors may experience in such moments can have profound consequences for organizations (Tavory & Eliasoph, 2013; Kunisch et al., 2021; Beckert, 2021). For example, Kaplan and Orlikowski (2013), studying technology strategies, argued that strategy making frequently involved the enactment of future projections, such that these projections may well shape the present and align it with the projected future:

“Though the future will likely not turn out the way it was projected, this does not mean that projections do not matter. Articulating projections shapes attention, deliberation, investment and effort. Thus the question should not be whether projections are

accurate, but rather what strategic possibilities are enabled and precluded by different projections.” (Kaplan & Orlikowski, 2013, p. 995)

While management scholarship has made significant strides toward recognizing that “the connections between the past and the future are always continuously re-negotiated in the present,” and that this may produce complex and non-linear temporal patterns (Kunisch et al., 2021, p. 1414), an in-depth inquiry into the temporal enactments that occur as organizations develop, implement, and use emerging technologies is yet lacking. How do actors in organizations navigate the complex and potentially non-linear relations between present and future times when working with emerging technologies? How may they “pull” the future into the present to realize the transformative visions associated with such technologies? Addressing these questions is of significant relevance at a time when society increasingly looks to emerging technologies and their associated future visions to overcome pressing global issues. Understanding how actors in organizations can, should, or must enact emerging technologies and their associated future visions in the present to change the status quo, and what consequences such enactments have for them, is a topic meriting attention.

Addressing these questions also presents an opportunity to generate important theoretical contributions for subjective time research in management scholarship more generally speaking. As Kunisch and colleagues (2021) recently argued, fully understanding the implications that enacted, non-linear temporality may have for processes of organizational and societal change requires further scholarly work. A promising avenue for better understanding these questions lies in the conjoined investigation of intra- and inter-subjective temporal experience. For the many advances that subjective time research has made over the last years, it has hitherto treated the intra- and inter-subjective (i.e., individual and collective) dimensions of temporal experience as rather disconnected and thereby failed to holistically examine the organizational enactment of temporality. As Shipp and Jansen (2021) noted in their recent review of subjective time research in the *Academy of Management Annals*: “more research is needed that examines individuals’ and collectives’ joint experience of the past, present, and future” (p. 308). We know that both dimensions are important, but we do not know how they may intersect and affect one another.

The cumulative dissertation at hand makes progress towards answering these questions by presenting three self-contained studies and tying them together to describe and conceptualize the phenomenon of “present-future convergence”. I define present-future convergence as *a particular kind of non-linear temporality that becomes enacted when actors*

*instantiate an envisioned future within the present following intra- and/or inter-subjective temporal construal* (see next section). The concept serves to highlight the organizational processes that lead to such enactments, as well as their counterintuitive consequences.

Where much extant management scholarship on time has tended to focus on the overlapping of collective-level temporal regimes such as rhythms, schedules, deadlines (Orlikowski & Yates, 2002; Granqvist & Gustafsson, 2016; Blagoev & Schreyögg, 2019), or ontologies of time (Reinecke & Ansari, 2015), present-future convergence homes in on the enacted overlapping of present and future *times*. Of course, some scholars have developed theories explicating how times become enacted, related, and negotiated through “temporal work” and “temporal translation” (Kaplan & Orlikowski, 2013; Hernes & Schultz, 2020), and investigated questions of temporal distance (see, e.g., Kim et al., 2019; Augustine et al., 2019; Shipp & Jansen, 2021; Beckert, 2021). However, scholarship has so far seldomly discussed the non-linear instantiation of an envisioned future within the present (but see Reinecke, 2018 for an important step in this direction). It has also not explained how, (1), the non-linear instantiation of an envisioned future within the present arises from actors’ conjoined intra- and inter-subjective temporal experience, nor (2), considered the full extent of the consequences that such instantiation may have for the development and use of emerging technologies or processes of organizational and societal change.

United under the umbrella concept of present-future convergence, the three papers gathered in this cumulative dissertation complement each other to address the practically and theoretically relevant gaps outlined above. In developing the papers, I utilized the qualitative interpretivist research approach typical for scholarship seeking to advance the discipline of management and organization theory through the grounded development of insightful concepts and theories (e.g., Kaplan & Orlikowski, 2013; Granqvist & Gustafsson, 2016; Glaser et al., 2017; Kim et al., 2019). Blockchain organizing constituted an unusually revelatory empirical context (Eisenhardt & Graebner, 2007; Siggelkow, 2007) for advancing understanding of the relationship between present and future times in management scholarship. As explained above, Blockchain technology is an emerging technology, such that its existence is in large part constituted by visions for the future. Second, the relations between subjectively experienced present and future times may be expected to be especially idiosyncratic and non-linear in practices of Blockchain organizing because Blockchain itself is a meta-organizational innovation whose very *raison d'être* is the transformation of present, conventional organizational structures. Accordingly, practices of Blockchain organizing may problematize the relationship between present and future in two ways at once, by not only bringing the future

into the present in the form of Blockchain's associated future visions, but by at the same time explicitly calling for a re-evaluation of present structures (e.g., organizational form and hierarchy, practices, institutions, and identity). Therefore, the Blockchain organizing context may be understood as a "talking pig" case (Siggelkow, 2007, p. 20) that surfaces the (potentially non-linear) relation and enactment of present and future times particularly well.

Taken together, the one empirical and two empirically inspired conceptual papers gathered in this dissertation capitalize upon this potential by explicating the intra- and inter-subjective processes underlying present-future convergence, by highlighting the important and counterintuitive consequences that this phenomenon may have for organizational and technological change, and by identifying rich opportunities for further scholarship. Beyond theoretical contributions, the cumulative dissertation at hand also serves by providing more empirical evidence and grounded insights into the radically new phenomenon of Blockchain organizing. In the remainder of this introductory chapter, I provide more detail on the overarching theoretical and methodological considerations underlying this dissertation. Then, I briefly introduce each of the three papers gathered here and offer an outlook on their findings.

### **(1.1) THEORETICAL APPROACH**

Organizations are commonly understood as multiagent systems with identifiable boundaries and system-level goals towards which the organizations' constituent agents are expected to contribute (Puranam et al., 2014, p. 166; see March & Simon, 1958; Stinchcombe, 1965; Weick, 1969; Aldrich, 1979; Scott, 1998). This dissertation seeks to advance understanding of organizations by examining the temporal experience and enactment of present-future relations that occurs throughout organizational practices in which the emerging Blockchain technology is being developed, implemented, and/or used (i.e., "Blockchain organizing"). In this pursuit, the dissertation at hand largely follows the neo-institutionalist tradition of management scholarship.

#### **The Neo-Institutional Tradition of Management Scholarship**

The neo-institutionalist lens upon managerial and organizational activity (Zucker, 1977; Meyer & Rowan, 1977; DiMaggio & Powell, 1983) originated in the late 1970s and was offered as an alternative to realist and rational theories of organizing (e.g., transaction cost theory (Williamson 1975; Pfeffer & Salancik, 1978)) and newly emerging ecological perspectives (Hannan and Freeman, 1977; see Barley, 2017). Where resource dependence and transaction cost theories placed – perhaps outsized – emphasis on the rationality of human

behavior, the ecological perspective relegated human agency to the sidelines entirely. The argument of the neo-institutionalists, conversely, was that the actions of humans in organizations not only matter, but that they frequently occur for cultural and symbolic reasons (Zucker, 1997; Meyer & Rowan, 1977; DiMaggio & Powell, 1983). Explaining this particular characteristic of organizational activity was the eponymous concept of “institutions”. Drawing on the work of Hughes (1936) and Berger & Luckmann (1966; 1977), the founders of neo-institutionalism defined institutions as meanings that are inter-subjectively shared among a group of people to the point of taking on a seemingly objective and exterior existence (Zucker, 1977; Zucker, 1987; Tolbert & Zucker, 1996), and further as reciprocated typifications of reality that serve groups as taken-for-granted heuristics (Meyer & Rowan, 1977). Being widely shared and seldomly questioned, institutionalized meanings and rules were theorized to constitute the grounds for “legitimate” behavior in organizations and their fields, thereby exerting a homogenizing pressure towards common behaviors and forms of organizing (DiMaggio & Powell, 1983).

Although the point of neo-institutionalism originally was to cast a new lens upon the role of human behavior in organizations, the lens for some years focused primarily on institutions as first-order cognitive and coordinative constraints within which human behavior occurred (DiMaggio, 1988). Consequently, neo-institutionalism wound up systematically deemphasizing the role that human agency might play in constituting, maintaining, and/or changing these social and organizational structures (Selznick, 1996; Hirsch & Lounsbury, 1997; Hallett & Ventresca, 2006; Barley, 2017). This perceived overemphasis on the external nature and stability of institutions has since been addressed by a large variety of theoretical refinements stressing the role of human interaction in organizational processes of institutionalization and institutional change. Scholars developed these refinements by drawing on, (1), the Chicago School of symbolic interactionist sociology (Strauss, 1978a; 1978b; 1982; Becker, 1999) to develop an “inhabited institutionalism” (Hallett & Ventresca, 2006) or “coalface institutionalism” (Barley, 2017), (2), Bourdieu’s (1977; 1990) and Schatzki’s (2001; 2017) phenomenological notions of “practice” to develop the understanding of organizational practices as constitutive of organizing (Feldman & Orlikowski, 2011; Smets et al., 2012; Smets et al., 2015) and most recently a “practice-driven institutionalism” (Smets et al., 2017), or, (3), Geertz’ (1973) accounts of cultural performativity, to theorize the enacted “logics of institutions” as sets of material practices and symbolic constructions (Friedland & Alford, 1991; Thornton & Ocasio, 1999). The majority of these theoretical iterations have also to some

degree embraced Giddens' (1984) structuration theory of the processual relationship between agency and structure.

While they all present their own perspectives upon organizational phenomena, these approaches are united in their enactivist understanding of neo-institutionalism, i.e., their recognition of the mutually constitutive relationship existing between the agency and interaction of organizational actors on the one hand, and the influence of inter-subjectively taken-for-granted structures upon said agency and activity on the other. Moreover, the ontological differences that separate these approaches are often minute (see Smets and colleagues' (2017) discussion of this), and their epistemological differences nuanced enough that they all draw from a common interpretivist toolbox inspired by symbolic interactionist and phenomenological sociology (see next section).

The dissertation at hand follows the neo-institutionalist tradition in its emphasis on enactment, taking a utilitarian perspective upon this tradition's substreams. I understand these streams of research as differently honed but matching lenses that help interpretivist management scholars illuminate different socio-cultural processes occurring in organizations. Accordingly, the three papers that make up this dissertation were all written utilizing an overarching approach of qualitative interpretivist sociology, while each drawing on the substreams of neo-institutionalism that best fit their respective research questions. The first article is rooted in the Geertzian understanding of performativity that inspired institutional logics scholarship, the third paper utilizes the lens of institutional logics outright, and the second paper draws on inhabited institutionalism as well as practice-driven accounts of institutional change. Combined, these papers provide complementary socio-cultural perspectives and insights on the enactment and consequences of non-linear temporality in Blockchain organizing. In the following subsection, I will explain in more depth how temporality and particularly my conceptualization of present-future convergence fit with the neo-institutional tradition.

### **Subjective Time and Temporal Relations in the Neo-Institutional Tradition**

Neo-institutional and subjective time research have always been at least implicitly linked in management scholarship, and a growing number of scholars have begun explicitly investigating this junction (e.g., Dorado 2005; Battilana & D'Aunno, 2009; Lawrence et al. 2001; Raaijmakers et al., 2015; Reinecke & Ansari, 2015; Granqvist & Gustafsson, 2016; Rowell et al., 2016; Augustine et al., 2019). Indeed, in recent years, interpretivist management scholars have increasingly turned their eyes to the subjective experience of time in

organizations, and the relationship that this process has to organizational dynamics and outcomes. Drawing from the foundational work of Saint Augustine (Book XI of the Confessions, AD 397-401), Russel (1915), and Durkheim (1915) – and benefitting from headways made in psychological and sociological research (e.g., Sorokin & Merton, 1937; Lewin, 1943; Emirbayer & Mische, 1998) – management scholars increasingly appreciated the “dual nature of time” (Shipp & Jansen, 2021, p. 305) as, on the one hand, an inherent characteristic of the universe (i.e., “objective” or “astronomical” time) and, on the other, an inherent characteristic of human consciousness (i.e., “subjective or “social” time (Bluedorn, 2002; Shipp & Jansen, 2021)). Repeatedly, scholars found that individuals’ and groups’ intra- and inter-subjective experience of time played a key role in organizational practices, including organizational change, strategy, and technology work (McGrath & Rotchford, 1983; Ancona et al., 2001; Tsoukas & Chia, 2002; Orlikowski & Yates, 2002; Ballard, 2008; Garud et al., 2011; Schultz & Hernes, 2013; Kaplan & Orlikowski, 2013; Garud et al., 2014; Reinecke & Ansari, 2015; Granqvist & Gustafsson, 2016; Rowell et al., 2016; Kim et al., 2019; Beckert, 2021).

One of the key differences between objective and subjective time is that the latter need not necessarily proceed in a clear-cut and linear fashion (“non-linearity”) (Kunisch et al., 2021). Scholars researching the role of subjective time have embraced Saint Augustine’s argument that “[t]here are three times; a present of things past, a present of things present, and a present of things future. For these three times somehow exist in the soul” (397-401, p. Chapter 20, Heading 26). Scholars have investigated what happens when individuals relate their past experiences and their future expectations to the concerns of the present (Mead, 1934; Heidegger, 1962; Schutz, 1967; Parsons, 1968; Emirbayer & Mische, 1998; Schultz & Hernes, 2013; Tavory & Eliasoph, 2013; Hernes & Schultz, 2020), in a process also referred to as “mental time travel” (Shipp & Jansen, 2021). Organizational researchers have focused particularly on the inter-subjective level, elucidating how different aspects of temporality become enacted when groups of people construct and act upon a shared temporal experience (Orlikowski & Yates, 2002; Kaplan & Orlikowski, 2013; Hernes & Schultz, 2020; see Giddens, 1984). As part of this, scholars of strategy and technology work have shown how boundaries between the inter-subjectively experienced “present” and “future” may be revisited and redrawn (Kaplan & Orlikowski, 2013; Tavory & Eliasoph, 2013).

Pivotal to understanding the experience and enactment of future time is temporal construal level theory (Oettingen, 2012; Kappes & Oettingen, 2014; Augustine et al., 2019). The theory, and particularly its concept of “temporal distance”, highlights that different actors

may experience an envisioned future to be differently “distant” from their experienced present and past. When an envisioned future is experienced as “near”, it is seen as relatively concrete, likely and actionable. When an envisioned future is experienced as distant, it is seen as relatively abstract, as possible but not likely, and consequently as less actionable (Oettingen, 2012; Kappes & Oettingen, 2014). In management scholarship, temporal construal has been researched at the field-level, as a phenomenon of inter-subjective temporal experience (Augustine et al., 2019). It has not, however, been linked to the established, intra-subjective (i.e., individual-level) processes of temporal experience such as mental time travel. Neither have management scholars explored the organizational dynamics that may be associated with temporal construal. As already discussed, combining the intra- and inter-subjective dimensions of subjective temporal experience in this way holds untapped potential to advance management scholarship (Shipp & Jansen, 2021) and explain non-linear temporality in organizations and emerging technology practices.

My conceptualization of “present-future convergence” as a particular kind of non-linear temporality that becomes enacted when actors instantiate an envisioned future within the present, picks up these strands. In accordance with the subjective time lens, I conceptualize present-future convergence as a phenomenon that arises as individuals in organizations engage in mental time travel and construe the distance of an envisioned future based on this mental time travel (intra-subjective dimension). As these individuals enact their intra-subjective temporal experiences in the shared practices of the organization, they negotiate them, resulting, for example, in homogenization, negotiation, or tensions at the inter-subjective level. Present-future convergence occurs in these processes whenever individuals or groups construe the distance between present and envisioned future as exceedingly small, leading them to concretely enact said future *within* the present (“instantiation”). Notably, not all individuals or groups in an organization need to construe the distance of the envisioned future in the same way, and thus agree on whether its instantiation within the present is sensible or not.

This conceptualization of present-future convergence homes in on a phenomenon of temporal enactment that has hitherto been only implicitly regarded in some subjective time research (e.g., Orlikowski & Yates, 2002; Kaplan & Orlikowski, 2013; Tavory & Eliasoph, 2013; Garud et al., 2014; Beckert, 2021; and see Shipp & Jansen, 2021). Being rooted in a conjoined lens of intra- *and* inter-subjective temporal construal, the concept facilitates more holistic investigation into the practically and theoretically relevant origins and consequences of non-linear temporality in organizations, particularly as regards the organizational development, implementation and/or use of emerging technologies. Where concepts such as



“multiplicity” of “temporal structures” (Orlikowski & Yates, 2002; see also Reinecke & Ansari, 2015) have focused on the presence of multiple temporal regimes (e.g., rhythms, schedules, or ontologies of times themselves), present-future convergence focuses on the state in which actors overlap present and future *times*. While the concepts of “temporal work” and “temporal translation” have explicated how times become enacted and related (Kaplan & Orlikowski, 2013; Hernes & Schultz, 2020), the conceptualization of present-future convergence offered above specifically facilitates understanding the conjoined processes of intra- and inter-subjective temporal construal that underlie the enactment of non-linear temporality, as well as understanding the consequences it may have for processes of organizational, technological, and societal change. The three papers gathered in the dissertation at hand contribute by capitalizing upon this potential, by highlighting the important and counterintuitive consequences of non-linear temporality, and by identifying rich opportunities for further scholarship.

