Changing times for digitalization: The multiple roles of temporal shifts in enabling organizational change

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Abstract
Shifting an organization's temporal order can be a key mechanism for accomplishing organizational change, but it is also fundamentally problematic: instead of helping an organization accomplish change, it may simply reinforce an already failing course of action. Our current understanding of the roles that temporal shifts play in enabling organizational change is inconclusive in terms of when and how temporal shifts contribute to the success of organizational change. We exploit an in-depth case study of a new digitalized design approach implemented at Advanced Construction to demonstrate how a temporal shift can increase temporal awareness, among organizational members, of the salient and differing temporalities involved. In this case, the increased temporal awareness facilitated improved temporal coordination, which in turn figured prominently in making actual change possible. Our study identifies three complementary roles of change-inducing temporal shifts—namely, in connection with past experience, current activities, and future directions. Thus, we develop a deeper understanding of the relation between temporal shifts and organizational change, and offer a novel account of how the establishment of a *temporal zone* harbors those three roles of temporal shifts.

Keywords
case study, organizational change, temporal shifts, temporality, temporary organizations

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Introduction

When do temporal shifts enable organizational change? A central concern in research on how organizations engage in temporal shifts—the deliberate and often sudden change in an organization's temporal order (Staudenmayer et al., 2002)—has been the establishment of a sense of urgency for driving organizational change (Amis et al., 2004; Kotter, 1990). Various time triggers that stimulate action and facilitate prioritization of short-term measures at the expense of long-term concerns have been singled out as especially influential (Ancona and Waller, 2007; Staudenmayer et al., 2002). These time triggers might encourage individuals to rethink their current course of action (Lindkvist et al., 1998) and/or to adapt to a changing situation; they also may induce firms to reposition themselves vis-a-vis competitors, thereby gaining a "temporal" competitive advantage (Brown and Eisenhardt, 1998). Implementing a temporal shift (Staudenmayer et al., 2002) and relying on the power of "rhythm change" (Ancona and Waller, 2007) have been identified as crucial measures for successful organizational change and, more generally, for succeeding in time-critical industries (Fine, 1998; Nadkarni et al., 2016).

Yet, studies (e.g. Ancona and Waller, 2007) have identified several problems associated with temporal shifts as enablers of organizational change. For instance, research has demonstrated that organizations run the risk of being caught in "speed traps" when over-emphasizing time pressure in decisions and actions (Perlow et al., 2002). Other authors have shown that, when experimenting with temporal shifts, organizations may become out of sync with the "pacers" in their environment (Ancona and Chong, 1996)—an outcome that could have detrimental effects on both their legitimacy and performance (Ancona and Waller, 2007). Studies of major organizational change, such as Foss's (2003) investigation of Oticon, and Pettigrew and Whipp's (1992) longitudinal case studies in the automotive and financial services sectors, have demonstrated that speed traps may endanger efforts to transform organizations and may lead to individualistic "urgency behavior" at the expense of collective and collaborative work intended to drive change (see also Kunisch et al., 2017; Leroy and Glomb, 2018; Waller et al., 2001).

So, even though changing people's experience of time could be a powerful mechanism for accomplishing change, it may also impede efforts to achieve that goal and result in the failure of organizational change. Some studies have highlighted the significant role of temporal shifts in enabling organizational change (see Staudenmayer et al., 2002), but empirical research has not clearly documented how organizations actually make such deliberate changes—most notably, via projects and related forms of temporary organizations (Burke and Morley, 2016)—to their temporal orders in ways that would allow for organizational change. We argue that developing knowledge of these dynamics would make us better equipped to address the multiple roles that temporal shifts play in enabling organizational change and thus enhance our understanding of how relatively small-scale but purposeful project-led changes in an organization's rhythm can yield large-scale organizational effects.

Against this background, our study aims to develop a better understanding not only of the multiple roles played by temporal shifts in enabling organizational change, but also of how organizations facilitate and "harbor" those roles by way of projects and temporary organizations. We seek to answer two research questions: (i) What roles do temporal shifts play in enabling organizational change? (ii) How are temporal shifts facilitated in such change processes?

Our article draws on a study of Advanced Construction's (pseudonym) digitalization of its design approach. We address how this organization implemented a new digitalized design approach and related supports (structures, roles, rules, etc.). Here, *digitalization* refers to how digital technologies are used to alter existing business and organizational processes (Verhoef et al., 2021)—for instance, the client interface, use of digital artifacts, storing of information, and modes of communication. Through digitalization, the firm applies digital technologies to reconfigure existing business and organizational procedures by enabling more efficient coordination between processes and to create additional customer value by enhancing client and user experiences (Pagani and Pardo, 2017). This case is highly relevant to address temporal issues, as the essence of digitalization involves changes in an organization's speed and coordination (Verhoef et al., 2021). We were surprised to find that our study uncovered a case in which temporal and organizational change occurred *without* driving the organization into a speed trap (Perlow et al., 2002) or resulting in performance losses (Davis et al., 2009).

From a theoretical standpoint, the case study described here demonstrates how this organization's alteration of its temporal order induced a shift of individuals' collective perception and how their experience of time became a primary enabler of organizational change. Our main contribution lends support to Staudenmayer et al.'s (2002) claims that temporal shifts are pillars of change and that *problems*, as the most typical trigger of change, are necessary but not sufficient drivers of change. This study augments our current knowledge of temporal shifts by identifying three distinct yet complementary roles of a temporal shift that are critical for enabling organizational change: a past-orienting, present-focusing, and future-directing role. In addition, we discover how the temporal shift was triggered by the establishment of a "temporal zone" in which the temporary organization and its associated temporal boundaries played a key role.