## **(1.2) METHODOLOGICAL APPROACH**

In studying how actors in organizations enact, navigate, and negotiate non-linear temporality of present and future times along the exemplary context provided by Blockchain organizing, I utilized the interpretivist and qualitative research approach typical for management scholarship from a neo-institutionalist lens.

### **Interpretivist Sociology**

Interpretivism is a philosophical stance situated within constructionist epistemology. The latter views the meaning of objects and phenomena as socially constructed by groups of human beings who stand in “a dialogue” with them (Crotty, 1998, p. 62). Interpretivism, working within this constructionist epistemology, centers researchers’ methodology upon approaches that facilitate an interpretive understanding (“Verstehen” (Weber, 1994)) of the meaning-based social actions and antecedent phenomena that have produced a particular outcome (Crotty, 1998). In this sense, interpretivist sociological research is concerned not with developing “necessary”, but rather “adequate” clarifications of causality, characterized by an apparent likelihood that the understanding of events generated could be applied also to help explain events occurring in different contexts and/or at a different time (Crotty, 1998; Weber, 1994).

As a philosophical stance, interpretivism subsumes a number of different traditions and “genres” (Bansal et al., 2018) of sociological research, including both the symbolic

interactionist and phenomenological lenses (Crotty, 1998) that have spawned differing albeit related streams of neo-institutional management scholarship. Within interpretivism, symbolic interactionism and phenomenology differ primarily with regards to “their attitude towards culture as our inherited meaning system” (Crotty, 1998, p. 84). Symbolic interactionism, focusing on the interactions of humans through which they make and remake meanings, employs open-minded, qualitative inquiry to understand the construction and maintenance of culture “as the meaningful matrix that guides our lives” (Crotty, 1998, p. 84). As applied in neo-institutional management scholarship, symbolic interactionist inquiry tends to focus on institutions and their dynamics as the focal aspects of (organizational) culture, and usually proceeds from the assumption that these cultural aspects are central to understanding how particular outcomes arise (Hallett & Ventresca, 2006; Barley, 2017).

Where symbolic interactionists go into the field dropping all preconceptions except for the assumption that cultural structures and patterns will somehow be important to understanding the phenomenon in question, phenomenologists employ “epoché” to suspend even this base assumption (Sanders, 1982). While different streams of phenomenological inquiry exist (Gill, 2014), the phenomenological lens generally calls for researchers to “set aside all previous habits of thought, see through and break down mental barriers which these habits have set along the horizons of our thinking” (Husserl, 1931, p. 43) – including preconceptions about the prevalence and relevance of culture within social settings. Rather, phenomenological inquiry seeks to articulate the implicit meanings and practical understandings that are associated with everyday human experience (Gill, 2014).

Although one lens seeks to reconstruct institutional patterns and the other to look beyond them, both lenses can complement each other in interpretivist research (Crotty, 1998). They call for dropping preconceptions and developing qualitative accounts of organizational phenomena, while emphasizing, in turn, cultural meanings and constraints or the practical understandings and opportunities for renewal that lie beyond them. Unsurprisingly, in neo-institutional management scholarship, both approaches (individually or in explicit/implicit combination) are prominently used to investigate the emergence, maintenance, and/or disruption of institutions and their associated meaning systems in organizations (e.g., see Smets et al. (2017) on the complementarity of symbolic interactionist and phenomenological approaches in neo-institutional research, or Weber & Glynn (2006) on how the more phenomenological sensemaking lens can advance institutional theories of organizing).

## Qualitative Interpretivist Research in the Neo-Institutional Tradition

Symbolic interactionist and phenomenological research both utilize similar and matching qualitative methods and serve the same practical purpose within neo-institutional management scholarship. Where quantitative methods are typically used in (post-)positivist neo-institutional research that focuses on the falsification of hypotheses derived from existing theory (Popper, 1959), qualitative interpretivist research contributes to the neo-institutional tradition by providing “thick, detailed descriptions of actual actions in real-life contexts” (Gephart, 2004, p. 455) and by constructing from these descriptions entirely new concepts and theories that can serve as “bases for understanding social processes that underlie management” (Gephart, 2004, p. 455).

In this pursuit, qualitative interpretivist research in the neo-institutional tradition employs a large methodological toolbox, utilizing approaches that variously combine research methods (Bansal et al., 2018) of ethnography (Spradley, 1989; 1990), ethnomethodology, (Garfinkel, 1986; Cicourel, 1974), grounded theory (Glaser & Strauss, 1967; Glaser, 1978; Strauss & Corbin, 1990), and process research (Langley, 1999). The typical template may be outlined as follows: (1), researchers initially forego existing theory to adopt an open mind as they immerse themselves in a single or a small number of “unusually revelatory” organizational cases (Eisenhardt & Graebner, 2007; Siggelkow, 2007); (2), in this context, researchers employ open-ended interviews (Spradley, 1989) and observations (Spradley, 1990), and gather organizational documents to generate a base of rich longitudinal data, observe interactions first-hand, and develop an intimate understanding of the nuanced cultural meanings (symbolic interactionism) and/or actual organizational practices (phenomenology) they are confronted with (Gephart, 2004); (3), during and after this data gathering, grounded theory-inspired analytical procedures are employed to iteratively and ideally inductively (although in practice more often abductively) develop and validate constructs that maintain the practitioners’ meanings while facilitating the formulation also of more abstract theoretical relations (Glaser & Strauss, 1967; Glaser, 1978; Strauss & Corbin, 1990; Gephart, 2004)<sup>1</sup>; (4) during this

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<sup>1</sup> In grounded theory, the cyclical coding process is said to be *inductive* because it aims to discover and develop new theoretical constructs directly from the observations, as opposed to applying existing theoretical constructs to this data *deductively* (Glaser & Strauss, 1967). However, even in this open-minded coding process, researchers still necessarily draw “on language, on culture. For that reason, we end not with a presuppositionless description of phenomena, but with a reinterpretation” (Crotty, 1998, p. 95; see also Wittgenstein, 1968). In fact, in interpretivist management research in the neo-institutional tradition, scholars are actively encouraged to develop new theory not in a vacuum but to, at some point in the analytical process, also relate their emerging theoretical constructs to existing theory (e.g., the concept of institutions). Accordingly, this research, while upholding the label of “induction”, tends to be more *abductive*, employing both induction and deduction, “which leads us, for a given kind of scenario, in a reasonable time to a most promising explanatory conjecture” (Schurz, 2008, p. 205).

analysis, researchers may also specifically identify key events and develop timelines describing how the organizational phenomenon under study emerged and evolved, in order to facilitate the development of process models capturing the relations between grounded constructs over time (Langley, 1999).

### **Methodological Approach of the Dissertation at Hand**

Informed by these epistemological considerations and inspired by existing management scholarship investigating time enactment within the neo-institutional tradition (e.g., Kaplan & Orlikowski, 2013; Granqvist & Gustafsson, 2016; Augustine et al., 2019; Kim et al., 2019), this dissertation was developed utilizing a qualitative interpretivist research approach. In pursuit of new theoretical concepts and models capable of illuminating the organizational processes that occur as organizations develop, implement, and/or use emerging technologies, the research project presented here followed a bespoke explorative research approach (Glaser, 2017). This approach made use of ethnographic, grounded theory, and process research tools as appropriate, and matched my utilitarian perspective upon the various substreams of neo-institutional management scholarship. That is to say, in developing the research presented in this dissertation, I did not make ex-ante decisions about which theoretical substreams of the neo-institutional tradition to focus on (performativity, institutional logics, practice-driven institutionalism), but rather let the appropriate theoretical contexts for the research arise from the open-minded interpretivist inquiry.

Overall, the research proceeded as follows: from early through mid-2019, I conducted a pilot study of 12 organizations actively developing, implementing, and/or using Blockchain technology. At this time, the research focus of non-linear temporality and present-future convergence had not yet emerged, and it was simply my goal to understand the phenomenon of Blockchain organizing (as an exemplar of organizational processes facing emerging technology more generally) from a neo-institutionalist point of view. Through a theoretical sampling approach aimed specifically at studying “polar types” (Eisenhardt & Graebner, 2007) that would exhibit Blockchain organizing in as much variation as possible (Corbin & Strauss, 1990), I contacted 40 prominent organizations from different industries, including both, start-ups and incumbents. The organizations were identified based on, (1), a review of articles about the Blockchain industry from Forbes, Fortune, MIT Technology Review, TechCrunch, and

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Notably, this pragmatic approach aligns as well with Weber’s (1995) foundational emphasis on developing *adequate*, rather than *necessary* clarifications in interpretivist sociology.

Cointelegraph, (2), 10 semi-structured interviews with prominent Blockchain experts, and, (3), information gained at field-configuring events (Blockchain conferences and meet-ups) in Berlin, Germany and Cambridge, UK. Across the 12 organizations that responded to me, I conducted 20 semi-structured interviews with organizational representatives to learn about their experiences working with Blockchain. As per the interpretivist research tradition, I went into these interviews with a semi-structured questionnaire and an open mind, in order to understand Blockchain organizing from the respondents' point of view. This pilot study served three purposes. First, it allowed me to gain an initial understanding of what Blockchain organizing looked like in real organizations, and the theoretical and practical questions that it raised. Second, in evidencing interesting patterns related to the performativity of future visions associated with emerging technologies, the pilot study inspired the first paper of this dissertation (Chapter 2, co-authored with Prof. Shaz Ansari), generated illustrative examples for the empirically inspired conceptual arguments made in said paper, and thereby more generally oriented me towards the importance of non-linear temporality in Blockchain organizing. Third, the pilot study acquainted me with decision-makers in organizations actively developing, implementing, and/or using Blockchain technology, and thereby served as a steppingstone toward more in-depth, ethnographic engagement with these organizations.

Indeed, from mid-2019 through late 2020, I was able to conduct an in-depth longitudinal study with one of these organizations (“Sphere”, a pseudonym) that I perceived to provide an unusually revelatory case for understanding the dynamics of Blockchain organizing. Over the course of 18 months, I conducted 60 semi-structured interviews across 23 members of Sphere, conducted participant observations for five months, and evaluated rich archival data including 88 meeting recordings and more than 1600 internal text messages. Building on the first paper of this dissertation and the meanings and practices present at Sphere, it was during this time that I decided to specifically focus my research on the enactment of non-linear temporality within Blockchain organizing. My in-depth ethnographic study of Sphere facilitated an empirical paper (Chapter 3) illuminating how organizations working to actualize a transformative vision of institutional change (in this case one involving Blockchain technology) enact, navigate, and negotiate a complex nexus of present and future times. The ethnographic engagement inspired also another conceptual paper (Chapter 4); this one illuminating non-linear temporality by theorizing and illustrating the technological prefiguration that occurs in organizations seeking to inscribe digital infrastructure (in this case, Blockchain technology) for purposes of social change.

A more detailed description of each paper's methodological approach will be provided in its respective chapter (2, 3, 4).

### **(1.3) INTRODUCTION TO THE THREE PAPERS**

In sum, the three papers presented in this dissertation contribute to understanding how actors in organizations enact and navigate the complex and potentially non-linear relations between present and future times when working with emerging technologies. They do so by collectively creating a foundation for understanding the individual- and collective-level origins and consequences of present-future convergence.

The first paper (Chapter 2, co-authored with Prof. Shaz Ansari), highlights how emerging technologies like Blockchain are associated with future visions (in the form of “theories”) that may attain Barnesian performativity, i.e., become enacted to transform present organizational and institutional realities even before the technological artefacts themselves have been materialized in the present. This is a form of present-future convergence. As the paper argues and illustrates, future visions associated with emerging technologies may become directly enacted in the present and thereby play an outsized role in the organizational transformation processes that precede, accompany, and enact the actual use and impact of those technologies. As a part of this dissertation, the paper highlights how present-future convergence may be fostered through society-level discourses that conflate technological features and affordances, and that amplify the extent, attainability, and immediateness of future technological impacts.

The second paper (Chapter 3) shows how, while working to change institutions, actors may feel torn between acting in accordance with the demands exerted by the existing institutions of the present or in accordance with the envisioned future that they seek to manifest (e.g., one of Blockchain-enabled coordination). The paper offers thick descriptions and generates grounded theory about the non-linearity of intra- and inter-subjectively construed present and future times that these individuals and groups may experience and enact. It contributes by providing an unprecedented account of how and why present-future convergence originates with different organizational actors (intra-subjective dimension), as well as how these actors enact and negotiate their intra-subjective temporal experiences at the organizational level (inter-subjective dimension).

The third paper (Chapter 4) develops the concept of “technological prefiguration” to highlight the hitherto underrecognized and undertheorized relationships between the

institutional logics an organization attempts to inscribe into IT artefacts (e.g., Blockchain) for the purposes of an envisioned institutional change, and those it enacts in its own practices. The theory of technological prefiguration offers an explanation for why the attempt to inscribe an artefact in such a way that its future use will trigger the enactment of new institutional logics may already require the instantiation of those new institutional logics during the present-time process of inscription. Hence, the paper shows and explicates how present-future convergence may arise specifically in *material* practices, and what consequences it may have for organizations.

In providing these insights, the papers firstly advance scholarly understanding of the organizational origins and consequences of non-linear temporality, particularly as it relates to organizational work on and with emerging technologies. Secondly, in highlighting the counterintuitive consequences that present-future convergence may have for the entwined processes of organizational and technological change, the papers open promising research avenues at the intersection of temporality, performativity, and sociomateriality. Thirdly, the papers provide important practical insights by showcasing the pressing empirical questions and problems that individuals and groups may encounter as they seek to utilize emerging technologies like Blockchain for the addressing of pressing global issues and positive transformation of society. These central contributions will be discussed at greater length in Chapter 5.

Tables 1, 2, and 3 summarize the papers' topics, methods, and results. The following three chapters present each paper in turn.

**Table 1:** Overview of the first paper

<p><b>Paper 1</b> (Chapter 2)</p> <p><b>BLOCKCHAIN AND THE PERFORMATIVITY OF EMERGING TECHNOLOGY THEORIES</b></p> <p><i>Moritz J. Kleinaltenkamp &amp; Shahzad (Shaz) Ansari</i></p>	
<b>Research question</b>	How may theories of emerging technology impacts become performative?
<b>Methods</b>	Conceptual paper with illustrative examples from the Blockchain space
<b>Results and Contributions</b>	<ul style="list-style-type: none"> <li>● Establishes that emerging technologies like Blockchain are inherently associated with future visions and expectations communicated in societal discourse</li> <li>● Develops two propositions illuminating how different characteristics of these future visions and expectations (conflation of technological features and affordances; amplification of the extent, attainability, and immediateness of technological impacts) may lead them to attain different degrees of performativity</li> <li>● Highlights how these performativity dynamics may lead individuals and organizations to enact envisioned futures within the present, even in absence of the corresponding technological artefacts</li> </ul>
<b>Academic outlet</b>	<p><u>Forthcoming in a peer-reviewed book:</u>  M. Barrett, E. Vaast, A. Langley &amp; H. Tsoukas (Eds.). <i>Perspectives on Process Organization Studies. Organizing in the Digital Age: Understanding the Dynamics of Work, Innovation, and Collective Action</i>. Oxford University Press.</p>



**Table 2:** Overview of the second paper

**Paper 2** (Chapter 3)

The second paper of the disseration is currently under review at a journal.

To protect the blind peer review process, the paper has been taken temporarily offline.

**Table 3:** Overview of the third paper

<p><b>Paper 3</b> (Chapter 4)</p> <p><b>DIGITAL INFRASTRUCTURES FOR INSTITUTIONAL CHANGE: INSCRIPTION AND THE ROLE OF TECHNOLOGICAL PREFIGURATION</b></p> <p><i>Moritz J. Kleinaltenkamp</i></p>	
<b>Research question</b>	What organizational processes and institutional challenges accompany the inscription of digital infrastructures for the purpose of institutional change?
<b>Methods</b>	Conceptual paper with illustrative examples from the Blockchain space
<b>Results and Contributions</b>	<ul style="list-style-type: none"> <li>• Generates the concept of “technological prefiguration”, defined as the enactment of the envisioned institutional logics an individual or collective seeks to inscribe into an IT artefact <i>within the very practices of inscription themselves</i> (as well as facilitatory organizational practices)</li> <li>• Develops five propositions explaining how technological prefiguration may arise in efforts to inscribe institutional logics into IT artefacts for the purpose of attaining an envisioned, future institutional change</li> <li>• The propositions emphasize dynamics relating to actors’ attention, their sense of purpose, to theory refinement, and to pragmatic legitimacy</li> <li>• Develops three propositions explaining the profound organizational challenges that may arise along this process and how they may be addressed through iteration and symbolic action</li> </ul>
<b>Academic outlet</b>	To be submitted to <i>Management Information Systems Quarterly</i>

## CHAPTER TWO

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### (2) BLOCKCHAIN AND THE PERFORMATIVITY OF EMERGING TECHNOLOGY THEORIES

#### (2.1) ABSTRACT

“Performativity” describes the phenomenon of theories not only *describing*, but at times also *producing* social reality. Over recent years, the performativity of theories has become an increasingly prominent topic in management research. At the same time, technological developments have motivated new theories ascribing drastic organizational impacts to emerging technologies such as artificial intelligence and Blockchain. We argue that the performativity of emerging technology theories requires further scholarly attention, as it can be an important driver of organizational change. In this chapter, we synthesize existing literature in order to shed light on how emerging technology theories may become performative. We propose that their performativity is driven by a lack of distinction between technology feature use, affordances, and the respective organizational outcomes of these two categories, specifically theorizing how this lack of distinction interacts with generic, effective, and Barnesian performativity. We close by discussing the implications of our insights for management research, practice, and public policy.