We start by presenting the notion that a temporal shift encourages individuals to reflect on their past, which helps them recognize what is problematic about their established behavioral patterns and ways of relating to time. Then we demonstrate that a temporal shift is essential for inducing reflection on current work practices, for improving temporal coordination (i.e., the sequencing and timing of interdependent activities), and hence for successfully undertaking the activities needed to achieve organizational change. Finally, we stress that a temporal shift must guide and direct individuals so that they know in what manner their current practices should be adapted in response to future challenges facing the organization.

Theory

Temporal orders and temporal shifts

Prior research has convincingly demonstrated the value of viewing organizations through a temporal lens (Ancona et al., 2001) in order to focus on the timing and frequency of—and various problems related to—the temporal coordination of change (Hernes et al., 2013). Studies have explored the many ways in which organizations become temporally patterned, the effects that the temporal order has on an organization's performance (Fine, 1990), and the problems that can arise from those temporal patterns in the context of organizational change initiatives (Kunisch et al., 2017). An organization's temporal order

shapes and is shaped by ongoing human actions within that organization (Orlikowski and Yates, 2002), which imprint conceptions about when tasks should be done, how frequently they should be undertaken, and the related "timing norms" that guide organizational members' behavior (Dille and Söderlund, 2011; Tukiainen and Granqvist, 2016).

Even though several studies have pointed out that there might very well be a high degree of temporal diversity within an organization (Mohammed and Harrison, 2013), organization theorists have generally emphasized the indispensability of a common temporal order (Sayles and Chandler, 1971) for ensuring sufficient temporal coordination (Moore, 1963) among diverse actors and units within an organization (Brown and Eisenhardt, 1997; Lawrence and Lorsch, 1967). These studies have singled out the significance of an organization's temporal order for making sure that certain procedures occur at intervals that are specific, regular, and in tune with its environment (Ancona and Chong, 1996). Mismatches—in the temporal order—among diverse players could lead to substantial managerial diseconomies (Dougherty et al., 2013) or even to the forfeiture of stakeholder legitimacy (Pérez-Nordtvedt et al., 2008).

Understanding organizational change requires knowledge of an organization's temporal order and of the ways in which that order could benefit from being changed (Moore, 1963; Zerubavel, 1981). Several studies (e.g. Ancona et al., 2001; Staudenmayer et al., 2002) have argued that changing an organization's temporal order is a prerequisite for enabling organizational change, noting that problems and external cues are necessary but not sufficient drivers of change. This stream of literature, which focuses on the role of temporal shifts in enabling organizational change (Staudenmayer et al., 2002), reiterates some of March and Simon's (1958) core messages on problem-driven change by highlighting the role of deadlines and time urgency as triggers of non-routine behavior.

However, prior research has illustrated several challenges associated with changing the temporal order of an organization—for instance, changing the duration of certain actions (Ekstedt and Wirdenius, 1995), changing the sequence of those actions (Amis et al., 2004), or changing their temporal location (Roy, 1959). Studies in this vein usually underscore the risks associated with altering the organization's temporal patterns and routines (Pentland et al., 2011; Turner and Rindova, 2018).

A number of recent empirical studies have remarked on the challenges associated with adjusting the temporal rhythm in and across organizations (e.g. Stjerne et al., 2019; Thompson, 2011), observing that these challenges can be especially severe in time-critical industries and project-based contexts where individuals attend to "local times" and are engaged in local problem-solving activities (Bresnen et al., 2004; Sydow et al., 2004). Research has also documented the role of different types of time pacers (namely, endogenous, exogenous, "jolts") and how they affect organizational adaptation (Ancona and Waller, 2007)—for example, influencing members' responses to the rhythms and "beats" that are necessary for temporal coordination (cf. Clark, 1985).

Micro-oriented studies have showcased the need to address the role and meaning of temporal shifts in organizational contexts, especially as regards how that role plays out in the context of projects and temporary organizations (Burke and Morley, 2016; Engwall and Westling, 2004). Most notably, Staudenmayer et al. (2002) postulated that a better sense of the alterations in how individuals relate to time could enhance our understanding of organizational change. These authors examined a variety of temporal

shifts, all of which seemed to affect the likelihood and ability of organizational members to facilitate change. Staudenmayer et al. (2002) claimed that encountering and addressing problems, although necessary for change, are not in themselves sufficient factors for ensuring that change actually does occur. Their research stressed the significance of temporal shifts for bridging the gap between problems, as cues for change, and change itself, as the outcome of change processes. However, that study did not address how organizations rely on temporal shifts to enable change, the diverse and complementary roles of temporal shifts, or how organizations enable and harbor multiple roles.

Temporal shifts and temporal zones

The frequency with which temporal shifts fail to enact change makes clear how necessary it is to consider carefully their implementation. In their study of development projects, Staudenmayer et al. (2002) found that projects and temporary organizations may effect temporal shifts. Yet, it is not evident from prior research (e.g. Lindkvist et al., 1998) just how a temporary organization operates so as to facilitate a temporal shift or, in particular, how temporary organizations influence the temporal dynamic of non-temporary organizations (Dille et al., 2018; Stjerne et al., 2019) to allow for a change in rhythm that enables organizational change.