#### (2.2) INTRODUCTION

“Performativity” describes the phenomenon of theories not only *describing*, but at times also *producing* social reality (Callon, 1998; MacKenzie & Millo, 2003; Ferraro et al., 2005; Gond et al., 2016). Over recent years, management and strategy scholars have increasingly appreciated the role of discursive performativity in the shaping of organizational realities. Scholars have stressed the performative dimensions of a variety of organizational concepts (e.g., Feldman & Pentland, 2003; Vaara et al., 2010; Guérard et al., 2013; Gehman et al., 2013) as well as scientific theories of organizing (e.g., Carter et al., 2010; Cabantous & Gond, 2010; D’Adderio & Pollock, 2014). The performativity perspective has contributed to these fields of study by showing how practitioners’ and scholars’ theories can become self-reinforcing and self-fulfilling (Marti & Gond, 2017), and how they can impact social welfare (Marti & Scherer,

2016) on basis of their ethical dimensions (Ferraro et al., 2009). These contributions have sparked new avenues for productive critique and research into organizational change, strategy, and public policymaking.

One area of practitioner and scholarly theorizing that is garnering increasing attention is that of emerging technologies; innovations characterized by radical novelty and impact, yet also uncertainty. Technological change has been a key topic of organizational research and practice for decades (e.g., Zammuto et al., 2007; Orlikowski & Scott, 2008). Over the last decade specifically, emerging technologies such as social media (e.g., Dutta, 2010; Gaines-Ross, 2010; Treem & Leonardi, 2013), artificial intelligence (e.g.; McAfee & Brynjolfsson, 2012; Mahidhar & Davenport, 2018; Faraj et al., 2018) and Blockchain (Gupta, 2017; Seidel, 2018; Lumineau et al., 2021), have particularly captured the imaginaries of organizational practitioners and researchers. This has resulted in vocal theorization about these emerging technologies' potential organizational and societal impacts. Such theories tend to extrapolate organizational outcomes in the future from technological features observed in the present. Frequently, this link is forged by (explicitly or implicitly) theorizing affordances (Gibson, 1979): imagined action potentials that would arise as a consequence of the emerging technology being subjected to organizational use (Faraj & Azad, 2012; Majchrzak et al., 2013; Leidner et al., 2018).

Such theorizing of the potential organizational impacts of emerging technologies has provided welcome guidance for practitioner decision-making and inspired insightful research. However, some have noted that emerging technology theories at times tend to exaggerate outcomes (e.g., Ramiller, 2006) as well as “muddle” the distinction between what is an *inherent technological feature*, what is a *contextual affordance*, and what *respective outcomes* can be associated with these categories (Leidner et al., 2018, p. 4). These critiques are important as emerging technology theories and the organizational outcomes they posit can be a powerful driver of organizations' engagement and experimentation with the technologies in question.

From a performativity perspective, inspiring organizational experimentation is a hallmark of self-fulfilling theories (Marti & Gond, 2017). However, the question whether theories of emerging technology impacts have a performative dimension, and the conditions under which they do so, has not received adequate attention in extant management research. Answering this question is crucial, as it promises to uncover a hitherto disregarded yet potentially impactful dimension of technological and organizational change. From a practical perspective, it could also help foster more reflective discourses on emerging technologies,

creating a foundation for informed resource allocation and public policymaking vis-à-vis uncertain innovations that could enhance social welfare just as well as diminish it.

In this chapter, we explore the performativity of emerging technology theories conceptually and through illustrative examples. Synthesizing existing literature from the fields of performativity as well as technological and organizational change, we develop an analytical vocabulary for conceptualizing the performativity of theories of emerging technologies and their impacts. Based on this, we propose that the performativity of emerging technology theories will be more pronounced the more those theories conflate technology feature use and affordances, and the respective organizational outcomes associated with these different categories. Using Blockchain as an exemplary emerging technology, we provide two illustrative examples from our ongoing empirical research in which emerging technology theories have become performative. In each of the examples we discuss, organizational actors started to enact Blockchain's widely theorized impact of trust-building *before* Blockchain was yet materially present at the site of organizing. We subsequently use these examples as an opportunity to further develop our proposition, discussing how different degrees of conceptual "muddling" can lead emerging technology theories to exhibit different degrees of performativity.

In the rest of the chapter, we first explain the concepts of "performativity" and "emerging technology theories", developing our proposition and analytical vocabulary. Then, we briefly explain Blockchain technology and describe the prevalent theories surrounding this emerging technology's organizational impacts. Third, we discuss the illustrative examples of organizational Blockchain use and, fourth, offer an answer to our motivating research question. Finally, we discuss how this answer contributes to research on technological and organizational change, and how it can help build more reflective emerging technology discourses benefitting management practice and public policymaking.

### **(2.3) PERFORMATIVITY**

In 1962, Austin observed that "to *say* something is to *do* something" (1962, p. 12, original emphasis). This phenomenon – today referred to as performativity – went on to find wide adoption in philosophy (Derrida, 1979; Butler, 1997; Barad, 2007), sociology (Callon, 1998; MacKenzie & Millo, 2003), and most recently management and strategy research (e.g., Feldman & Pentland, 2003; Vaara et al., 2010; Carter et al., 2010; D'Adderio & Pollock, 2014; Ferraro et al., 2005; Guérard et al., 2013). While always coming back to Austin's original observation, scholars across these fields have taken the concept of performativity in a variety

of directions. In a recent review of performativity literature in organization research, Gond and colleagues identified five different, prevalent perspectives upon the concept: (1) “performativity as doing things with words”, (2) “performativity as efficiency”, (3) “performativity as actors’ constituting the self”, (4) “performativity as bringing theory into being”, and, (5) “performativity as socio-materiality mattering” (2016, p. 445). In exploring whether and how emerging technology theories can be performative, this chapter is most closely aligned with the fourth of these perspectives (“performativity as bringing theory into being”).

This conceptualization of performativity as bringing theory into being originated with science and technology sociologists, in particular Hacking (1983), Pickering (1995), Latour (1993), and Callon (1998). Building on Hacking’s, Pickering’s, and Latour’s critiques of representationalism, Callon in *The Law of Markets* argued that the science of “economics, broadly defined, performs, shapes and formats the economy, rather than observing how it functions” (1998, p. 2). This view was further popularized by MacKenzie and Millo’s (2003) striking empirical analysis of the Black-Scholes’ formula becoming able to predict derivative market prices by shaping traders’ practices. A few years later, MacKenzie (2006) refined the analytical tools of this particular conception of performativity by distinguishing between three hierarchically related types of performativity: “generic”, corresponding to the use of a theory, “effective”, corresponding to the use of a theory making a difference in the world, and “Barnesian”, corresponding to the use of a theory making a difference in the world that moves the world closer to how it is depicted in the theory.

These conceptual foundations have since inspired management and strategy scholars to theorize the performative dimensions of organizational concepts such as routines (Feldman & Pentland, 2003), labels (Learmonth, 2005), strategic plans (Vaara et al., 2010), performance (Guérard et al., 2013), and values (Gehman et al., 2013). In addition, there is a growing management and strategy literature specifically investigating the performativity of scientific theories. For example, scholars have investigated Porter’s competitive strategy framework (Carter et al., 2010), rational choice theory (Cabantous & Gond, 2010), and modularity theory (D’Adderio & Pollock, 2014) through the performative lens offered by Callon and MacKenzie. In all of these cases, the understanding that theories do more than simply describe the world facilitated sophisticated critiques, thereby refining existing management and strategy concepts and opening up new research avenues.

Most recently, Marti and Gond (2017) built on this body of research to conceptualize the conditions under which theories can exhibit “Barnesian” performativity. They argued that

theories became self-fulfilling when they first motivated experimentation, that experimentation then produced anomalies, and those anomalous outcomes finally induced shifts in organizational practices (Marti & Gond, 2017). They further proposed mechanisms fostering this chain of events. For example, as regards the first phase, they posit that theories will be better at motivating practitioners to experiment when they, (1), challenge existing practices in culturally resonant ways, (2), identify material devices that make theoretical concepts visible, and, (3), by doing so, can garner the support of powerful initial backers (2017, p. 16-19). As regards the second phase, they define anomalies as “observable events that (1) violate widely shared expectations about how certain actors or entities will behave, while (2) conforming with expectations that result from the new theory” (2017, p. 11).

We now discuss how this performativity lens relates to emerging technology theories.

#### **(2.4) EMERGING TECHNOLOGY THEORIES**

Even though the term “emerging technology” is enjoying increasing popularity among practitioners and scholars alike (e.g., Bailey et al., 2019), a definition has remained elusive. A recent literature review (Rotolo et al., 2015, p. 13) of emerging technology research concluded that academic conceptualizations of the term gravitated around five key attributes of technologies: “(i) radical novelty, (ii) relatively fast growth, (iii) coherence, (iv) prominent impact, [and] (v) uncertainty and ambiguity”. Accordingly, the authors conceptualize an emerging technology as:

“a radically novel and relatively fast growing (sic) technology characterized by a certain degree of coherence persisting over time and with the potential to exert a considerable impact on the socio-economic domain(s) which is observed in terms of the composition of actors, institutions and patterns of interactions among those, along with the associated knowledge production processes. Its most prominent impact, however, lies in the future and so in the emergence phase is still somewhat uncertain and ambiguous.” (Rotolo et al., 2015, p. 13)

This conceptualization reveals an intimate relationship between emerging technologies and theorization: in the general understanding, theories ascribing “considerable impact” (taking forms such as changed actor compositions, institutions, and interaction patterns) to a particular technology are inherently necessary for that technology to be considered an “emerging technology”. Simply put, emerging technologies cannot exist without theories ascribing considerable future impact to them, and the existence of such theories for a particular

technology is a good indicator that the technology will be considered as “emerging” by a majority of observers.

Accordingly, there is a rich landscape of practitioner and scientific theories ascribing at times drastic organizational impacts to the latest technological advancements. Over the last ten years alone, contributions in practitioner-oriented journals such as Harvard Business Review ascribed far-reaching organizational impacts to emerging digital technologies ranging from social media (e.g., Dutta, 2010; Gaines-Ross, 2010), via big data and artificial intelligence (e.g., McAfee & Brynjolffson, 2012; Davenport & Patil, 2012; Bean, 2016; Mahidhar & Davenport, 2018; Fountaine et al., 2019) to Blockchain (e.g., Gupta, 2017; Iansiti & Lakhani, 2017; Choudary et al., 2019). This is neither a new phenomenon – contributions to Harvard Business Review with striking titles such as “Telecom: hook up or lose out” (Clemens & McFarlan, 1986) have a history of more than 30 years – nor a phenomenon confined to a single outlet. Scholarly journals, too, have been platforms for theorizing the impacts of emerging digital technologies ranging from internet-enabled information technology (e.g., Zammuto et al., 2007), to social media (e.g., Treem & Leonardi, 2013), artificial intelligence (e.g., Faraj et al., 2018), and Blockchain (e.g., Seidel, 2018; Lumineau et al., 2021).

While providing crucial guidance to practitioners and scholars facing a radically new phenomenon, emerging technology theories such as the above have also faced criticism for exaggerating organizational impacts by amplifying the value of innovations, glossing over organizational variation, and amplifying the urgency of organizational response (e.g., Ramiller, 2006). Furthermore, Leidner and colleagues (2018, p. 4) recently pointed out that technological features, affordances (i.e., action potentials arising in the context of feature use), and the respective organizational outcomes of these different categories were frequently “muddled” in academic theorizing of technology impacts. Using the example of a train ride, Leidner and colleagues emphasize the distinction between technological features, affordances, and their respective organizational outcomes as they envision it:

“Riding the train is the direct use of the object [the train] whereas working, sleeping, meditating, or conversing are not uses of the train itself, but affordances made possible by the train ride. One might be tempted to say that the outcome is that the individual arrives at work, but this is the outcome of riding the train, not the outcome of the affordances produced by riding the train. An outcome of affording the ride on the train to work, for example, may be that the individual completes more work in a given day than [they] would if [they] drove to work.” (Leidner et al., 2018, p. 4)



This example reveals a number of important aspects about emerging technology theories. First and foremost, it highlights that affordances, being action potentials opened up by technology feature use, are naturally more relational and precarious than inherent technology features (Shotter, 1983, Faraj & Azad, 2012; Fayard & Weeks, 2014). Where the outcomes of feature use can more or less be expected to manifest so long as one meets the use requirements (“buying a ticket” in the case of the train ride), the outcomes of affordances will manifest only if the use requirements are met *and* the circumstances of use support actualizing the affordance (“buying a ticket and being motivated to work during the commute” in case of the train ride). Thus, secondly, where emerging technology theories do not sufficiently distinguish between technological features and affordances, they are also less likely to distinguish between the degrees of attainability that are associated with outcomes of feature use on the one hand (“arriving at work”), and the outcomes of affordances (“getting more work done in a single day”) on the other.

Consequently, leaving implicit the differences between technological features and affordances “muddles” the distinction between the straightforward use of an emerging technology’s features and the contextual action potentials afforded by the use of those features. This portrays a simplified relationship in which far-reaching but conditional organizational outcomes can be reaped with certainty and little effort. Returning to Ramiller’s (2006) critique, such category conflation amplifies the portrayed value of the technology relative to its costs, glosses over organizational variation that might powerfully mediate outcomes, and thereby amplifies the urgency of organizational response.

## **(2.5) CONCEPTUALIZING THE PERFORMATIVITY OF EMERGING TECHNOLOGY THEORIES**

Based on the above considerations, we propose that a lack of differentiation between the explicit or implicit categories of technological features and affordances as well as their respective outcomes in the theorizing of emerging technology impacts will amplify the extent, attainability, and immediateness of the technologies’ impacts. These theories’ simplified narratives will be better at challenging existing practices in culturally resonant ways and garnering the support of powerful backers: uninhibited by the conditionality of actual organizational praxis, they are able to craft an enticing link between a single material device (the emerging technology in question) and far-reaching organizational outcomes that include both, the straightforward outcomes of feature use and the “anomalies” (Marti & Gond, 2017) that are more likely to stem from affordances. In this vein, these theories will be better at

inducing experimentation, the first phase of theories becoming self-fulfilling. We thus propose that emerging technology theories leaving implicit the categorial differences between technology features and affordances, and thus their respective organizational outcomes, will be more likely to exhibit general, effective, and Barnesian performativity.

With this proposition, we have also arrived at an analytical vocabulary that facilitates a deeper look into when and how emerging technology theories become performative. Based on our reading of the literature, the search for answers to these questions should proceed by analyzing how emerging technology theories differentiate (or not) between the categories of technological feature use and affordances as well as their respective outcomes, and whether their application in practice meets the requirements of general, effective, and Barnesian performativity.

We now turn to Blockchain, an exemplary emerging technology. Against this backdrop, we discuss two examples from our ongoing empirical research that serve to illustrate and enhance our proposition.

## **(2.6) BLOCKCHAIN AS AN EXEMPLARY EMERGING TECHNOLOGY**

We chose Blockchain as an exemplary emerging technology because it is a novel and fast-growing technology (Deloitte, 2019) for which practitioners and scholars alike have theorized considerable organizational impacts (Underwood, 2016; Tapscott & Tapscott, 2016; Gupta, 2017; Iansiti & Lakhani, 2017; Seidel, 2018; Choudary et al., 2019; Lumineau et al., 2021). It is also a technology that exhibits coherence across socio-economic domains – with Blockchain applications being observable in private business sectors ranging from manufacturing to financial services, energy, and healthcare (Deloitte, 2019), in development NGOs, and in public administration (Allessie et al., 2019) – while at the same time still being characterized by conceptual ambiguity (Jeffries, 2018). In this vein, Blockchain is an archetypical example of emerging technology.

From a technology features perspective, Blockchain facilitates the maintenance of data across a network of computers (Nakamoto, 2008). Rather than storing records on central servers, Blockchain uses encryption methods to allow peer-to-peer connected computers to store, update, and verify such records on distributed digital ledgers, which are sometimes also referred to as “global spreadsheets” (Swan, 2015). Blockchain transactions are verified, cleared, and stored in digital blocks of data connected to preceding blocks, thereby creating the eponymous “chain”. The first Blockchain application, Bitcoin, was developed in 2008 (Nakamoto, 2008). In 2014, the Blockchain application “Ethereum” (Buterin, 2018) iterated

upon this foundation to enhance its potential through so-called “smart contracts”. Simply put, smart contracts represent computer programs that are automatically executed by the computer network maintaining the Blockchain when the records meet certain conditions. For example, if Blockchain is used to store financial data, one might devise a smart contract that, at the start of every month, automatically distributes 5 \$US to all accounts.

From an organizational outcomes perspective, the features of Blockchain technology outlined above have been theorized to facilitate radical organizational decentralization (Tapscott & Tapscott, 2016; Seidel, 2018; Gupta, 2017; Choudary et al., 2019). Satoshi Nakamoto, the creator of Blockchain, designed the technology with the intention of making obsolete central third parties such as banks, which have created lucrative intermediary positions for themselves by garnering the trust of unacquainted actors and, on the basis of that trust, maintaining and verifying transactional data (Nakamoto, 2008, p. 1). Before Blockchain, maintaining and verifying such data without an intermediary would have been difficult, because malicious actors could have cheated (e.g., double-spending money). As the cryptographic methods employed by Blockchain networks counteract cheating whilst maintaining equal authority for all members of the network, practitioners and scholars alike have theorized that the use of Blockchain will create trust between unacquainted actors, making them able and willing to transact even in the absence of third parties and centralized authority. In this vein, the abolition of intermediaries and hierarchical structures has been portrayed as the natural, even inevitable, result of the “trust machine” (The Economist, 2015) that is Blockchain (e.g., Tapscott & Tapscott, 2016; Seidel, 2018; Gupta, 2017; Choudary et al., 2019).