A temporary organization operates as a "temporally bounded group of interdependent actors that are formed to complete a complex task" (Burke and Morley, 2016: 1237), using formal planning techniques to negotiate and coordinate their work (Yakura, 2002). Such organizations are established to ensure action during a compressed time period in order to generate collaborations and transitions that would otherwise not occur (Bresnen, 2006; Lundin and Söderholm, 1995). Thus, the chief purpose of a temporary organization is to realize a particular kind of complex and temporary task or project (Kenis et al., 2009). However, temporary organizations also serve a number of other functions—for instance, changing the temporal orientation of the actors participating in the temporary organization (Pemsel and Söderlund, 2020; Stjerne et al., 2019) and ensuring that actions are aligned with external pacers (Dille et al., 2018; Khavul et al., 2010). Hence, there is a close link between establishing some kind of temporal alteration and rhythm change and the project-based approach to organizing (Lindkvist et al., 1998; Okhuysen and Eisenhardt, 2002). Some studies even point out that a central aim of the project-based approach to organizational change is to facilitate a temporal shift (Whittington et al., 1999). This view offers a novel understanding of projects as particular types of temporary organizational forms that target both the temporal orientation of and temporal coordination among the involved actors (Dougherty et al., 2013), revealing that projects are mechanisms by which organizations can explore new ways of doing things and realizing change (Davies, 2013; Obstfeld, 2012), and especially with regard to temporalities (Pemsel and Söderlund, 2020).

One way of thinking about the rationale of organizing through projects is to allow for new approaches in relation to the experience of time (Lundin and Söderholm, 1995; Scranton, 2014); thus, projects can lead to "brief moments of freedom" that provide a "liminal space" (Shortt, 2015), which gives individuals the opportunity to explore new

ways of thinking about time (Söderlund and Borg, 2018)—and, ultimately, new ways of doing things (cf. Tryggestad et al., 2013). Several studies (e.g. Bakker et al., 2016; Burke and Morley, 2016) have documented the paramount role that projects and related forms of temporary organizations play in stimulating reflection among organizational members (Edmondson, 2012; Sankowska and Söderlund, 2015) and in generating novel ideas about action patterns and routines (Brady and Davies, 2004; Obstfeld, 2012) by, for example, "breaking the spell" (Gersick, 1995: 145) and/or fostering critical thinking (Lindkvist et al., 1998). In this way, projects may contribute to establishing what we refer to as a *temporal zone* that allows for creativity and the exploration of new temporalities and temporal orders (cf. Bakker et al., 2016). Such a zone encourages exploration and creativity because it leads individuals to deviate from their everyday routines and obligations (Shortt, 2015; Söderlund and Borg, 2018). Thus, a temporal zone, as defined here, facilitates experimentation with and learning about how people approach time; projects become an organizational form in which time compression, and therefore temporal alternation and temporal shifts, come to the fore.

Along these lines, organizational scholars have argued that the virtue of a temporary organization rests, to a great extent, on its capacity to create and maintain a temporal zone (cf. Bakker and Janowicz-Panjaitan, 2009) wherein involved actors can establish the goal-relevant organizing principles and coordination structures that are needed to succeed with their project mission (Lenfle and Söderlund, 2019). Studies have suggested also that the use of temporal "boundary objects" (Tukiainen and Granqvist, 2016) add substance to such temporal zones by making participants more aware of the diverging and supporting temporalities involved (Pemsel and Söderlund, 2020).

For instance, Gersick (1988, 1989) observed that project teams deliberately shift their attentional focus at the project's temporal midpoint—a reflection of actors' awareness of the deadline. Building on the work of Gersick, Lindkvist et al. (1998) similarly explored the effects of deadlines in large-scale development projects; they found that, as delineators in the temporal zone, deadlines promote rethinking and reflection and thus help maintain the zone's capacity to stimulate contemplation of the organization's temporal order. Hence, there is clearly a need to enhance our understanding (a) of the various and complementary roles that *temporal shifts* play in enabling organizational change, and (b) of how the establishment of a *temporal zone*, as enabled by a temporary organization, facilitates and harbors these multiple roles toward the end of fostering organizational change. Such explorations should lead to greater awareness, not only of how temporal shifts enable organizational change, but also of how temporary organizations and projects facilitate such shifts and thereby result in successful organizational change.

Methods

The data presented in this article were obtained through a large-scale examination comprising several studies of the underlying reasons for project-based and temporary organizing. As we worked on this case study, we recognized the disproportionate role played by a changing temporal order in explaining actual organizational change. After reviewing the existing literature on organizational temporality, temporal orders, temporal shifts, and temporary organizations, we became increasingly aware of the theory-based benefits that could

be derived from advancements in our understanding of how these concepts are related; thus, our study may contribute to knowledge in this field through "the force of example" (Flyvbjerg, 2006: 228). The focus of our study was continually being clarified as we examined the emerging results and explored the literature that could help us make sense of the data (Mantere and Ketokivi, 2013). These activities in turn informed subsequent data collection (cf. Alvesson and Kärreman, 2007), and we realized—toward the study's end—that a focus on temporal shifts could go a long way toward accounting for how the preconditions for such shifts are related to successful organizational change.

Research setting

Advanced Construction is a major international design firm that works on some of the most cutting-edge systems and technical design projects in the world. It has offices in multiple locations (mainly in Europe) and has been involved in a series of high-visibility projects. The company has more than 1000 employees and collaborates regularly with some 300 consultants and partners on projects for clients in industries that include construction, infrastructure, automotive, healthcare, and energy. In the project discussed in this article, we identified a change in workflow that resulted from rapid digitalization: the implementation of new digital models that required a new approach to design and collaboration. We neither expected these findings nor had any preconceived notions about the role played by temporal shifts in the change process.

Our case study showed that what might appear to be a relatively minor change (that occurred during 2014–2016) in the temporal order actually operated as a powerful mechanism that triggered re-evaluation of the status quo and encouraged individuals to contemplate both the rationale for and possible routes of change. Furthermore, our initial interviews indicated that prior projects and earlier change efforts at Advanced Construction had encountered considerable skepticism regarding the use of digitalized models and practices. Our investigation revealed that previous initiatives seeking to implement digitalized approaches had not succeeded, which piqued our curiosity.