In such theories of the organizational impacts of Blockchain technology, the affordances of the technology tend to remain implicit. As a result, such theories present a straightforward narrative according to which simple use of the features of Blockchain directly produces far-reaching organizational outcomes: feature use outcomes such as the storage and maintenance of data across a network of computers, and affordance outcomes such as the building of trust between parties, the automation of interdependent activities based on the Blockchain data, and the decentralization of organizational/market structures. However, as previously discussed, affordances are mere action potentials that are more precarious and context-dependent than technology features. Thus, when not clearly separating affordances from feature use, Blockchain theories tend to disregard the many material and social contingencies mediating the appealing affordance outcomes of interparty trust, algorithmic coordination, and organizational/market decentralization. For example, there may be reasons other than a lack of

mutual trust and ability to coordinate – such as legislation, contractual obligations, and normative institutions – that explain why incumbent intermediaries and hierarchies exist. Consequently, predominant Blockchain theories amplify the extent, attainability, and immediateness of the technology’s impacts, increasing their performative quality by inducing experimentation.

We now offer two examples of organizations using Blockchain technology in which the performativity of simplified Blockchain theories came to the fore.

## **(2.7) ILLUSTRATIVE EXAMPLES OF ORGANIZATIONAL BLOCKCHAIN USE**

The data supporting these two examples stems from our ongoing research into organizational Blockchain use. In Spring of 2019, we conducted a primary telephone interview with a top manager of each organization. In addition, we gathered publicly available archival materials (three secondary interviews and 35 blog posts) available online.

### **Illustration: Standards Org**

Standards Org (a pseudonym) is an international NGO working on the development and maintenance of supply chain standards. In 2017, Standards Org’s innovation department concluded that Blockchain was likely to have a “strong future impact on trade and industry” (Pilot Project Head, primary interview). In 2018, the organization’s management decided that “alright, Blockchain, the hype existing around that should be captured and we should simply test, in a pilot project [...], what you can and can’t do with that technology” (Pilot Project Head, primary interview). Searching for a viable context for the pilot project, they identified an appropriate use case in the field of lorry delivery.

Lorry delivery is one of the primary methods by which goods are transported along the supply chain. To make this process more efficient, collaborating as well as competing European producers, retailers, and providers of transport services have long agreed upon a standardized shipping container: wooden pallets. More than 500 million such pallets are currently in use. These pallets are bought by organizations individually, but are frequently traded in a routinized exchange system in which the sum of them changes hands around 2.5 billion times a year. The process works as follows: as warehouse staff receive goods from lorry drivers, they sign an exchange form indicating the number of laden pallets received and empty pallets given in exchange. When an organization receives fewer pallets than it delivers, it is able to use this exchange form as a voucher to claim additional pallets at a later point. But in recent years, this

paper-based exchange routine has come under increasing scrutiny. Retailers, producers, and logistics companies alike have criticized the paper forms for being error-prone and cumbersome. At the same time, previous efforts to digitize the pallet exchange forms have been held back by the sensitivity of the data represented on them. Because pallets have intrinsic value, and sales volumes can be read off from the number of containers exchanged, organizations seeking to protect their competitive positions are loathe to share pallet exchange information or store it under the lone jurisdiction of any individual actor. As the pilot project's head reflected:

“You have a use case with a lot of transactions, with many parties involved; you have a lack of transparency and a lack of trust, and you have a highly manual task, because around 95% of these transactions are still being handled manually today [...]. So, that was a use case that practically cried for testing whether Blockchain can deliver trust, security [...], distributed data. And Blockchain also provides the opportunity to abolish intermediaries, and we at [Standards Org] of course also wanted to see: does that work? Because we are also a kind of intermediary.” (Pilot Project Head, primary interview)

Thus, in 2018, Standards Org gathered thirty-five national and multinational businesses around a pilot project aimed at using Blockchain to digitize the exchange of wooden pallets. These businesses included competing as well as collaborating producers, retailers, and logistics companies, as well as IT service providers, who engaged in a series of workshops to collectively design the Blockchain solution. They decided on aspects such as what data exactly should be stored on the Blockchain, and how visible that data should be to all parties. Over the course of these workshops, almost half of the initial partnering businesses dropped out of the project. Ultimately, the pilot project ended in late 2018 with seventeen businesses testing the viability of a Blockchain-based solution in a two-week practical experiment where lorry drivers and warehouse staff used a mobile app to register the exchange of pallets on a Blockchain. The experiment was deemed a success by all parties that participated in the experiment. Ultimately, however, the pilot project revealed also surprising aspects about Blockchain:

“The biggest problem is that Blockchain itself does not create trust. Rather, I have to build trust between the parties as a foundation. [...] And so, we found that, especially in the beginning of such a project, a neutral third party or intermediary can foster the use of a Blockchain architecture.” (Pilot Project Head, primary interview)

Standard Org’s pilot project thus provides an example of emerging technology theories becoming performative. As the pilot project head’s comments reflect, the organization was driven to initiate the pilot project on the basis of emerging technology theories that had ascribed considerable future impacts to Blockchain based on the simplified argument that use of its features will “deliver trust” and “abolish intermediaries” (even though these are actually affordance outcomes). Connecting the material device of Blockchain to drastic organizational impacts in this straightforward way resonated with the key decision-makers at Standards Org and resulted in experimentation. These aspects of the example illustrate the potential for emerging technology theories to, (1) exhibit *generic performativity* (the theories arguing that Blockchain can deliver trust and abolish intermediaries are being used by decision-makers) and, (2) *effective performativity* (the theories arguing that Blockchain can deliver trust and abolish intermediaries are motivating experiments that would not happen in absence of these theories).

Strikingly, during the experiment, Standards Org found that it had to build trust between the parties involved (through a series of workshops) in order to even create a situation where Blockchain could be used (the field test). This aspect of the example illustrates also the potential for emerging technology theories to exhibit *Barnesian performativity*. Here, the theories arguing that Blockchain can deliver trust have driven the building of trust and the use of Blockchain, even though the former was not materially tied to the latter.

### **Illustration: Energy Org**

Energy Org (a pseudonym) is a technology start-up in the energy industry. In 2015, a co-founder of Energy Org was working at a professional services firm and encountered Blockchain technology while doing desk research. At the time, she perceived the technology as an opportunity to address pressing issues in energy markets:

“So, it was only when I heard about Blockchain [...], I came across a single slide, when I was at [a professional services firm], on the Ethereum white paper [...]. And for me, it was really like the missing piece in the coordination of this new decentralizing energy industry. There was an ‘aha’ moment – actually, I was like Cassandra. I kind of picked up the sheet and was running around the energy floor being like: ‘do you realize what this means!?’” (Co-founder, archival interview)

She went on to co-found Energy Org together with an experienced energy industry CEO in 2016. The mission of Energy Org is to provide a Blockchain-based platform that would provide different actors in the energy industry with a better visibility of energy generation and demand, creating a market that allocates resources more efficiently. At present, Energy Org's strategy director informs, energy transmission companies "don't actually have visibility of 50% of [energy] generation that's on the network [...]. They can't see that it's there, let alone what it's doing" (Strategy Director, primary interview). Energy Org believes that this problem will only be exacerbated in the future, by cheap renewables enabling private individuals to generate and sell electric energy on their own. Moreover, previous efforts that have sought to counteract the fragmentation of energy markets by establishing centralized platforms have failed, because they could not do so without creating exploitable information asymmetries and conflicts of interest. Such outcomes were deemed unacceptable for platforms that fundamentally sought to bring together competitors lacking mutual trust.

Energy Org believes that Blockchain will provide the solution: a "Blockchain-based platform would allow different products to be traded in one central location without having a central authority with privileged visibility and access over that market." (Strategy Director, primary interview). Energy Org believes Blockchain to have this capacity because it "fosters transparency and trust by guaranteeing the execution of certain processes (pre-programmed through 'smart contracts')" (Co-founder, archival blog post), and thus "can stand in for many of the trust functions for which we have typically looked to large, established & expensive corporates" (Co-founder, archival blog post).

Since its foundation, Energy Org's efforts to realize such Blockchain-based platforms in various national contexts have moved forward by approaching the biggest actors, "taking them through proof-of-concept, into pilots, and into deployment" (Strategy Director, primary interview). One of the start-up's biggest projects faces different energy system operators and started in early 2018, when Energy Org got those system operators to agree to participate in a proof-of-concept. In this project, Energy Org seeks to create the foundation for an efficient energy market by using Blockchain as a means for data sharing. However, a year later, the project was still in its infancy, and Blockchain was far from being deployed:

"[Laughs] Well, the project's been running 12 months, and we have just gotten to the point where we can start the project, because it's taken 12 months to negotiate the contract which defines what [the participating system operators'] involvement in the project is going to be. So, that just goes to show how difficult that coordination is

between the parties. Even having agreed to do the project, it's taken 12 months to actually get to the start. So, that's precisely the issue, that there's a lack of trust [...]” (Strategy Director, primary interview)

In this vein, Energy Org, too, exemplifies the performative quality that emerging technology theories can take on. The co-founders’ comments indicate that Energy Org was founded based on the theory that Blockchain could “foster trust” in a fragmenting energy industry. This motivating theory, conflating feature use and affordances, created an “‘aha’ moment” and spurred the co-founder to seek opportunities to test the theory through experiments with groups of large corporate actors. Once more, these aspects of the example illustrate the potential for emerging technology theories to exhibit *generic performativity* (the theories arguing Blockchain can foster trust is being used by the co-founder) and *effective performativity* (the theories arguing that Blockchain can foster trust motivated the founding of an organization and engaging in experimentation to test the technology’s promise). While seeking opportunities to engage in experimentation, Energy Org found that it first had to spend considerable time and effort building initial levels of trust between corporate actors through negotiation, before it could even begin conducting proofs-of-concept and field tests in which Blockchain would be deployed. Thus, this example, too, illustrates also the potential for emerging technology theories to exhibit *Barnesian performativity*. Again, at this degree of performativity, the theories arguing that Blockchain can foster trust are driving the building of trust and the use of Blockchain, even though the former is not materially tied to the latter.

## **(2.8) REFLECTIONS ON THE ILLUSTRATIONS**

Both Energy Org and Standards Org found themselves building trust between unacquainted actors *in order to use* Blockchain technology, as opposed to this process being an *outcome* of Blockchain use. At both sites, the trust building efforts happened *before* Blockchain was even yet materially present. In this vein, the examples provide an opportunity to further clarify our proposition of how emerging technology theories may become performative.

As we previously proposed, a lack of differentiation between technological features, affordances, and their respective organizational outcomes is likely to induce experimentation by amplifying the extent, attainability, and immediateness of emerging technology impacts. Where such experimentation actually happens on the basis of emerging technology theories,



generic and effective performativity are the result. However, when it comes to Barnesian performativity (theories becoming self-fulfilling), experimentation is merely the first stage. For a theory to exhibit Barnesian performativity, experimentation on the basis of a theory in the next phase also has to produce observable events that violate widely shared expectations and were predicted by the theory. The examples of Energy Org and Standards Org show how this may happen for emerging technology theories: simplified narratives disregarding the different conditionalities of feature use and affordances may be so inspiring that actors feel compelled to force the anomalous outcomes predicted for the emerging technology (e.g., trust building) – which are actually outcomes of implicit affordances – *before* the technology is yet being used. In such cases, actors *imitate* the affordances theorized for the emerging technology even in the absence of the material device, producing the theorized anomalies and practice shifts even though the underlying causality has been reversed (“Blockchain itself does not create trust. Rather, I have to build trust between the parties as a foundation” to use Blockchain).

Regarding the question of how emerging technology theories may become performative, we thus propose:

***Proposition 1:*** *The less that emerging technology theories differentiate between technological features, affordances, and their respective organizational outcomes, the more simplified their narrative will be and the more likely they will be to exhibit generic and effective performativity.*

***Proposition 2:*** *The most simplified emerging technology theories will be so inspiring that actors force the theorized anomalies by imitating the implicit affordances, inducing practice shifts and enacting Barnesian performativity.*

## **(2.9) DISCUSSION**

In this chapter, we have sought to extend the burgeoning discussion on the performativity of scientific and practitioner theories to the field of technological and organizational change. Examining emerging technologies as a key area in this field of research, we have argued that emerging technologies cannot exist without theories ascribing considerable impact to them. Synthesizing insights from the research on performativity as well as technological and organizational change, we have proposed that emerging technology theories conflating the implicit or explicit categories of technological features and affordances as well as their respective outcomes will be more likely to exhibit all three types of

performativity – generic, effective, and Barnesian performativity – offered explanations for why this may be the case, and discussed examples illustrating this logic.

We thus view this chapter as a first step towards recognizing the performativity of emerging technology theories that opens the door for systematic and empirical investigations of this issue. In this vein, we believe that we make a number of contributions to the existing scientific discourse and open up a promising research agenda.

First, our conceptual examination of the performativity of emerging technology theories reinforces and extends research on the sociomaterial (Orlikowski & Scott 2008) nature of technological and organizational change, that is, the insight that organizational transformations are never single-handedly “driven” or “produced” by new and emerging technologies. Where previous research has especially focused on the sociomaterial entanglement of technological artefacts and their developers and users (e.g., Leonardi, 2011; Barrett et al., 2012; Mazmanian et al., 2013), our performative perspective on emerging technology theories brings a new type of actor to the fore: scholars and experts whose theorizing attracts an audience in organizational and field-level discourses. Moreover, where longitudinal, empirical research on technological and organizational change has tended to view the adoption or internal development of a new technology as the starting point of the change process (e.g., Heracleous & Barrett, 2001; D’Adderio, 2003; Leonardi, 2011; Barrett et al., 2012), our performative perspective on emerging technology theories shows that it is crucial to also consider how managerial decision-making and exposure to certain theories set the ground for that change process and its outcomes.

Second, our conceptual examination of the performativity of emerging technology theories calls for a deeper inquiry into the extensive, unforeseen, but hitherto disregarded organizational consequences of conceptual work and theories, and how these theories may potentially amplify the organizational impacts of emerging technologies. How different emerging technologies have been co-constituted in discourses ascribing “considerable impact” to them, how those discourses have gone on to exhibit different types of performativity, and what consequences these performative outcomes have had for practitioners and scholars (e.g., attaining a thought-leader image, or misallocating financial resources) all appear as promising new research questions.

In the meantime, we believe that our conceptualization of how emerging technology theories can exhibit different types of performativity creates an opportunity to more critically engage with the existing practitioner and scholarly discourse on emerging technologies and their impacts on organizations. Reflecting on the clarity with which prominent emerging

technology theories distinguish between technological features, affordances, and their respective outcomes, how much space those distinctions leave for also considering the contingencies of outcomes, and whether the direction of causality implied is realistic, may produce discourses that are less prone to hype cycles and more attuned to the capabilities and needs of real organizations.

Finally, performative theories do not only shape social reality in terms of managerial decision-making, they also affect social welfare (Marti & Scherer, 2016) and have “ethical consequences” (Ferraro et al. 2009, p. 673). Recognizing the performative and ethical dimensions of emerging technology theories is particularly important given how drastic some of the impacts they ascribe to technologies are. To consider just one example, the practitioner and scholarly discourse surrounding artificial intelligence is rich with speculation of just how many jobs the technology is likely to replace. Being sensitive to the performativity of such theories could help public policymakers to consider the extent, attainability, and immediateness of their theorized impacts, thus supporting their efforts to minimize social harm and maximize social welfare in the context of emerging technologies.

## CHAPTER THREE

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The second paper of the dissertation is currently under review at a journal.

To protect the blind peer review process, the paper has been taken temporarily offline.

## CHAPTER FOUR

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### **(4) DIGITAL INFRASTRUCTURES FOR INSTITUTIONAL CHANGE: INSCRIPTION AND THE ROLE OF TECHNOLOGICAL PREFIGURATION**

#### **(4.1) ABSTRACT**

Actors working to bring about institutional change increasingly leverage digital infrastructures while doing so. For example, ample scholarship has examined how change-oriented actors use social media to organize and communicate their change vision. More recently, scholars' and practitioners' attention has turned to new phenomena such as Blockchain and open data platforms, where institutional change efforts and technology intersect in a different way. In these cases, change-oriented actors attempt to kick-start large-scale change by inscribing their envisioned institutional logics directly into IT artefacts serving a pivotal role in institutional arrangements. While scholars have long recognized the validity of such technological inscription as an approach to institutional change, a systematic understanding of how the inscription of digital infrastructures for these purposes proceeds is currently lacking. In this conceptual paper, I synthesize literature from information systems and organizational research to develop a theory of "technological prefiguration" that illuminates this topic. The concept and associated propositions highlight a crucial but hitherto disregarded organizational challenge that institutional change efforts proceeding via the inscription of digital infrastructures face. I illustrate these arguments with examples from the Blockchain space and discuss how an understanding of technological prefiguration can inform research and practice.

#### **(4.2) INTRODUCTION**

Change-oriented actors have long worked with digital technologies in their efforts to achieve institutional change. The previous decade saw social movements drawing on new digital technologies such as social media platforms for the purposes of organizing and strategically communicating their change vision (Van de Sande, 2013; Mason, 2012). Such social media platforms are *digital infrastructures*: IT artefacts that act as a fulcrum of

interaction between the numerous members of an ecosystem, field, or industry (see Hinings et al., 2018; Tilson, 2010).