Data collection

Our study was multi-modal in the sense that we collected and analyzed multiple forms of empirical evidence: interviews, documents, drawings, and design models (Gustafsson and Swart, 2020). Interviews were the primary source for our case study, while documents provided contextual understanding and validation of interview data. During the interviews, the two lead researchers were actively involved asking detailed questions and taking notes about what people were doing, why they were doing it, and what the consequences were. We employed an inductive and grounded way of collecting and making sense of the data. As we came to understand the criticality of time-related issues in the project and in the actual change process, we consulted the literature for the purpose of sharpening our questions with respect to what topics we could pose to interviewees; over time, the interviews became increasingly analytical (Kreiner and Mouritsen, 2005). In particular, Dawson's (2014) detailed analysis of the study of time and temporality gave us several ideas in terms of what to look for, what questions to ask, and how to make

sense of temporality in the organization—as well as how different time-scales figure in the interviewees' temporal descriptions and experiences (see also Zaheer et al., 1999).

Our data collection was situated in a homogeneous context (one project in the design firm) but drew on a heterogeneous population (designers, experts, managers, etc.). The selection of interviewees combined snowball sampling and an information-oriented approach, a strategy designed to obtain a rich, nuanced, and situational understanding of the phenomenon under study (Flyvbjerg, 2006). Data collection proceeded in two rounds. In each round, data saturation (Glaser and Strauss, 1967)—that is, when the answers started to become repetitive—was achieved after about 15 interviews; we then conducted a few additional interviews for analytical purposes.

The initial round of data collection involved 20 interviews that were conducted in the first phase of and midway into the project. In this round our aim was to learn as much as possible about the project, why it had been initiated, and what challenges arose in its undertaking. We had complete freedom to interview anyone in the organization and also to contact other project stakeholders. The initial interviews were with the individuals most intimately involved with the project and the new way of working. We quickly found that interviewees spoke in terms of "before and after" implementation of the new digitalized approach. This observation motivated us to dig deeper into the practices of everyday experiences at the firm before, during, and after the change. Thus, we discovered how the project changed the temporality of those practices—for instance, how it made people experience time in a new way, how they now perceived time urgency, and how they related their experience to the past and the future. We asked questions about what had happened in the past as well as about what was happening in real time and about how they perceived planned future actions. We also interviewed client representatives, several industry experts, and external stakeholders, in addition to the manager who oversaw the project, and individuals who either managed or worked directly on various subprojects.

During this stage of our research, we also scrutinized a multitude of documents to help us develop understanding of and insights into the research problem (Bowen, 2009; Glaser and Strauss, 1967). The documents—which included reports, presentations, and letters—gave us quite a thorough understanding of what was going on in the firm, and why and who were involved; they also gave us ideas about what questions to ask in our interviews and about who should be interviewed (cf. Goldstein and Reiboldt, 2004). Documents (written reports and presentations) were actively used by our interviewees to illustrate and describe what and how things had been done, and subsequently also by us, in the interviews to better describe the topic of a particular question. As boundary objects, these presentations helped us understand the phenomenon being studied; they also made it easier for the interviewees to remember and explain not only what had occurred but also how and why (Bowen, 2009). We also used documents to identify how things had changed and evolved during the course of the project, which was central for capturing the nature and progression of change.

In the second phase of data collection, we conducted another 20 interviews with those who were more directly involved in the project as managers, team leaders, designers, technical experts, engineers, or consultants; these individuals were thus heavily involved in and affected by the temporal shift. Our selection of interviewees was more focused

during this phase. We investigated the project's evolution in real time and also via retrospective analysis, seeking thereby to understand, as well as possible, the actuality of the project process. We followed an interview guide that was devoted largely to eliciting details about how work practices had been changed, how those changes had unfolded, and the context for change (cf. Pettigrew and Whipp, 1992). Documents played a key role throughout the study and were constantly present during our interviews to make it easier for interviewees to remember and for us to understand the content and evolution of change.

The data collection lasted three years and involved multiple sources of information toward the end of enhancing the case study's richness and validity (Flyvbjerg, 2006; Yin, 1994). We collected nearly 2000 pages of material that included notes, log books, drawings, interview transcripts, and written documents related to the new approach and its implementation.

Data analysis

Our data analysis adopted an inductive analysis strategy, which in later stages of our research entailed a continual and reflective iteration between the empirical observations and a search for theoretical explanations (Alvesson and Kärreman, 2007). When reading our interview transcripts and interpreting the collected data, we became increasingly convinced that the case study embodied a definite relationship between time and change—a suspicion that increased our motivation to understand the nature and dynamics of this relationship. We realized early on that one particular initiative related to the project's rhythm was pivotal: the enactment of the "no-design time" (NDT) regime. Many of our interviews in the second phase of data collection revolved around the description of this initiative and its consequences for project participants and for the rest of the organization. The NDT initiative consisted of regularly *prohibiting* digital design work for short periods of time. That prohibition had far-reaching ramifications because project participants needed to change their procedures for carrying out work, for organizing meetings, and for structuring their work sequences.

In focusing on NDT, we undertook extensive comparisons across interview transcripts and documents (as in Bowen, 2009) to elaborate a grounded temporal framework that reflected also the relevant literature; thus, we addressed what the project had accomplished and how both digitalization and NDT had affected the organization's temporal order (Aguinis and Bakker, 2020; Ballard and Seibold, 2004). This approach allowed us to develop an arsenal of temporal conceptions and constructions, which we used to analyze our case and the specific changes that had been made. An additional benefit was the resulting detailed analysis of how project participants had changed their senses of duration, sequence, frequency, and timing (Zerubavel, 1981)—and of how their temporal awareness had been affected.