More recently, change-oriented actors such as social movements have begun engaging with digital infrastructures in a new way. Scholars of information systems and organization studies have noted that, rather than simply *using* digital infrastructures for the purposes of engaging in strategic discourse, change-oriented actors in recent years have increasingly attempted to *inscribe* their motivating logics directly into these infrastructures in order to kick-start wider enactment of their envisioned institutional change (Faik et al., 2020; Hinings et al., 2018; Glaser, 2017; Gawer & Phillips, 2013). During these inscription efforts, actors capitalize on the modularity and re-programmability of IT artefacts (Hinings et al., 2018; Yoo et al., 2012; Yoo et al., 2010), shaping their materiality in such a way that the artefacts enable and constrain users' actions in ways that correspond to the actors' desired logic of behavior (Faik et al., 2020; Hultin & Mähring, 2014; Hargadon & Douglas, 2001; Orlikowski, 2000; Orlikowski, 1992, Akrich, 1992). Where these IT artefacts can be positioned as digital infrastructures, the logics inscribed into them may become enacted widely.

Accordingly, scholars and practitioners alike increasingly understand the inscription of digital infrastructures as a potential approach for fostering institutional change. Recent years have seen the rise of new digital infrastructures that change-oriented actors inscribed with logics of organizational decentralization, transparency, openness and collaboration. For example, Blockchain technology originated with the “Cypherpunk” movement of the 90s, which created this infrastructure for the purposes of radically decentralizing social and organizational coordination (Coleman & Golub, 2008; Greenberg, 2013; Hellegren, 2017). Today, Blockchain and its inscribed logics of decentralization and transparency are shaping private sector consortia as well as governmental organizations (Seidel, 2017; Hinings et al., 2018; Berryhill et al., 2018; Alessie et al., 2019; Lawrence & Phillips, 2019; Lumineau et al., 2021). Similarly, open data platforms rooted in the open-source movement and inscribed with logics of organizational openness and collaborative innovation are increasingly affecting how private businesses and government organizations operate (Kassen, 2013; Cohen et al., 2017; Mergel et al., 2018; McBride et al., 2019).

However, research has also noted challenges facing actors working towards institutional change via the inscription of digital infrastructures. Challenges have been associated either with, (1), the process by which actors try to establish an inscribed IT artefact as digital infrastructure in an ecosystem or field (e.g., Gawer & Phillips, 2013; Hargadon & Douglas, 2001), or, (2), the process by which an established digital infrastructure is used and

disseminates its inscribed logics (e.g., Orlikowski, 2000; Orlikowski & Scott, 2008; Berente & Yoo, 2012; Hultin & Mähring, 2014; Pine & Mazmanian, 2017).

An aspect of the inscription approach that has remained largely unexamined is the process by which the inscription of digital infrastructures for purposes of institutional change is organized in the first place. Glaser (2017) has provided an in-depth account of the role that “design performances” play in efforts to inscribe artefacts for changing an organization’s internal routines. In addition, cursory attention has been paid to the organizational work that may accompany the inscription of artefacts (Gawer & Phillips, 2013; Orlikowski, 2000; Orlikowski, 1992), and the co-constitutive nature of technology and organizing is increasingly recognized (Faraj & Pachidi, 2021; Faik et al., 2020; Orlikowski & Scott, 2008; Leonardi, 2011). However, the fundamental organizational challenges that may arise specifically during the inscription of digital infrastructures for the purposes of wider *institutional* change (i.e., change beyond the inscribing organization) have not been regarded in depth.

Looking to the institutional literature that research on inscription frequently draws on (e.g., Faik et al., 2020; Hinings et al., 2018; Hultin & Mähring, 2014), hitherto unrecognized organizational challenges may arise when the *institutional logics to be inscribed* into digital infrastructures clash with the *logics of the existing institutional arrangement governing organizational activities of and surrounding inscription*. Where the larger organization studies literature understands any organizational activity to be situated within social structures whose pluralist demands and prescriptions may contradict (Friedland & Alford, 1991; Seo & Creed, 2002; Kraatz & Block, 2008; Pache & Santos, 2010; Battilana & Dorado, 2010; Besharov & Smith, 2014), discourses about the inscription of digital infrastructures have tended to frame inscription itself as though it occurred mostly in a virtual realm of code, unshackled from real-world organizational and institutional exigencies. Hence, an in-depth account of the organizational processes and institutional challenges that accompany inscription is currently lacking, inhibiting our understanding of the role inscription may play within efforts to change institutions.

In the conceptual paper at hand, I seek to develop this account. Synthesizing literature from information systems and organizational research, I develop a theory of “technological prefiguration” that systematically regards the interactions between inscription and organizing, the fundamental challenge that arises at this nexus, and how this challenge may be overcome. I offer propositions discussing each of these aspects and combine them in a conceptual model. I illustrate each of these arguments with examples from the Blockchain space and close by discussing how the theory can inform research and practice.

### **(4.3) INSTITUTIONS AND INSTITUTIONAL LOGICS**

Institutional theory provides a socio-cultural lens upon society and organizations. “Institutions” themselves are understood as socially constructed and “enduring elements” of society that “have a profound effect on the thoughts, feelings and behavior of individual and collective actors” (Lawrence & Suddaby, 2006, p. 216). The concept captures meanings that are inter-subjectively shared among a group of people to the point of taking on a seemingly objective and exterior existence (Zucker, 1977; Zucker, 1987; Tolbert & Zucker, 1996), such that they become reciprocated as taken-for-granted heuristics (Meyer & Rowan, 1977). Rules, beliefs, and values are common examples of institutions (Scott, 2014). Being widely shared, these institutions define what does and does not constitute “legitimate” behavior in a given context (DiMaggio & Powell, 1983; Hinings et al., 2018). In this sense, institutions are understood to exert “isomorphic pressures” that lead the actions of individuals and organizations to converge around widely accepted typifications, as opposed to these actions being primarily guided by purely rational and materialist concerns (DiMaggio & Powell, 1983; see also Mair & Reischauer, 2017; Hinings et al., 2018).

While early institutional research tended to overemphasize this capacity for institutions to shape actors’ behavior top-down, in recent years, this view has been balanced with the recognition that institutions themselves are not inert structures existing independently of individual and collective actors. Rather, a growing stream of institutional theory has highlighted the idea that institutions are “inhabited” (Hallett & Ventresca, 2006), i.e, that the establishment, maintenance, and/or alteration of institutions fundamentally depends on how people enact them in their day-to-day interactions (Oliver, 1991; Lawrence & Suddaby, 2006; Lounsbury & Crumley, 2007; Powell & Colyvas, 2008; Smets et al., 2017; Lawrence & Phillips, 2019). These day-to-day reconstructions of institutions are understood to be “rife with conflict, contradiction and ambiguity” (DiMaggio & Powell, 1991, p. 28).

The concept of “institutional logics” (Thornton & Ocasio, 2012; see also Friedland & Alford, 1991) has become a particularly valuable and popular lens upon the day-to-day enactment of institutions and the potential for these institutions’ prescriptions to contradict and clash. Institutional logics are defined as “patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality” (Thornton & Ocasio 1999, p. 804). Analytically, institutional logics serve to “conceptualize the linkage of broader institutions (at the organizational and societal levels) to individual practices” (Seidel & Berente, 2013; see also Berente & Yoo, 2012; Friedland & Alford, 1991). Logics hence exist



between abstract institutions and actual instances of human action. They are action-oriented “ensembles of higher order meanings” that “frame how individuals make sense of the world around them” (Cloutier & Langley, 2013, p. 361).

Notably, actors may be exposed to prescriptions emanating from multiple institutions at the same time, and these pressures may contradict, such that clashes between incompatible institutional logics arise (Friedland & Alford, 1991; Seo & Creed, 2002; Kraatz & Block, 2008; Pache & Santos, 2010; Battilana & Dorado, 2010; Besharov & Smith, 2014; Smets et al., 2015). Such clashes require active management, as they can present a threat to the sustained existence of organizations (Oliver, 1991; Pache & Santos, 2010; Kraatz & Block, 2008; Greenwood et al., 2011; Dalpiaz et al., 2016; Smith & Tracey, 2016). At the same time, clashes between logics can evoke new and innovative ideas and practices that provide an opportunity to theorize and enact changing logics, thereby changing the “enduring” institutions of society themselves (Seo & Creed, 2002; Smets et al., 2012). “Theorization” describes the process by which actors who encounter new ideas and practices abstract and typify these new ideas and practices in “understandable and compelling formats” (Suddaby et al., 2002, p. 75; see also Greenwood et al., 2002; Mena & Suddaby, 2016). These formats align the new ideas and practices with prevailing normative prescriptions to bestow a “moral” legitimacy, or with functional concerns to bestow a “pragmatic” legitimacy (Suchman, 1995). New ideas and practices thus packaged can be tested, disseminated, and actively advocated for among a growing number of actors, such that they “make the transition from theoretical formulation to social movement to institutional imperative” (Strang & Meyer, 1993, p. 495; see also Tolbert & Zucker, 1996; Purdy & Gray, 2009; Lounsbury & Crumley, 2007; Lawrence & Suddaby, 2006; Reay et al., 2006).

With these foundations of institutional theory established, in the next section, I present extant research discussing the role that IT artefacts such as digital infrastructures play in institutional processes. In particular, I present prevalent understandings of how institutional logics enacted by one group of actors may be inscribed into IT artefacts as part of these actors’ attempts to achieve wider enactment of the logic for the purposes of institutional change.

#### **(4.4) INSTITUTIONAL LOGICS AND INSCRIPTION OF DIGITAL INFRASTRUCTURES**

Current information systems research considering the relationships between institutional processes and IT artefacts such as digital infrastructures turns on the understanding that both are mutually constitutive of each other (Orlikowski & Scott, 2008; Hultin & Mähring,

2014; Faik et al., 2020). In line with the definition of institutional logics, this lens emphasizes that the day-to-day interactions establishing, maintaining, and altering institutions are fundamentally *material* practices. Accordingly, institutional processes are understood to be not merely social but “sociomaterial” in nature (Orlikowski & Scott, 2008), both shaping and being shaped by the artefacts and ecologies situating human activity (see also Orlikowski, 2000; Orlikowski, 1992; Hultin & Mähring, 2014; Whiteman & Cooper, 2001).

In detail, the relationship between institutions and IT artefacts is increasingly understood through the concepts “attention” and “affordances” (Faik et al., 2020; Hultin & Mähring, 2014; Gawer & Phillips, 2013). In the prevalent understanding, institutional logics “guide the allocation of *attention* by shaping what problems and issues get attended to and what solutions are likely to be considered” (Thornton et al., 2012, p. 90; own emphasis). *Affordances*, in turn, are defined as action potentials which emerge from the situated relationship between the actors’ perception and the material configuration of IT artefacts (which may be perceived to enable some actions while constraining others) (Gibson, 1979; Faraj & Azad, 2012; Fayard & Weeks, 2014). Faik and colleagues (2020) have argued that the allocation of attention that occurs during the enactment of institutional logics fundamentally shapes how actors construe the action potentials opened up by a particular IT artefact, and vice versa: “as individuals and organizations draw from accessible logics in their interactions with IT-in-use, they focus their attention on specific IT affordances. In turn, IT affordances (re)enact IT-in-use and prompt the users to activate specific institutional logics.” (2020, p. 1364). In this vein, many organization studies and information systems scholars have acknowledged that, to the extent the materiality of IT artefacts is similarly and durably configured across sites, common patterns of action may emerge (Orlikowski, 1992; Orlikowski, 2000; Leonardi, 2011). Moreover, research holds that the deliberate configuration of IT artefacts’ materiality can “inscribe” these artefacts with particular institutional logics, such that users’ interaction with these artefacts may prompt enactment of the logics (Faik et al., 2020; Orlikowski, 2000; Hargadon & Douglas, 2001; Hultin & Mähring, 2014).

To the extent that this occurs widely and repeatedly, inscribed IT artefacts may serve as a medium for enacting institutional change. In this process, extant research has repeatedly emphasized the crucial role of digital infrastructures that act as fulcrums of interaction between members of a consortium, an ecosystem, field, or industry (Hinings et al., 2018; see also Mair & Reischauer, 2017; Tilson, 2010). Because many actors engage with these digital infrastructures daily, the logics inscribed into them have the best chance of becoming enacted widely. As opposed to more traditional infrastructures, digital infrastructures are relatively easy

to inscribe by virtue of their virtual and re-programmable nature (Hinings et al., 2018; Yoo et al., 2012; Yoo et al., 2010), and this virtual nature further makes them relatively cheap to construct and establish. Due to network effects (Katz & Shapiro, 1994), finally, digital infrastructures are also subject to exponential growth of users, such that even entirely new IT artefacts can become established as digital infrastructure relatively quickly.

#### **(4.5) TECHNOLOGICAL PREFIGURATION DURING INSCRIPTION OF INSTITUTIONAL LOGICS**

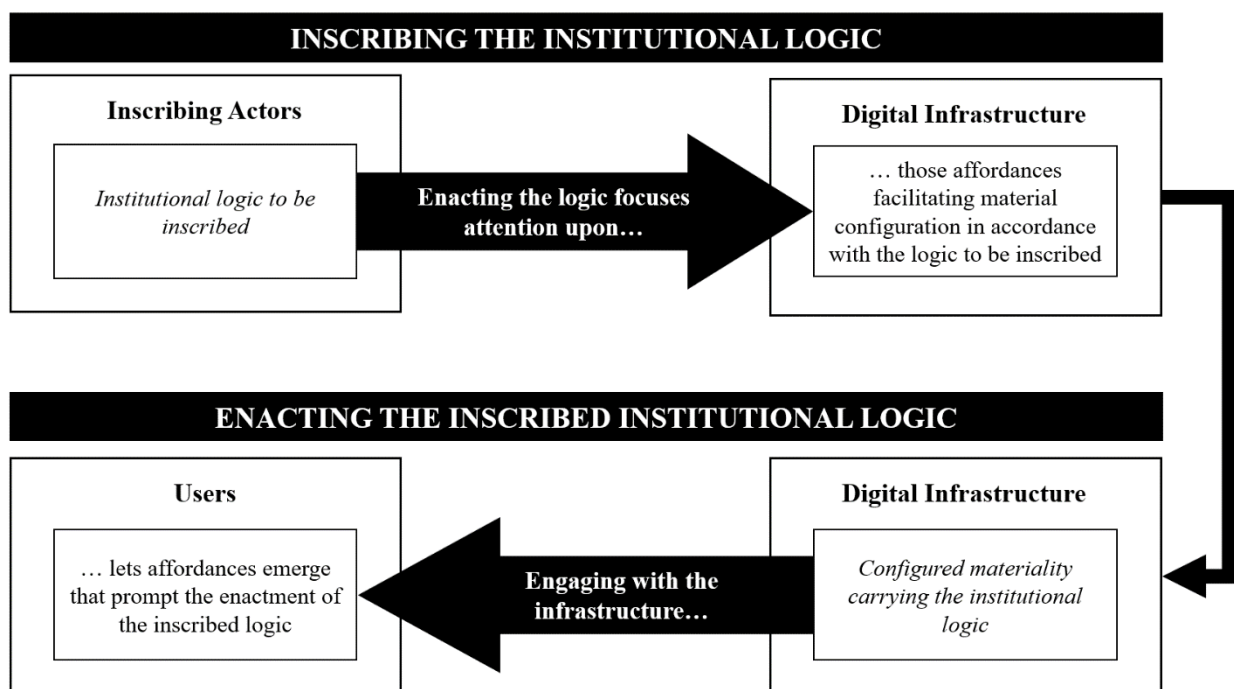
In extant theory, the process of inscription hence turns on the relationship between attention and affordances. Inscription of digital infrastructures is understood to be possible because the materiality of these infrastructures may be durably configured such that when they are used, certain affordances may emerge that prompt the users to enact the inscribed institutional logics. An important flipside of this understanding is that, without themselves enacting the logic to be inscribed, inscribing actors will not be able to focus their attention upon and actualize those affordances of the infrastructure that facilitate its logic-appropriate material configuration (i.e., its inscription). Therefore, during the act of inscription, inscribing actors to some degree *have to enact the institutional logic they seek to inscribe into the digital infrastructure*. This distinction is visualized in Figure 4.

Extant research has shown that this enactment of the logic to be inscribed occurs beyond individual cognition or the virtual realm of code editors and development environments (Orlikowski, 2000; Olirkowski, 1992). As Orlikowski (2000) found when studying how developers at Iris Associates inscribed their collaborative work logic into a software product called “Notes”:

“As is common in many software development projects, the Iris developers used the technology they were building to support their own development activities, using its features of electronic mail, discussion databases, text entry, text edit, text search, and tool design to create and share repositories of software documentation and modules. So, the first technology-in-practice to be constituted with the Notes technology was the one enacted recurrently by members of the Iris development team. It was a structure of collaboration, which both shaped and was shaped by the ongoing Iris software development process. It was influenced by the Iris developers’ strong views about distributed control and individual empowerment, their participative culture and limited hierarchy, their energy and motivation to create a computer tool to support

collaboration, as well as the properties of the emerging Notes technology that Iris developers were inscribing into the artifact. Their enactment of a collaborative technology-in-practice thus modified aspects of the technology itself (through the addition or improvement of various properties), strengthened the Iris developers' belief in the value (both for themselves and more generally) of computer-supported collaboration, and reinforced their distributed and collegial work practices and norms [...].” (Orlikowski, 2000, p. 414)

While inscribing their “strong views” about the value of a distributed and collaborative work logic into the software they were building, the developers at Iris Associates went beyond merely cognitively picturing those views during coding. Rather, they enacted the collaborative work logic throughout their collective practices, which both meant using the unfinished product to organize their own work as well as engaging in facilitatory organizational practices having to do less with software development per se and more with their team culture. Orlikowski presents these enactments of the logic that occurred within and beyond the software coding practices as having had beneficial impacts upon the project as a whole: benefits relating to the final quality of the software, to the robustness of the logic, and to the motivation of the developers.