Hence, our data analysis became increasingly theoretical in the sense of selecting, extracting, and coding data relevant to the emergent theory (Glaser and Strauss, 1967). Interview statements were clustered into categories, from which we devised a framework that could explain our findings (see Table 1 and Table 3). Analysis of the collected data revealed a pattern of how project participants and key stakeholders used their time-scales

Table 1. Data structure and coding.

Data	1st-order categories	2nd-order constructs
"The architects, historically, got too much time in making last-minute corrections." (Coordination Manager)	Sense of duration in the past	Past-orienting
"The current project practices were very sequential, first one works, then send to another, and then to a third . . . and, here, this did not work, we needed to work in a much more reciprocal and flexible manner in the model, which challenged the way we usually sequence our work procedures in design." (Model Manager B)	Sense of sequence in the past	
"The digital models we used to use did not allow us to co-design across and within disciplines as we needed. It was too obtuse; we needed to work in another, faster, frequency to meet deadlines." (Model Manager A)	Sense of frequency in the past	
"It is very difficult to calculate the duration of a design task. However, the result of this is that the architects have had the power of when something is ready to go. We have a deadline and, a few minutes before, the architect decides to move a wall. This results in making the persons who are responsible for creating the drawings and ensuring that they look good in a certain template—with logo, printing, delivering them—becoming extremely stressful, so the timing of when an architect was able to make his/her last change in the drawing was not optimal." (IT Manager)	Sense of timing in the past	
"Many people had the idea that everything should be incorporated into one model. I thought this was ridiculous; I knew how slow and heavy the program would be in use. Hence, I realized that—in order to make the duration of the responsiveness in the model acceptable in practice—we need to build a smarter system of databases that was coordinated in the model. This is what I did and it made the coordination task much shorter." (Digital Tool Developing Director)	Sense of duration in the present	Present- focusing
"Before we had to 'clean and correct' the many ways in which architects draw things in our digital models into a coherent, acceptable whole when the architects thought they were finished. Now, due to our new model, we correct on an ongoing basis, whenever we notice something is wrong. This completely changed the order of things." (Model Manager B)	Sense of sequence in the present	

(Continued)

Table 1. (Continued)

Data	1st-order categories	2nd-order constructs
"Our constant scanning of the models changed the pace of our work. Now, it is not heaped onto us, at once, at the end of the project. Now, it allows for much more frequent interaction between architects and us. This has helped and improved our collaboration." (Model Manager A)	Sense of frequency in the present	
"For architects, in general, the digitalization era had just begun; it was a rather greenfield area. This made the timing perfect for implementing the new digitalization tool and all new practices that go along with it. People were not yet so stuck in their own 'best ways', so to speak, and we also made sure to bring in many newly examined people from the university to ensure that people's mindsets were hungry to learn and change." (Coordinating Director)	Sense of timing in the present	
"Every project goes much faster now, partly due to the digital revolution, where everything is drawn and coordinated in real time. I believe this real-time coordination in design will continue to create shorter lead times as things are further developed and practices are even more settled and adjusted." (Designer A)	Sense of duration in the future	Future- directing
"In this particular project, the builder started to build before we had finished the detailed design. I am not sure if this is the best order to follow for the next project. It creates a lot of extra urgency. But the deadlines were very tight, so many things really melded together and overlapped." (Designer B)	Sense of sequence in the future	
"So far, the particular competence of running a project like this, with this particularly high level of fast-paced responsiveness in digitalized design, is, unfortunately, very individualized. I hope that, in the future, more projects and companies in the industry will adopt our solution, but I am not sure how often this will happen. I hope it will be with a high enough frequency to keep competence alive and develop it further." (Digital Director)	Sense of frequency in the future	
"The timing of design practices between occupations (technical consultants, architects) did not always operate smoothly. Sometimes, one architect moved a door by 20 cm because that would improve the room functionality and then the switcher—which the electrical guy had placed beside the door—was suddenly in the door. Over time, this got better but I think these timing coordination issues will be smoother in the future as we learn." (Architect B)	Sense of timing in the future	

of past, present, and future to justify and motivate changes related to sequence, frequency, duration, and timing. We discovered that, during the temporal shift, actors engaged in reflective temporal sense-making as regards their perception of past temporal conceptions (Staudenmayer et al., 2002), the present sense of time pressure (Chen and Nadkarni, 2017; Staudenmayer et al., 2002), and future projections and possibilities (Dougherty et al., 2013). In this way, project participants solved today's problems in order to manage the future—which, in turn, spurred a desire to effectuate organizational change. We therefore concluded that the temporal shift instigated three related temporal roles: a past-orienting, a present-focusing, and a future-directing role. These findings are summarized in Table 1.

In the final stage of our analysis, we sought to comprehend why and how the temporal shift succeeded in activating organizational change. We observed that the project had established a temporal zone, which facilitated the three roles' alignment in the service of enabling organizational change.

Findings

We made use of detailed data on how actors actively and strategically engaged in creating and enabling temporal shifts in order to succeed with their project mission and to realize organizational change at Advanced Construction.