**Figure 4:** Two central processes facilitating institutional change via the inscription of institutional logics into digital infrastructures.

Scholarly recognition of such ties between the inscription of artefacts on the one hand and organizational enactment of the logic to be inscribed on the other dates back as far as 1968. At that time, Melvin E. Conway formulated “Conway’s Law”, an adage stating that organizations tended to design technological systems whose structures reflected their own social structure (Conway, 1968). However, while Orlikowski’s observations and Conway’s Law fit neatly with current sociomaterial perspectives upon the relationship between IT artefacts and organizing, in-depth explorations of the dynamics highlighted by them are notably absent from current information systems scholarship discussing the dynamics of inscription. The remainder of this paper aims to offer such an exploration.

### **Conceptualizing Technological Prefiguration**

Based on the extant theory and observations just presented, it appears that enacting the logic to be inscribed in practices that *directly* contribute to the inscription effort (i.e., practices of actual material configuration) is an inextricable aspect of inscription, and furthermore, that this enactment of the logic to be inscribed also has to reach to practices that only *indirectly* contribute to the process of inscription (i.e., facilitatory organizational practices) for the inscription to have the best chances of achieving its intended goals. While information systems scholarship has paid relatively less attention to these dynamics, scholars of social movements have long examined these organizational enactments of the logics one seeks to actualize in the world using the concept of “prefiguration” (Reinecke, 2018; Van de Sande, 2013; Yates, 2015). “Prefiguration” describes “the embodiment, within the ongoing political practice of a movement, of those forms of social relations, decision-making, culture and human experience that are the ultimate goal” (Boggs, 1977, p. 100). It refers to actions “in which certain political ideals are experimentally actualized in the ‘here and now’, rather than hoped to be realized in a distant future. Thus, in prefigurative practices, the means applied are deemed to embody or ‘mirror’ the ends one strives to realise” (Van de Sande, 2013, p. 230). While the concept of prefiguration has rarely been discussed in relation to institutional theory (Reinecke, 2018) or inscription (but see Yates, 2015, who hinted at this relationship), it describes precisely that link between inscription of artefacts and organizational logic enactment specified above: to some degree, inscribing actors have to enact the institutional logics they seek to scale up via digital infrastructures in the “here and now” practices that directly and indirectly contribute to inscription. I derive the following initial definition and proposition:

**Definition:** “Technological prefiguration” describes the enactment of institutional logics that an individual or collective attempts to inscribe into an IT artefact *within the very practices of inscription themselves* as well as *faciliatory organizational practices*.

**Proposition 1:** *Technological prefiguration contributes to the successful inscription of institutional logics into an IT artefact, and their dissemination through said artefact.*

In the following, I will further elaborate and illustrate this proposition. In doing so, I will repeatedly present examples from Sphere (a pseudonym). Sphere is a Blockchain start-up seeking to disrupt institutions of centralized organizational and socio-economic governance via provision of a decentralized, digital communication infrastructure. I had the opportunity to study Sphere between 2019 and 2021, initially via interviews with its members and later by joining the organization as an unpaid volunteer contributor. The descriptions and quotes presented in the following stem from this engagement.

Sphere was created by a group of volunteers who have together been working on “the technological tools and social patterns and practices to enable the next economy – one that is distributed, equitable, and regenerative” since 2014. In 2016, the group theorized “Sphere Chain”, a peer-to-peer computing solution similar to Blockchain technology that allows users of digital applications to transact and coordinate with one another without requiring central servers or organizations that validate the legitimacy of their actions. In this vein, Sphere understands itself to be growing a “new distributed Internet [that] will change everything: from forms of business and social organization to the evolution of human consciousness itself.” In early 2018, the organization ran two crowdfunding campaigns that promoted Sphere Chain as a new digital infrastructure that would make “possible an entire network of distributed apps that are free from centralized, corporate control.” These campaigns raised tens of millions of \$US, allowing Sphere to incorporate and hire its former volunteers as fully salaried employees. Since then, Sphere has focused all its efforts on the construction and popularization of its Sphere Chain infrastructure.

However, Sphere does not resemble a traditional, bureaucratic corporation. In one attempt to prefigure the Sphere Chain vision for organizing using a wholly decentralized, digital infrastructure, the founders of Sphere deliberately set up the organization as one without central offices and co-located employees, in which team members collaborate primarily via extensive videochat meetings and an internal text messaging tool. In addition, the company was set up with a formally flat, decentralized hierarchy, as well as loosely defined structures

and roles. Shortly after Sphere’s incorporation, one of the lead Sphere Chain developers reflected on these structural decisions in the organization’s text messaging tool, stating:

“We want to build a decentralized Internet [...] If we would organize ourselves in a hierarchical and centralized way in which a small upper management team decides about the roles and pay of every department [...], [Sphere] would fail to achieve that promise. Why? Because of Conway’s law.” (Developer)

Many members of the organization, including the two co-founders and the volunteers who had been with Sphere since the beginning, supported the flat hierarchy and loosely defined structures and roles on the same basis. When I later asked one of Sphere’s co-founders to elaborate on this perceived need to prefigure the institutional logic of decentralized, digital coordination Sphere was trying to inscribe into the Sphere Chain infrastructure, he explained:

“I think that there may be a systemic reality that... If you don't at least try to have a certain consciousness, the tools that you create won't match that consciousness and vice versa. Right? So, there's this kind of chicken-and-egg thing. So, you end up having to do it in a spiral. So, there may be a systemic requirement that you *do* this [i.e., enacting the “consciousness” to be inscribed], despite of how hard it is. Because if you don’t try, what's embodied in the tool itself will not support that [consciousness].” (Co-Founder)

This co-founder, who is himself one of Sphere Chain’s lead developers, supports technological prefiguration because he is convinced that the organization will only be able to configure Sphere Chain’s materiality in accordance with their desired “consciousness” (i.e., institutional logic), if they actually enact said consciousness during the process of material configuration. As per Faik and colleague’s (2020) theory of inscription, the implication here is that, without enacting the consciousness in the practices of material configuration, Sphere’s members attention will not be oriented in such a way as to allow them to actualize those affordances of the IT artefacts they are configuring which are required for the logic-appropriate construction of Sphere Chain. Accordingly, I derive a second proposition:

***Proposition 2:*** *Technological prefiguration during the practices of material configuration supports an inscription effort by orienting the inscribing actors’ attention to those affordances of the IT artefact that facilitate its logic-appropriate configuration.*

In the following two subsections, I will elaborate and illustrate also how technological prefiguration in facilitatory organizational practices that do not themselves configure the materiality of the IT artefact in question ultimately support the larger inscription effort.

### **Theorization, Experimentation, and Legitimacy**

In institutional theory terms, the inscription of a logic into an IT artefact occurs as part of the “theorization” process in which new ideas and practices become abstracted and typified into understandable and compelling formats (in this case the IT artefact). While it may be sensible to assume that theorization and inscription proceed linearly, such that the logic to be inscribed is already “fully theorized” before the actual work of inscription begins, research suggests that theorization and inscription rather occur in recursive cycles of abstraction, artefact design, experimentation, and theory and/or artefact refinement (see, e.g., Gawer & Phillips, 2013; Feldman & Orlikowski, 2011; Lounsbury & Crumley, 2007; Glaser et al., 2021). The quote from Sphere’s co-founder already presented above, in which he explained the perceived need to conduct prefiguration and inscription of institutional logics “in a spiral”, presents this same understanding. Orlikowski (2000), too, observed at Iris Associates that the developers’ own appropriation of the software they were building surfaced aspects of the software and the underlying collaborative work logic that they could still improve upon, resulting in the enhancement of both. Similarly, research on prefiguration in social movements has repeatedly stressed how prefiguration serves to actively experiment with and iteratively refine the institutional logics that present these movements’ ultimate ends (Reinecke, 2018; Van de Sande, 2013; Yates, 2015; Poletta, 1999).

Hence, beyond the actual practices of material configuration, technological prefiguration in facilitatory organizational practices provides a wide testbed in which the logics to be inscribed can be safely enacted, validated, and iteratively refined, such that more “robust” (Hargadon & Douglas 2001) versions of the logic and the inscribed IT artefact are developed. These may then be more successfully disseminated and established as digital infrastructure, and they may more reliably prompt the enactment of their inscribed institutional logics among users. Accordingly, I derive a third proposition:

***Proposition 3a:** Technological prefiguration during facilitatory organizational practices supports an inscription effort because it presents opportunities for iterative testing, validation, and refinement of the logic and the IT artefact being inscribed.*



At Sphere, this relationship between prefiguration and iterative theorizing and inscribing was strikingly illustrated by the phrase “eating your own dogfood” that many members of the organization frequently used. Another one of co-founders explained the idea to me in an interview:

“We were building distributed software to empower distributed organizations. And we thought we probably should... you know, *be* one. That we should "eat our own dog food" in that regard. [...] We're saying: [Sphere Chain] will help you solve certain problems by being decentralized – by not having a center. But the problem is: not having a center also creates a set of problems. And so, I think we had to have that set of problems, and be engaged in the process of solving them for ourselves, to truly be able to authentically offer them to others. Right? And that's what I mean by ‘eating your own dog food’.” (Co-Founder)

Accordingly, beyond building the Sphere Chain infrastructure for running distributed applications, the organization has also put effort into building an example application running on this infrastructure that would be used internally across all functions (i.e., also in facilitatory organizational practices). As the above quote expresses, developing and using this so-called “dogfooding app” was intended to combine with the organization’s globally distributed, digitally coordinated nature and flat structure to allow the organization to work through and solve the new “set of problems” created by the logic of decentralization and digital coordination it was inscribing into Sphere Chain.

Beyond making the logic and inscribed IT artefact better and more robust, the co-founder’s statement indicates that such internal testing and refinement may benefit institutional change projects proceeding via the inscription also in a second way. By allowing change-oriented actors to attest that the logic and IT artefact in question have already been successfully employed internally – and in fact, facilitated the production of the novel IT artefact in question – technological prefiguration allows these actors to “authentically offer them to others”. In institutional theory terms, the idea expressed here is that technological prefiguration across practices of material configuration as well as facilitatory organizational practices allows organizations to construct a pragmatic legitimacy for the logic and IT artefact they seek to disseminate. Attestations that the logic and IT artefact have already been employed internally with success allow change-oriented actors to create a link “between new ideas and economic benefits” that others may want to mimic (Greenwood et al., 2002). In this way, pragmatic legitimacy supports efforts to disseminate the logic and establish the IT artefact as digital

infrastructure, and can be seamlessly combined with claims to moral legitimacy (Suchman, 1995) that may have been developed independently of prefiguration.

***Proposition 3b:** Technological prefiguration during facilitatory organizational practices supports the dissemination of an inscribed IT artefact and its associated institutional logic because it allows change-oriented actors to construct a pragmatic legitimacy for the artefact and logic that rests on the fact that both were internally enacted and used throughout their creation.*

### **Sense of Self and Sense of Purpose**

Technological prefiguration in facilitatory organizational practices also support the inscription and dissemination of an IT artefact and its inscribed institutional logic due the relationship that technological prefiguration has to individual and organizational senses of self. Research on institutional logics has shown that logics “provide social actors with vocabularies of motives and sense of self. [They] not only direct what social actors want (interests) and how they are to proceed (guidelines for action), but also who or what they are (identity)” (Lok 2010, p. 1308). Individuals coming together to work on transforming existing institutions via popularization and enactment of a new institutional logic are frequently motivated to do so because their personal motives and sense of self are tied up with this new institutional logic (Lok, 2010; Creed et al., 2010). In research on social movements, prefigurative practices have been found to constitute a crucial component of the “emotional energy”, the sense of political subjectivity and sense of purpose that keeps individuals motivated and engaged with the institutional change project over the longer periods of time that they tend to take (Reinecke, 2018; see Gordon, 2008). Technological prefiguration hence not only serves to convince outside actors of the logic and inscribed IT artefact via the construction of pragmatic legitimacy, but also serves to reinforce the change-oriented actors’ own conviction and drive (see also again Orlikowski’s (2000) observations of Iris Associates). Inversely, individuals coming together to work on institutional change projects may respond negatively when there is a lack of prefigurative practices. If participants feel that the group is not “walking the talk”, the emotional energy may turn to an energy of disappointment and lack of conviction; members may lose motivation and leave the project (Reinecke, 2018; see also Selznick, 1957). To the extent that institutional change projects provide no other incentives for participation (e.g., monetary), the presence or absence of prefigurative practices may become a make-or-break question for organizational cohesion.

***Proposition 3c:** Technological prefiguration during facilitatory organizational practices supports the dissemination of an inscribed IT artefact and its associated institutional logic because it speaks to actors' senses of purpose and political subjectivity, thereby maintaining the actors' desire to contribute to the effort.*

Throughout Sphere's history, many of its team members have repeatedly shown that questions surrounding technological prefiguration were deeply important to their sense of identity and their motivation to work for the organization even through times of hardship. For example, in late 2018, one team member, having recently attended an organization-wide session (the "Sphere Common Ground" session) discussing how Sphere could best enact its desired institutional logics in its organizational practices, noted in a meeting:

"I just want to say how grateful I am for [one of the co-founders] in particular and [another team member]... you know, they ran the Sphere Common Ground session that really sort of renewed my own connection to Sphere and why I joined in the first place, and what my aspirations were, and... you know, what it is we're trying to do. I know *what* we're trying to do, but *how* we're trying to do it [is what they spoke about]. You know, that meant a hell of a lot to me. Yeah, I really, really appreciated that."  
(Operations Manager)

Reflecting on how technological prefiguration is tied up with Sphere's team members' sense of self and sense of purpose, one of the co-founders noted in an interview: "certainly for me, I'm not really interested in being a big part of a not-self-organizing organization. And yet I think that certain people would say 'we're not self-organizing enough'." The latter part of this statement refers to some cases in Sphere's past where team members also left the organization again because they felt that Sphere was not engaging in enough technological prefiguration. When I interviewed one of these past team members, they explained that they decided to leave the team in response to structural changes in the organization that they perceived to have "caused kind of a reversion right back into more [...] command-and-control structure. [...]" That just struck me as very... you know, not within the values of what I had expected at all"  
(Past Team Member).

Why did these structural changes come about that inhibited enactment of the logic of decentralized coordination, even though most members of the organization agreed that some degree of technological prefiguration was important?

#### **(4.6) THE CHALLENGE OF TECHNOLOGICAL PREFIGURATION**

Although technological prefiguration is central to inscription and dissemination efforts, it also subjects inscribing actors to a fundamental organizational challenge. This challenge arises because inscribing actors working towards institutional change are often still subjected to isomorphic pressures emanating from the very institutions they seek to overturn. These isomorphic pressures call for the enactment of institutional logics which are likely to clash with the institutional logics the actors are trying to enact and inscribe into the digital infrastructure. In this position of institutional contradiction, fully enacting the logic to be inscribed into the digital infrastructure across all practices becomes difficult (see Friedland & Alford, 1991; Oliver, 1991; Seo & Creed, 2002; Kraatz & Block, 2008; Pache & Santos, 2010; Battilana & Dorado, 2010; Besharov & Smith, 2014), and may surface rifts that threaten to upend the change project altogether.

Organization studies is replete with accounts of these logics clashes and how they put at risk institutional change projects. Scholars of social movements have long discussed the fundamental challenges associated with prefiguration (Reinecke, 2018; Van de Sande, 2013; Yates, 2015; Schneiberg & Lounsbury, 2008; Martí & Fernandez, 2013; Munir, 2015). They found that prefiguring movements often follow patterns of either, (1), creating “exceptional spaces” (Feigenbaum et al., 2013) that allow them to prefigure fully and live in defiance of institutional pressures (Oliver, 1991) at the cost of their ability to affect the existing institutional reality (Reinecke, 2018), or, (2), acquiescing to the institutional pressures (Oliver, 1991), thereby maintaining their ability to affect the existing institutional reality but effectively giving up the prefigurative approach and reducing the transformative impact of their project (Reinecke, 2018).

Accordingly, actively managing the logics clash associated with prefigurative approaches to institutional change is central for these approaches to find success. In response to extant scholarship on inscription that has tended to disregard this challenge, I argue that paying attention to it is crucial for further understanding the validity of inscription approaches to institutional change.

***Proposition 4:** Technological prefiguration poses a challenge for the inscribing actors, as enactment of the logics to be inscribed is put at risk by isomorphic pressures emanating from existing, dominant institutions that contradict these logics.*

***Proposition 5:** Actively managing the challenge associated with technological prefiguration supports the inscription and dissemination of institutional logics by reducing the chance for detrimental patterns of full acquiescence to or full defiance of institutional pressures to arise.*

While most of Sphere's members agreed that some form of technological prefiguration was central to the success of their project, and in many ways succeeded in enacting it, they did not always feel able to engage in prefiguration across all parts of their organization. Sphere's incorporation, which was a necessary measure for the organization to become able to spend the money generated via its crowdfunding campaigns, in some ways subjected Sphere to the existing, capitalist and bureaucratic institutional order that it seeks to overturn. Although technological prefiguration of the Sphere Chain infrastructure would call for the full decentralization of organizational structures, the informal rules and formal regulations of the existing institutional order – in which, for example, there have to be individual people that are legally accountable for an organization's actions (e.g., meeting regulatory requirements surrounding hiring and pay of employees across the globe) – in 2018 prompted the organization to install an "executive team".