The pressure to change

Top management at Advanced Construction felt an urgent need to stay attuned with digitalization developments in order to retain the firm's market position and reputation as a leading and innovative design company. Yet, not everyone shared this urge—in fact, many designers preferred traditional design practices and were openly critical of the novel digitalized approach, which they felt hampered creativity and collaboration:

> Even though we already had some degree of digitalization in the organization, the digitalization maturity, in general, was rather low among our designers. Some designers constantly asked us to print things out for them instead of working on them in the previous digital model. (Digitalization Manager)

However, Advanced Construction's clients and partners demanded improved and more efficient design practices, and they pushed quite hard for the adoption of a novel digitalized design approach. Both internal and external pressures were driving change and implementation of the new digitalized approach at Advanced Construction. A new project—for one of the industry's big players—gave Advanced Construction a golden opportunity for unilaterally implementing a new digitalized design approach. More specifically, one impetus for change was that the client had extraordinarily challenging requirements for this particular project, which required a rethinking of conventional design and project practices:

> The project gave us a problem that we needed to solve . . . but how we were to solve it was far from obvious. (Project Director)

> It was definitely important that the client had so clearly declared that this had to be done using a novel digitalized approach. It was an enormous challenge for us and we had to collaborate in new ways and build our digitalization competence quite rapidly [. . .] to meet the new requirements from the client. (Designer)

The client and the project participants had limited prior knowledge of how best to address these challenges. A core team of ten individuals was established within the project that would focus on its digitalization challenges:

> We told people that we had two basic choices. Either we would try to do it using the old approach, which we know would probably break down because of the size and the amount of data that we needed to generate. Or we take a step into the future and respond to the real challenges facing this project. I think everyone then realized that we had to innovate and we decided to move into the future with this project, instead of trying to save the past. (Design Manager)

In adopting this future orientation, the team explored digitalization opportunities by attending conferences and listening to how other international firms had solved similar problems. In this manner, the team began to obtain some rough ideas about possible solutions:

> We saw that many had tried to maintain old design practices in the new software. We just couldn't do that. We realized we had to rethink the design practices to rejuvenate our design approach. In that respect, we developed new design practices as well as new software solutions. It was a big step for us. We were changing both what we were delivering and how we worked. (Head of Design)

The insights gained through this process of listening and learning confirmed that, in light of the project's complexity, Advanced Construction had to create something new if it were going to meet its contractual requirements. Hence, project organization required changes from the outset—that is, to increase the odds of successfully completing the project's mission:

> We were working under quite extreme time pressure. I think that was really important, otherwise we would never have made this bold decision that early. If you don't have a lot of project experience, you don't understand these things. (Vice President)

A new digital platform was developed. However, the challenges were far from over. The new approach called for a new organizational structure with new roles for the tasks of integrators and coordinators.

Taking off

Advanced Construction created a digital team of about 50 people whose chief task was to formulate, develop, and implement the novel design practices. One of the first problems that this team had to solve stemmed from the new model's creation of severe

real-time interdependency challenges that required much tighter temporal coordination. As soon as anyone started to design or change something, their action instantly affected the tasks of others who were working on the model. This dynamic and the need for responsiveness necessitated new rules and work practices in order to ensure smooth operation—procedures that amounted to a clear break from the past:

> We worked a lot more autonomously in the past, dividing the work into different work packages and then implementing design solutions at later stages. In this project, we had five major parts—but, instead of letting them run off on their own, we emphasized that they needed to stick together. It might sound simple but it really was a completely different approach, especially when you are facing this level of complexity. (Design Manager)

The design ambitions, in terms of functionality, appearance, and color, were greater and entailed increased attention to commonality and matching of design solutions. When combined with the project's speed requirements, these factors created a plethora of new and difficult problems. Many of these challenges were associated with adaptation and coordination. Once the team began testing the model, they realized the magnitude of those challenges:

> We have hundreds of examples of where we made changes to parts of the system—which everyone then adapts to later on and believes that this is the new solution. But then the people who suggested that design change find out that, after all, this might not be the best design because of manufacturing, technology development, cost, or other considerations. Well, basically, the model is very much alive, so to speak, and that creates a lot of additional problems. (Vice President)

The digital team reconvened to reflect on how the new design approach could be more efficient in practice. When engaged in problem solving, the team sought to solve the problem here and now but was also oriented toward a future that involved increases in system complexity, time compression, traceability, and digital maintenance. For this reason, there was much greater concern than usual about what might be required in the future: what kind of projects would emerge, what new partnerships would be needed, and what technical approaches would be available. People frequently spoke about transitioning from "talking about the past" to "looking ahead toward the future". From such discussions emerged a new hierarchy to take control of the new approach and the evolving system's complexity. Although the digitalized approach ended up establishing a new form of flexibility due to its high level of responsiveness, it also called for standardization—for instance, with regard to modules that could be reused throughout the project—in order to avoid confusion and inefficiencies.

Solving temporal challenges

Resolving the tensions between flexibility and standardization led to the creation of two new roles—*content manager* and *equipment manager*—whose purpose was to deal with standardization issues in the digitalized design approach and to ensure that tasks were performed quickly by calling for common solutions and modules. The goals of this imperative

were not only to speed up the process but also to discourage designers from inventing their own solutions or labels because doing so would make it impossible to search for elements or to change their features quickly when needed. In other words, the new approach would not have reached its full potential, and might not have yielded any efficiency improvements at all, unless its components were all drawn and labeled in a standardized manner. Hence, responding more quickly became a priority for the organization.

The head of the digital team realized that, despite the new focus on developing standardized solutions, the designers ignored it. Instead, they continued drawing as they always had, following their work habits and their own standard solutions. Of course, this recalcitrance created problems for both the digital team and the project manager. Should the project fall behind on a deadline and delivery, there would be a substantially increased risk that any future changes in design solutions, adjustments to new technology, or new releases of software would only further add to the project's already challenging nature. The head of the digital team and the project manager discussed this issue and, in response, created the *model manager* position. The design project manager assigned the same hierarchical status to both the digital team manager and the model managers as that of the designers. Model managers were essential for ensuring that designers adopted the new procedures. Their role was twofold: to support and help solve emerging issues and to ensure that the designers followed the rules and prescriptions.

In this new regime, model managers had the authority to decide both how and when design tasks should be undertaken; they were also empowered to dismiss designers who refused to follow the new work practices. This change drove home the point that completing the project's mission relied absolutely on designers working in accordance with the new approach, which meant that they now had less flexibility than before.