The executive team acknowledged that "full" technological prefiguration was not always possible in light of the pressures emanating from the existing institutional order, and its actions have intermittently acquiesced to those pressures (while maintaining prefigurative practices where they deemed it possible, e.g., in the globally distributed and fundamentally digital nature of the organization). This development was not well received by some of Sphere's members, prompting intense internal debates and, as the statement presented in the previous section illustrated, even caused some members to leave the team. One team member in an interview described this as the "biggest challenge" Sphere had faced, and remembered that:

"It was hard, you know? People felt hurt and betrayed, and it became... at some level it becomes personal just because we're humans. Even though, in a lot of ways, it's not personal, because I think we were all there for this mission that is Sphere and Sphere Chain. But that never makes it easy, just because you feel like you have a shared mission." (Communications Manager)

One of the co-founders, who is himself a member of the executive team, reflected in an interview:

“The point is that the hardware and software... in my view, they crack a door into that new world. [...] But it makes total sense that to the degree to which we ourselves embody the old world, it’s really painful. Which we did and still do.” (Co-Founder)

#### **(4.7) APPROACHES FOR MANAGING TECHNOLOGICAL PREFIGURATION**

The preceding sections have established that technological prefiguration is a central and – to some degree – even necessary aspect of institutional change projects proceeding via the inscription of digital infrastructures. They have also established that this technological prefiguration subjects change-oriented actors to a fundamental challenge, whereby enacting the logic to be inscribed during technological prefiguration may contradict with the isomorphic pressures emanating from existing institutions. Although this contradiction between new and existing logics is a well-known phenomenon in institutional theory, it has scarcely been acknowledged and theorized in relation to logic inscription. In this section, I draw on existing research to develop a final proposition discussing how change-oriented actors may overcome this challenge.

At large, extant research differentiates three approaches to managing institutional contradiction in organizations: eliminating pluralism, compartmentalizing activity, and processual balancing (see Oliver, 1991; Kraatz & Block, 2008; Pache & Santos, 2010).

##### **Eliminating Pluralism**

Organizations may respond to clashing institutional logics by eliminating their subjection to institutional pluralism (Kraatz & Block, 2008). Some of the studies of social movements portrayed above have already introduced this strategy. These found that prefiguring social movements are subjected to an institutional pluralism in which the logics they seek to enact and actualize in the world clash with those logics emanating from the existing institutional order they seek to overturn, and frequently react to this clash by either “defying” (Oliver, 1991) the prescriptions of the existing institutional order (construing themselves to inhabit an “exceptional space” that shelters them from these prescriptions (Feigenbaum et al., 2013; Reinecke, 2018)) or by “acquiescing” (Oliver, 1991) to the prescriptions of the existing institutional order (Reinecke, 2018; Schneiberg & Lounsbury, 2008; Martí & Fernandez, 2013). The former eliminates pluralism by cutting out the existing institutional order, whereas the latter eliminates pluralism by giving up on the prefigurative approach. Both are detrimental to these movements’ ability to foster their desired institutional change, as the former mitigates

their ability to meaningfully interact with the existing institutional order, and the latter reduces their transformative impact upon said institutional order.

### **Compartmentalizing Activity**

Organizations may also respond to clashing institutional logics by maintaining the institutional pluralism but separating its influences on organizational activity and treating these in distinct compartments of the organization (Kraatz & Block, 2008). For example, organizations may enact the institutional logic prescribed by the dominant institutional environment in their practices facing outside stakeholders, while engaging in prefiguration exclusively in their internal practices. This “decoupling” (Boxenbaum & Jonsson, 2017; Greenwood et al., 2011; Bromley & Powell, 2012) or also “loose coupling” (Orton & Weick, 1990; Berente & Yoo, 2012) “enables organizations to seek the legitimacy that adaptation to rationalized myths provides” (Boxenbaum & Jonsson 2017, p. 80) while internally prefiguring their novel institutional logic.

However, extant research also suggests that this compartmentalizing approach may not be “sustainable over time” (Boxenbaum & Jonsson, 2017, p. 104). Recalling the above discussion of how organizational practices are tied up with individuals’ senses of self and sense of purpose, “it seems that an organizational image that is persistently inconsistent with how organizational members see themselves will eventually provoke a corrective action” (Boxenbaum & Jonsson, 2017; see also Selznick, 1957; Dutton & Dukerich, 1991; Gioia et al., 2013). Research into the “conditions under which organizations can continue to decouple their structures from their practices” (Greenwood et al., 2011) is yet to arrive at a verdict.

### **Processual Balancing**

Finally, organizations may respond to clashing institutional logics by balancing their enactment on an on-going basis and in this process searching for opportunities to find intermittent complementarity (Kraatz & Block, 2008). Research has shown that even logics which generally conflict with one another may still be compatible or even complementary in certain situations, such that organizations may iteratively move through cycles of gradually bridging and again separating logics in their practices (Smets & Jarzabkowski, 2013; Smets et al., 2015). This dynamic process lacks a finite resting point. Rather, it is one of on-going organizational becoming (Jay, 2013; Kim et al., 2019; Tsoukas & Chia, 2002) that may over time allow organizations to forge a durable organizational self that is able to evoke different identities at different times through symbolic acts (Selznick, 1957; Kraatz & Block, 2008).

In this sense, an approach of processual balancing that looks for opportunities to find situated complementarity between clashing logics will intermittently also move through phases of compartmentalization via decoupling or loose coupling. Viewed in total, research thus suggests that organizations are best able to navigate clashing institutional logics when they engage them not as a singular either-or choice (“eliminating pluralism”), but rather as influences that need to be balanced on an on-going basis by moving through cycles of separating logics (to enact different ones at different times and/or in different places), and capitalizing upon their situated complementarity.

***Proposition 6:** A balancing approach moving through intermittent cycles of separating and bridging institutional logics (through symbolic action, iteration, and based on situational demands) is best suited to overcoming the challenge posed by technological prefiguration.*

At Sphere, the formation of the executive team presented a failure to fully prefigure the logic to be inscribed, caused initial internal debates and prompted some team members to leave the project. Since then, these debates have again subsided. Moreover, Sphere today still largely engages in technological prefiguration across its practices of material configuration as well as facilitatory organizational practices. The management approach taken by the executive team was to continuously shift the organizational practices between institutional acquiescence and technological prefiguration in accordance with situational opportunities. For example, during the onset of the 2020 COVID-19 pandemic, financial turbulence prompted a phase in which the executive team intermittently conducted more centralized and top-down decision making. All the while, some prefigurative practices, such as the team’s distribution across the global and collaboration via digital means remained stable, and the organization also continued to signal its commitment to larger prefiguration through symbolic acts such as the “Common Ground session” for which a team member expressed so much gratitude in a quote presented earlier.

In meetings reflecting on Sphere’s organizational evolution, its co-founders have repeatedly presented this approach as one of balancing logics over the long term. As one co-founder noted in a meeting in 2018:

“What I’m hearing there, which is also something that I think we’ve embodied a lot in Sphere as part of this evolutionary path to the Sphere Chain world [...] is this kind of placenta model. To me, that feels like a placenta... that’s feeding a new critter from



the old critter. [...] It just strikes me as a neat way of thinking about it and a way of holding it as well. That allows us to live in both worlds that we want to live in. And to me, that's a key aspect of this goal, of what we're up to, is holding both of those spaces simultaneously." (Co-Founder)

Over Sphere's evolution, various members of the executive team repeatedly stressed the role that iteration and situational decision-making played in this process:

"I look at even the stage of our contracts that we're in and the organizational structure that we're in... These are all steps that are *toward* moving to another organizational structure. [...] I see this all over the place as a kind of iterative process in our social structures." (Co-Founder)

"One of the things that people hear coming out of my mouth a lot is 'adjacent possible'. So, for me, what's really crucial is to figure out how you get 'there' from 'here'. And most of what I see in the world is people wanting something that you can't get from here. There's no path. So, what I'm interested in is: all of the things that are adjacently *actually* possible. Not two septs away, but one step away. [...] You put up the scaffolding before the building can hold itself up." (Co-Founder)

This long-term balancing approach to navigating the clashing logics, turning on iteration, symbolic acts, and a movement through phases of separating and bridging logics based on situational circumstances, was well received by the majority of Sphere's team members. Many of Sphere's original volunteer supporters remain with the organization to this day and have stressed in interviews with me that they are satisfied with Sphere's degree of technological prefiguration. For example, a member of the ecosystem team reflected that:

"There is still a lot of embodying something new. The kind of conversations that I have with a number of my colleagues, the level of openness that I can have and the support and personal growth that I have is just beyond what I would expect to ever have in any job. And it would be absolutely impossible at any business-as-usual joint." (Ecosystem Manager)

#### **(4.8) A THEORETICAL MODEL OF TECHNOLOGICAL PREFIGURATION**

In sum, the propositions I have developed and illustrated above facilitate a theoretical model explaining how technological prefiguration comes to play a role in institutional change projects

proceeding via the inscription of digital infrastructures (Propositions 1 through 3c), how it raises an organizational challenge (Propositions 4 and 5), and how this challenge may be overcome (Proposition 6). I depict the model in Figure 5.

#### **(4.9) DISCUSSION**

In this conceptual paper, I have sought to develop an in-depth account of the largely unexamined organizational processes and challenges that accompany efforts to change institutions via the inscription of digital infrastructures. Synthesizing literature from information systems and organizational research, and drawing on illustrative examples from a Blockchain start-up, I have proposed a theory of “technological prefiguration” that illuminates the manifold interactions between inscription efforts and organizational practices. In particular, the theory contains eight propositions explaining, (1), why technological prefiguration comes about and how it may benefit institutional change efforts proceeding via the inscription of digital infrastructures, (2) the unique challenge technological prefiguration poses to these efforts, (3), how this challenge may be effectively navigated, and visualized the interaction of these propositions.

Doing so, the paper offers a number of contributions. First, the theory of technological prefiguration highlights important interactions between institutional change efforts, IT artefacts, and organizational practices that extant research has paid rather little attention to. While research discussing inscription of IT artefacts (Orlikowski, 1992; Orlikowski, 2000; Hargadon & Douglas, 2001; Gawer & Phillips, 2013; Faik et al., 2020) and the interactions between IT, organizational practices and institutions (Orlikowski & Scott, 2008; Leonardi, 2011; Hinings et al., 2018; Mair & Reischauer, 2017; Fuenfschilling & Truffer, 2015) has sometimes implied dynamics of technological prefiguration, a term for these and – more importantly – an in-depth theoretical account systemically illuminating them, has still been lacking. Consequently, discussions of inscription for purposes of institutional change have rather tended to ignore the need for technological prefiguration and the striking organizational challenge it poses, such that the process of inscribing institutional logics into digital

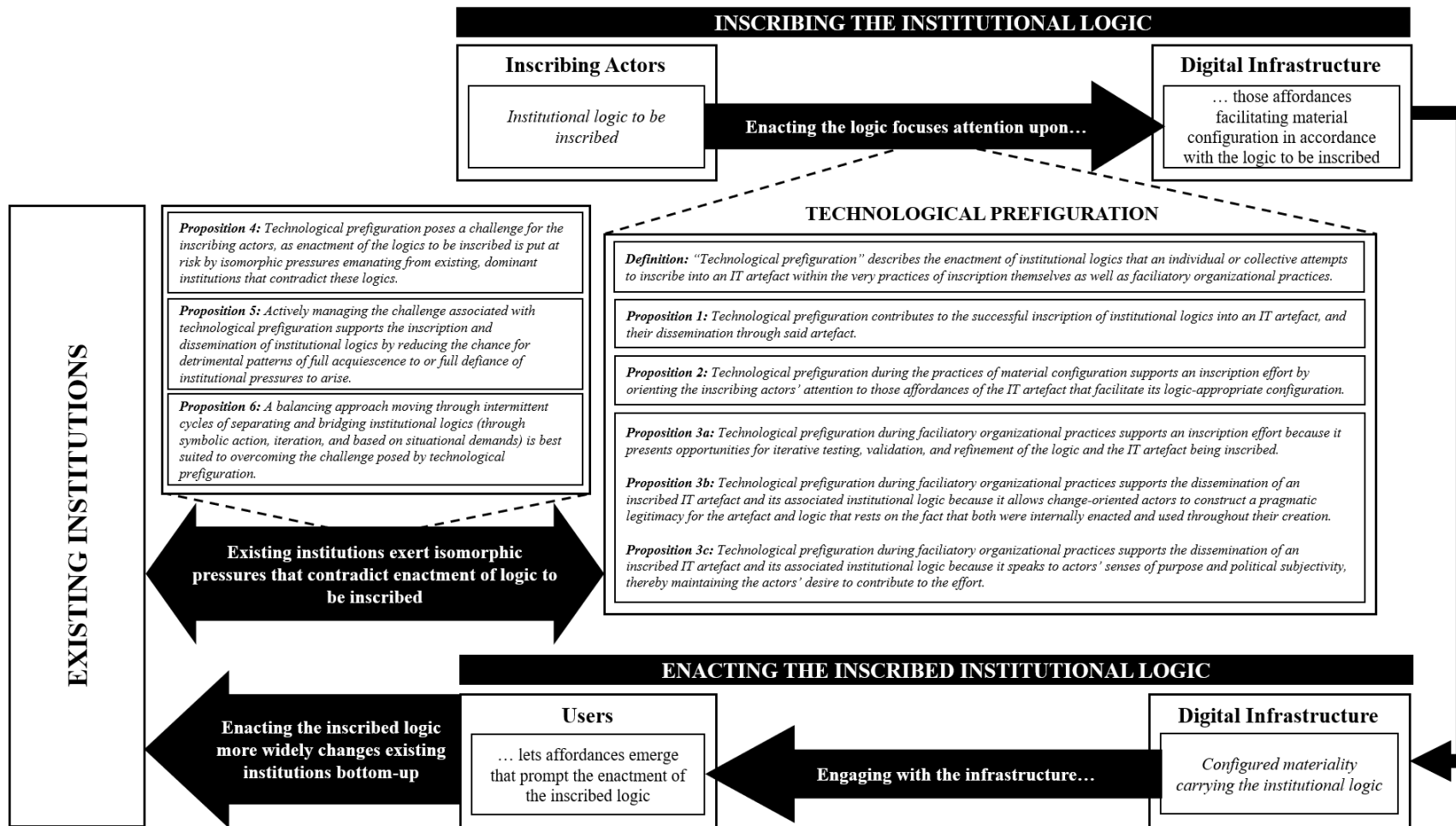


Figure 5: A theoretical model of technological prefiguration.

infrastructure has sometimes been presented as more virtual, unencumbered by organizational and societal contingences, and ultimately trivial than it really is. Based on insights from across various strands of information systems and organizational research, the theory developed here highlights the importance of technological prefiguration for institutional change efforts proceeding via the inscription of digital infrastructures, emphasizes and illustrates how technological prefiguration raises clashes between enacted logics that may put the change efforts at risk, and offers an explanation for how they may be overcome. Accordingly, researchers and practitioners sensitized to these dynamics of technological prefiguration will have a more holistic understanding of institutional change efforts proceeding via the inscription of digital infrastructures.

In developing this theory, the paper secondly opens up promising new avenues for research. The eight propositions, although well illustrated by the case of Sphere, require empirical validation. Opportunities to do so are plentiful, as attempts at changing institutions via the inscription of digital infrastructures are becoming increasingly commonplace. Exploring these through the lens of technological prefiguration should allow researchers to further explore the surprising relationships between organizational structures and the materiality of developed IT artefacts that were first posited by Conway's Law and to which practitioners appear to relate strongly to this day. In particular, the case of Sphere presented in this paper raises the interesting question of why inscribing actors do not seem to trust that they will be able to adequately inscribe an institutional logic into an IT artefact without enacting it more widely, even when they are already able to picture and articulate said logic clearly. What is the sufficient *degree of enactment* that allows actors to actualize the affordances required for the logic-appropriate configuration of IT artefacts? What edge cases may call into question the eight propositions? Is Conway's Law indeed a *law*? Further research is required to explore these questions.

Finally, the theory of technological prefiguration facilitates concrete practitioner advice. As noted in the very beginning, more and more actors are pursuing efforts to change organizational and societal institutions via the inscription of digital infrastructures such as Blockchain and open data platforms. The theoretical model of technological prefiguration can support these pursuits in multiple ways. First, it helps create an awareness for the concrete benefits that may derive from technological prefiguration across practices of material configuration and facilitatory organizational practices, which practitioners may want to consider when organizing their inscription efforts. Second, the model helps these practitioners grapple with the contradictory position they may eventually find themselves in, by not only helping them identify and acknowledge the contradiction of logics that may be at play, but by also

outlining the iterative, process-oriented management approach that may help them navigate it. Beyond the Blockchain space, the model of technological prefiguration may, for example, support efforts to scale-up logics of cross-boundary collaboration and transparency via digital infrastructures in public sector organizations. These digital infrastructures are often developed (at least partially) in-house, by governmental agencies who are mostly still subjected to the existing institutional norms of siloed work. In these projects, the challenge of technological prefiguration is bound to arise. Drawing on the process-oriented management approach presented in this paper may then help projects such as these find success.

## CHAPTER FIVE

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### **(5) CONCLUDING REMARKS**

This cumulative dissertation sought to illuminate how actors in organizations enact, navigate, and negotiate non-linear temporality of present and future times, especially when working with emerging technologies. It has done so by studying Blockchain organizing as an exemplary empirical context, using this context to develop three papers. The papers, taken together, create a foundation for understanding the individual- and collective-level origins and consequences of non-linear temporality, and particularly of present-future convergence.