The role of model managers was to be constantly present for the designers and to emphasize the consequences of not meeting the overall project deadline or the milestones along the way. The managers helped and taught those designers who were unsure about how to draw using the new guidelines, and they were also responsible for the continuous monitoring required to detect possible design errors as the work progressed:

> Look at this list of objects. Here, you have 15,000 units of [X] and 12,000 of [Y] . . . and around half a million interior objects . . . and then you surely realize that if things start messing up, you are going to have one hell of a problem . . . [laughing]. (Head of Design)

This detection and correction routine was perhaps the most important work performed by model managers, who were also tasked with ensuring efficient project collaboration:

> One of my key assignments was to detect errors and then to contact the people who were responsible to ensure that those errors were corrected. It could relate to all sorts of things: wrong object, wrong tag, incorrect use of objects . . . Here is a deviation—can you please take a look at it? (Model Manager)

The model managers made it clear to designers that errors were expected as a normal element of the process—although, naturally, all errors had to be identified and rectified:

We had a very open dialogue during this project. People were involved and they were allowed
to make errors and to misunderstand things . . . Many people appreciated that, especially since
we were working with such a complex system . . . and many things were so critical . . . [it] was
better to be forgiving and to have people dare to do things than to think that they cannot make
any mistakes or it all goes to hell. (Head of Design)

It was mainly because of this manager-driven focus on errors that designers came to
alter their temporal conceptions; thus, they became increasingly aware that their behav-
ior was being monitored and that such supervisory attention could correct or otherwise
alter their output at any time. There previously had been very little interference, and cor-
rections and synchronizations occurred at a much later stage. Installing model managers,
therefore, created and enforced a needed sense of urgency.

Changing the rhythm

Those who participated in the project soon realized that its size meant that many draw-
ings had to be delivered on a weekly basis. Furthermore, the client had specific require-
ments regarding these deliveries. One strategy that Advanced Construction implemented
to meet those client needs was the NDT initiative, which changed the rhythm of the
process:

The no-design time referred to the time during which the designers were not allowed to design
in the digital models. This was the time that we needed to prepare the deliveries of blueprints
each week and to synchronize all information in various underlying databases. The designers
were quite upset about this change to their work pace. (Project Director)

During these NDT periods, which occurred each Thursday, designers were not
allowed to design within the new model's parameters. There was always a large number
of drawings that had to be integrated, in a particular manner, prior to being reviewed and
to receiving a special label that signified they were accurate and contained the correct
metadata. To accomplish this goal, Advanced Construction created another new role—
publication manager—that was filled by individuals who oversaw the process of prepar-
ing and synchronizing the content and changes in all databases.

The NDT period was viewed as a peculiar (indeed, provocative) initiative by many
designers, who were accustomed to making changes up until the very last minute before
delivery. Nonetheless, most experts and designers working with the digital model viewed
NDT as being instrumental to creating a shared vision for—and a collective spirit in—
the project. This change led to heated debates but also to the ultimately productive re-
evaluation of long-held attitudes. Moreover, many respondents saw NDT as being the
key ingredient for "establishing a rhythm" for the project:

We had an agreement of a pace that we could tap into. We said that Wednesday afternoon would
be the last occasion for making updates and changes and that, on Thursday morning, we would
implement this idea of no-design time, where we cleaned the model and then synchronized with
all underlying databases. There was a work routine for this, with 20 activities that they always
went through. It was a very strict routine. And when it was all done, they exported all information

to the model, which was updated so everyone could start working on the next iteration. (Project Director)

Thus, NDT enabled a thorough integration of information as well as the identification of problems and deviations:

We worked on the routine and with programmers to ensure that the digital model was up-to-date and working. We tested things as much as possible and as much as time would allow. (Model Manager)

One implication of NDT was that designers had to adapt to a novel way of relating to this shared problem-solving cycle. That cycle was crucial for driving local change activities and individual adjustments:

No-design time was very important for the project even though it meant that people typically had to change their routines. For instance, they had to schedule their meetings on different days and use other periods to work on other things. People learned the new way to work and to adjust. We did this early on in the project so that it was a part of creating the entire project and the organization, you could say. (Design Manager)

In this way, NDT created a shift among project participants in terms of how they structured the major components of their work. Although many project participants had experience with similar work routines and pacing mechanisms, NDT was decidedly different. This difference was related not only to NDT's frequency (every week) but also to the deliberate four-hour interruption and the shared responsibility of maintaining the pace set by project management:

We have had, of course, delivery cycles and such things on other projects, too, but this was quite different. In the other projects, which are normally a lot smaller, you started with a routine and said, "let's agree on delivering that on that day" . . . but people gradually tended to slip on this agreement, making late deliveries . . . which led to really poor integration. These problems could be handled during smaller projects but, in a project like this one, it just would not work. (Designer)

Throughout the project, we observed how the participants had to rethink their old work habits and to experiment with the novel digitalized approach:

I knew I couldn't leave things for later because I would miss the delivery deadline for the iteration. I had to reflect much more on when to begin and complete things in order to be able to ship my parts on time and thereby help others do their work. And I also knew that delays would not be acceptable. We had this rhythm and timelines were immovable. (Designer)

No-design time certainly received its share of criticism and negative comments. It was widely viewed as adding an unnecessary bureaucratic element to design work, and some felt that it was far too rigid. The idea of NDT presupposed that greater integration was necessary and had to be synchronized; moreover, the digital model was designed in a way that called for frequent synchronization. The project's expert analysts surmised

that integration was needed on at least a weekly basis in order to ensure that the complexity did not overwhelm the project or those who were tasked with detecting errors in the model:

> We worked with this mantra of synchronizing weekly. We launched it in order to get everyone to understand the importance of being involved, so to speak. We repeated it many times to remind people of its importance. (Digital Manager)