The research focus and papers emerged from an interpretivist research approach following the neo-institutional tradition of management scholarship. Each of the papers followed a substream of research in the neo-institutional tradition to develop adequate (Weber, 1996; Crotty, 1998) new theoretical concepts and process models (either directly from empirical data or inspired and illustrated by this data) that can help provide a grounded, and more in-depth understanding of how actors may instantiate their envisioned future within the present to realize transformative visions, how their intra- and inters-subjective temporal experience and construal play into this process, and the consequences that such enactments of non-linear temporality may have for organizational, societal, and technological change. By providing these theoretical contributions, the papers respond to recent calls by management scholars engaged with the topic of subjective time to consider the complex, enacted and non-linear character of time (Kunisch et al., 2021), to investigate the intra- and inter-subjective dimensions of temporal experience conjointly (Shipp & Jansen, 2021), to consider in more depth the relationship between subjective time and institutional dynamics (Granqvist & Gustafsson, 2016), as well as the relationship between subjective time and technological change (Kaplan & Orlikowski, 2013). From a practical perspective, the papers offer insights by highlighting the empirical questions and problems that individuals and groups may encounter as they seek to utilize emerging technologies like Blockchain for the addressing of pressing global issues and the transformation of society.

#### **(5.1) SYNTHESIS OF THE THREE PAPERS**

The first paper (Chapter 2) contributes to scholarly understanding of non-linear temporality against the backdrop of two illustrative empirical examples. It does so by highlighting how emerging technologies such as Blockchain are inherently associated with

future visions, and how these visions may become enacted within the present to transform present organizational and institutional realities even before the technology itself is being used yet. In this process, the envisioned future is enacted in the present as a self-fulfilling prophecy (attaining Barnesian performativity), expressing non-linear temporality. Beyond enriching our understanding of organizational engagement with Blockchain and emerging technologies more generally, and raising new considerations for the development of technology policy (see the discussion in Chapter 2), the paper presents some of the counterintuitive organizational consequences of present-future convergence and offers theory explicating how this phenomenon may be evoked through societal discourses. Hitherto, management scholarship on subjective time had noted the potential for dynamics of Barnesian performativity to arise, but had not explored this phenomenon in depth. As already noted in the preamble, Kaplan and Orlikowski (2013), in their seminal study of temporal work, raised the following point in their discussion:

“Though the future will likely not turn out the way it was projected, this does not mean that projections do not matter. Articulating projections shapes attention, deliberation, investment and effort. Thus the question should not be whether projections are accurate, but rather what strategic possibilities are enabled and precluded by different projections.” (2013, p. 995)

Moreover, Garud and colleagues (2014), have noted how performative speech acts uttered by entrepreneurs as part of their storytelling are “wishful enactments of a desired future” within the present (Borup et al., 2006, p. 286), and how they may lead to a loss of legitimacy if the entrepreneurs fail to then also materialize said future.

The first paper of this dissertation extends these initial discussions of performativity dynamics in subjective time research by developing and illustrating specific propositions illuminating how society-level discourses may lead individuals and organizations to instantiate the envisioned future within the present despite the fact that some of the physical requirements for the envisioned future have not yet materialized. Picking up the understanding of present-future convergence being based in temporal construal that was offered in the Preamble, these propositions highlight the crucial role that intentional or unintentional exaggeration within narratives about future visions plays: the more valuable, immediate, and inevitable the occurrence of an envisioned future is presented to organizational actors (Ramiller, 2006; Marti & Gond, 2017), the more likely it becomes that they will performatively instantiate this envisioned future within the present.

**The second paper of the disseration is currently  
under review at a journal.**

**To protect the blind peer review process,  
the paper has been taken temporarily offline.**



The third paper (Chapter 4) of this dissertation, finally, relates these empirical dynamics and theoretical insights to the information systems literature to shine a new light on non-linear temporality as it plays into efforts to inscribe technological artefacts. The paper synthesizes existing literature on institutional logics and institutional change, technology inscription, and social movements to develop and illustrate a theory of “technological prefiguration”. The theory offers eight propositions illuminating the variegated ways through which actors may come to perceive the envisioned future impact of the technological artefact they are inscribing as intimately entangled with their own organizational practices in the present. Thereby, the paper not only contributes to understandings of institutional change and sociomateriality in information systems research (see the discussion in Chapter 4), but again enriches management scholars’ understanding of non-linear temporality. In our increasingly digital world, futures are increasingly determined by the ways in which the technological artefacts we use have been and are being developed (Orlikowski, 1992; Orlikowski, 2000; Faik et al., 2020). The theory of technological prefiguration points our attention to how the futures brought about by technological artefacts may be determined already at an earlier stage, during their development, when predominant, enacted institutional logics may intentionally or unintentionally become inscribed into said artefacts. In this sense – and calling renewed attention to “Conway’s Law” (Conway, 1968) – the third paper sensitizes us to the fact that temporal experience and present-future convergence are central aspects determining the course and consequences of the on-going digital transformation of society. Due to the dynamics of technological prefiguration, present and future times become related and negotiated in any technology development process. Indeed, the possibility to create transformative artefacts “liberating” society into envisioned futures is, at least to some extent, dependent upon the possibility for the creators of these artefacts to instantiate said future with the present even before the transformative artefacts themselves exist.

Against this backdrop, from a scholarly as well as a practical perspective, understanding how non-linear temporality and particularly present-future convergence arise is arguably more important than ever. Through its in-depth empirical exploration and theorizing, the dissertation at hand has attempted to take initial steps in this direction.

## **(5.2) FURTHER RESEARCH**

The contributions made by the papers gathered in this dissertation point to interesting new avenues for research (see each paper’s discussion). Altogether, they form a promising

management research agenda investigating present-future convergence and its consequences for technological, organizational, and societal change.

First, further research is needed to validate the novel theoretical models developed in this dissertation also in different empirical contexts. While the models are, in the vein of interpretivist qualitative research, not intended to offer necessary explanations of causality but only adequate ones, more positivistically inclined scholars may wish to identify empirical edge cases that can be used to validate or falsify – and thereby iteratively refine – the propositions and theoretical dynamics such that they become more generalizable. Here, one promising area of research opened by this dissertation surrounds Conway's Law (Conway, 1968) and the propositions surrounding technological prefiguration. Is Conway's Law indeed a *law* in the positivist sense, or are there edge cases in which these particular dynamics of present-future convergence do not emerge? What characterizes those edge cases, what outcomes do they lead to, and how does knowledge of them help further elucidate the dynamics of technological prefiguration? Other scholars may wish to test the propositions facing the performativity of envisioned futures from the first paper (Chapter 2) also in other contexts, or to validate the pattern of conjoint intra- and inter-subjective temporal construal theorized in the second paper's (Chapter 3) process model.

Second, interpretivist research can pick up the promising leads for further theory development generated by the research presented in this dissertation. For one, further conceptual and empirical work may want to capitalize upon the potential that extant knowledge of the performativity of theories and envisioned futures (Gümüşay & Reinecke, 2022; Marti & Gond, 2017; Borup et al., 2006) holds for understanding the organizational enactment of temporality and its consequences. The first paper highlights the important role that exaggerated portrayals of the extent, attainability, and immediateness of a theorized future play in making it self-fulfilling, which directly links to the theory of temporal construal (futures as more or less distant, believable, and actionable) portrayed in the second paper. At the center of these two theories (performativity and construal of temporal distance) lies a promising and hitherto untapped avenue for furthering subjective time research. Follow-on studies are needed to investigate in more detail how the traditionally intra-subjective process of temporal construal *affects and/or is affected by* discourses about envisioned futures at the inter-subjective level, and how both of these aspects of subjective temporal experience come together to create self-fulfilling futures in organizations, fields, and society. Augustine and colleagues' paper (2019), although considering only the field level and not explicitly relating temporal construal to performativity dynamics, presents an important first step into this direction. Other scholars may

wish to expand upon it by explicitly interrogating the relationship between temporal distance and different degrees of performativity, and doing so across individual and collective levels.

Another avenue for further conceptual and empirical research relates to the concept of technological prefiguration. With the causes and consequences of technological prefiguration laid out, a central, puzzling question that yet remains to be answered is *why* inscribing actors do not seem to trust that they will be able to adequately inscribe artefacts without enacting their associated future vision in the present organizational practices, even when they are already able to picture said future vision quite clearly. Why is the picturing of a future vision not enough for them, and what constitutes for them a *sufficient degree* of future instantiation (i.e., the degree of future instantiation that facilitates the lowest acceptable level of artefact inscription)? Investigating these questions provides opportunities to develop novel concepts and theories covering the differences and relationships between the (more intra-subjective) cognitive dimension of temporal experience on the one hand, and its (more inter-subjective) embodied dimension on the other.

Finally, a third avenue for research regards the practices that negotiate differing understandings of temporality within organizations. Important research on this subject has already been done (e.g., Kaplan & Orlikowski, 2013), but the second paper of this dissertation points to opportunities for further work. This second paper identified three inter-subjective processes – the acknowledgement and internalization of paradox, the meeting of minimal requirements of future enactment through intermittent symbolic acts, and the incremental building of interpersonal trust – as having been central to generating agreement over temporal construal. To what extent may these also be central to generating inter-subjective agreement around other aspects of organizational temporality? And to what extent may extant knowledge of the role that symbolic acts (Selznick, 1957) and interpersonal trust (Kramer, 1999) play for organizational cohesion support the further advancement of subjective time scholarship in the management discipline? Future conceptual and empirical research projects may wish to probe the opportunities for cross-pollination that exist at this intersection.

### **(5.3) IMPLICATIONS FOR BLOCKCHAIN ORGANIZING**

Finally, the dissertation at hand also contributes to the practice and nascent scholarly understanding of Blockchain organizing. As discussed in the second chapter, a rich discourse identifying Blockchain as a pivotal emerging technology has emerged in the last years (see, e.g., Underwood, 2016; Tapscott & Tapscott, 2016; Gupta, 2017; Iansiti & Lakhani, 2017; Seidel, 2018; Choudary et al., 2019; Lumineau et al., 2021). Most recently, Blockchain has

emerged as a central technology of concepts like “Web3” and the “metaverse”, which tech giants from Meta (formerly known as Facebook) to Microsoft are presently embracing. To such practices and discussions surrounding Blockchain, the dissertation at hand contributes by identifying, illustrating, and explaining many of the counterintuitive organizational phenomena that may arise when organizations develop, implement, or use Blockchain technology, and that are ultimately rooted in non-linear temporality.

One such phenomenon is the Barnesian performativity – i.e., self-fulfilling character – of societal discourses about the envisioned impacts of Blockchain technology, which this dissertation describes and conceptualizes. This dimension of Blockchain organizing has hitherto not been acknowledged by practitioners or academics, even though it has important implications for both. Acknowledging the Barnesian performativity of the Blockchain vision helps us understand that the “future” impacts of Blockchain are being negotiated and enacted in the very present, even before any given organization actually begins developing or using Blockchain, and also before the technology has widely spread throughout organizations and societal institutions. Irrespective of materiality, the Blockchain vision becomes manifest as soon as executives, experts and academics engage in its discourse. Austin’s observation, that “to *say* something is to *do* something” (1962, p. 12, original emphasis), rings true here.

For Blockchain practitioners, this outcome of the dissertation at hand may foster a more reflective engagement with the Blockchain discourse. Empowered by the crucial distinction between technology features and technology affordances made in Chapter 2, and with an awareness for how the conflation of these categories may exaggerate the extent, attainability, and immediateness of Blockchain’s envisioned organizational and societal impacts, practitioners should become better able to make decisions about Blockchain organizing that are rooted in the realities and demands of the present as much as they capitalize upon innovative potentials. For scholars studying Blockchain organizing, in turn, the conceptualization of the Barnesian performativity that has been offered in this dissertation may create an appreciation for the fact that Blockchain may affect organizational and societal change even before the actual artefacts are introduced into a given context. Accordingly, when conducting longitudinal studies of Blockchain organizing, it is crucial to consider also how the involved actors’ very first exposure to, participation in, and enactment of the Blockchain discourse sets the ground for any following change processes or outcomes. Moreover, the conceptualization of Barnesian performativity points to how crucial it is to consider Blockchain phenomena not only at the organizational level but also at the level of fields and societal discourses.

Technological prefiguration is another counterintuitive aspect of Blockchain organizing discussed in this dissertation. For Blockchain practitioners, the conceptualization and theorization of technological prefiguration contributes by, firstly, offering a concept to explicitly name and discuss a phenomenon that Blockchain practitioners may have implicitly been grappling with for a while. Secondly, the concept and theory offered, in describing how technological prefiguration may support change efforts as well as raise challenges for Blockchain organizations, facilitates more deliberate, strategic, and reflective approaches to handling the phenomenon. In particular, practitioners may benefit from the discussion of the three different approaches for handling clashes of institutional logics that management scholarship has observed over the years and that the paper relates to Blockchain organizing.

For scholars, the conceptualization and theorization of technological prefiguration creates a new lens through which to understand the complexity of Blockchain organizing. Drawing on institutional theory, the associated propositions identify layered dynamics surrounding actors' attention, their sense of purpose, the refinement of change theories, and the pragmatic legitimization of Blockchain visions and artefacts as important aspects. Each one of these dynamics presents a promising avenue for better understanding the processes that go on when organizations develop, implement, and use Blockchain technology.

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## (7) APPENDIX

### (7.1) List of Individual Papers and Pre-Publications

This cumulative dissertation consists of an envelope (Chapters 1 and 5) and three individual papers, presented in the following order within the text above:

#### Chapter 2: Blockchain and the Performativity of Emerging Technology Theories

- Co-authored with Prof. Shahzad (Shaz) Ansari
- Forthcoming as:  
Kleinaltenkamp, MJ & Ansari, S. (Forthcoming). Blockchain and the Performativity of Emerging Technology Theories. In M. Barrett, E. Vaast, A. Langley & H. Tsoukas (Eds.), *Perspectives on Process Organization Studies. Organizing in the Digital Age: Understanding the Dynamics of Work, Innovation, and Collective Action*. Oxford University Press.

The second paper of the dissertation is currently under review at a journal.

To protect the blind peer review process, the paper has been taken temporarily offline.

#### Chapter 4: Digital Infrastructures for Institutional Change: Inscription and the Role of Technological Prefiguration

- Single-authored
- To be submitted to *Management Information Systems Quarterly*

## Co-Authorship Statement

The following paper, forthcoming as:

Kleinaltenkamp, MJ & Ansari, S. (Forthcoming). Blockchain and the Performativity of Emerging Technology Theories. In M. Barrett, E. Vaast, A. Langley & H. Tsoukas (Eds.), *Perspectives on Process Organization Studies. Organizing in the Digital Age: Understanding the Dynamics of Work, Innovation, and Collective Action*. Oxford: Oxford University Press.

was co-authored by Moritz J. Kleinaltenkamp and Prof. Shaz Ansari of the University of Cambridge. Moritz Kleinaltenkamp and Prof. Shaz Ansari certify that in developing and writing this paper, the distribution of labor was as follows:

### Conception (First Round)

- In Late 2018, Prof. Shaz Ansari and Moritz Kleinaltenkamp agreed that they would develop a paper together, based on the pilot study Moritz Kleinaltenkamp would be conducting starting in January 2019.
- In two meetings, Prof. Ansari and Moritz Kleinaltenkamp worked together to identify an initial research question for the paper. The work on this was split evenly.

### Research (First Round)

- Moritz Kleinaltenkamp sampled, organized, and conducted all interviews for the pilot study.
- Moritz Kleinaltenkamp conducted an initial qualitative analysis of these interviews to further refine the initial research question and develop a theoretical contribution to answer this question.
- Prof. Shaz Ansari and Moritz Kleinaltenkamp met twice to discuss these refinements and Moritz Kleinaltenkamp's theory development. Prof. Shaz Ansari validated Moritz Kleinaltenkamp's ideas and offered suggestions for improvement.

### Writing (First Round)

- Moritz Kleinaltenkamp settled on a research question and theoretical contribution, and wrote a first draft of the paper to present at the 11<sup>th</sup> International Process Symposium in Summer 2019.

- Prof. Shaz Ansari reviewed the paper, making suggestions for further changes in the abstract, introduction, and discussion sections.
- Moritz Kleinaltenkamp and Prof. Shaz Ansari presented the paper at the 11<sup>th</sup> International Process Symposium, gathering further feedback. They met to discuss this feedback and to decide how to proceed.
- Moritz Kleinaltenkamp reworked the paper based on the conference feedback, in order to submit it to the double-blind peer-reviewed conference proceedings. Prof. Shaz Ansari made a small number of further edits to the paper (regarding phrasing in the abstract and introduction) before submission.

#### Conception (Second Round)

- The editor of the conference proceedings informed the authors that the paper was to be revised and resubmitted, categorizing this revision as “high risk” and noting the substantial work that was still required.
- Moritz Kleinaltenkamp and Prof. Shaz Ansari met to discuss the editor’s and reviewers’ comments and to decide how to proceed. Together, they reconceptualized the paper.

#### Research (Second Round)

- Moritz Kleinaltenkamp went back to the data and related it to existing research to develop a new central line of argumentation for the paper, the propositions, and the overarching contribution.

#### Writing (Second Round)

- Moritz Kleinaltenkamp completely rewrote the paper, based on the new conceptualization and research.
- Prof. Shaz Ansari made a small number of edits to this rewritten version (primarily relating to phrasing).
- The paper was then re-submitted and accepted without further changes.



Moritz J. Kleinaltenkamp



Prof. Shahzad (Shaz) Ansari