Hence, NDT became a coordinating feature of the project and one that was maintained by the new roles established, especially the model managers. It was a change that affected how project participants reflected on both the organization's past and its future. In addition, NDT helped ensure that project activities were integrated and up-to-date—factors that figure prominently when high levels of coordination are needed:

> This idea of no-design time was super important for us to be able to ensure the validity of the design model—that the numbers and identity tags we used were the same throughout—in various databases. Thus, for every iteration, we ensured that these data were updated against all underlying databases—to ascertain that the information was accurate—on which people relied in the digitalized approach. (Chief Operating Officer)

Consequences of the temporal shift

The rhythm changes introduced by the new procedures facilitated a shift in project participants' increased awareness of time-related concerns: speed of responses, greater appreciation of temporal factors, and acceptance of a radical approach to enabling system-wide synchronization. In many ways, this perceptual shift depended on encouraging behavioral changes early in the project, which would pay off during its later stages. Subsequent adjustments were also needed with respect to project activities and to the solving of related problems at the local level:

> One important idea with the new approach is that you put in a lot of work at the beginning that will pay off later on. That's the whole idea, I would say. And we needed people to get that. To get them to rearrange their way of thinking around these things. (Model Manager)

The digitalized approach was also a mechanism for inducing the organization to adopt a more long-term perspective. The firm would benefit from realizing that change was needed to cope not only with future challenges but also with the current project—that is, because the new model would improve both manufacturability and implementation during its later stages. However, project participants came to recognize that other tasks could also be accomplished much more rapidly than before:

> Some things took a lot more time, for sure, and people were a bit frustrated by that but there were so many other things that could be done much quicker with the new approach; stuff that took a week to do before could be done in minutes . . . unbelievable, right? (Design Manager)

Discussion

Our study set out to explore what roles temporal shifts play in enabling organizational change and how temporal shifts are mobilized. In our case-study firm, we discovered that a new temporal order—established through the firm's NDT initiative—enabled several different yet clearly related changes that informed our understanding of the relation between a temporal shift and actual organizational change.

The temporal shift led to changes with respect to the dimensions of duration, sequence, timing, and frequency (Zerubavel, 1981), all of which supported better temporal coordination in the project. The shift not only changed the rhythm of the work week but also affected how individuals viewed the past, how the organization had historically worked, and the problems this created for adopting the novel design approach. In this respect, the temporal shift was a clear departure from how things had been done in the past, which boosted reflective capacity of the firm's staff. We also observed that the temporal shift provided opportunities for action in the present, which made people more aware of what actions were needed to implement change. Finally, it influenced beliefs about how the new approach would work in future operations of clients and how past ways of working had to be adapted in order to accommodate the new requirements of clients. This future-directing role of the temporal shift also encouraged people to reflect on where the organization was going and on what it needed to implement for success in achieving organizational change.

Figure 1 and Table 2 offer an overview of the various elements involved in accomplishing organizational change at Advanced Construction. First, we identified internal and external drivers of change. We then observed the formation of a project-based approach and establishment of the temporary organization, which together provided the foundation for a temporal zone that allowed individuals to adapt and experiment with the organization's temporal order. The actual temporal shift followed, and our findings indicate that it served several distinct purposes: past-orienting, present-focusing, and future-directing. Overall, the temporal shift led to increased temporal awareness and understandings of the role of time in facilitating change, and then to improved temporal coordination (Moore, 1963) and readiness for change (Staudenmayer et al., 2002).

Table 3 elaborates the three roles (past-orienting, present-focusing, and future-directing) of the temporal shift and the four temporal dimensions (duration, sequence, frequency, and timing) that were altered by the change. The table also presents a description of how the shift created a readiness for organizational change—that is, via increased temporal awareness and improved temporal coordination. In what follows, we explicate these distinctions and discuss how the temporal shift served the three primary roles that we believe to be essential for enabling organizational change.

Three roles of the temporal shift

One vital function of the temporal shift was to make people more *time conscious*, especially in terms of becoming more aware of time as a resource that was both limited (Gersick, 1988) and valuable (Staudenmayer et al., 2002). As a result, much more attention was paid to temporal factors than before the shift, which stimulated reflection on the individual and collective use of time (Sankowska and Söderlund, 2015). Thus, the firm's

staff developed a better understanding of how they had worked in the past and of what changes were needed. We shall now detail, in turn, the temporal shift's three roles.

The past-orienting role. Our study clearly establishes how a rhythm change facilitated changes in the organization's temporal order that enabled change in the organization itself. Our analysis indicates that Advanced Construction had never developed a coherent temporal order because its employees and core collaborators neither attended to nor responded to a shared time pacer (Gersick, 1994). The firm had been unable to implement an overall organizational "metronome" (Sayles and Chandler, 1971) and instead had deliberately reduced task-related interdependencies so that its employees could continue to work autonomously (Thompson, 1967). In contrast, the new temporal order was predicated on interdependence, mandated time discipline, and increased deadline pressure—factors that were necessary to establish the momentum for change. Thus, the temporal shift made employees aware that project collaboration involved a specific rhythm (Sayles and Chandler, 1971) that needed to reflect the challenges of digitalization.

The NDT-induced temporal order can be seen as a means of creating alternative procedures and finding new (albeit still routinized) work rhythms. The new temporal order at Advanced Construction forced people to distance themselves from the organization's previous temporal order—an effect that seems to have resulted in more openness to change itself. For instance, and as seen from our empirical account of how employees perceived the past, several respondents declared that they had to re-evaluate the sequence of their work as well as when to meet with other colleagues and when to schedule such activities as testing, integration, and detailed design. Individuals' views changed regarding not only the timing and sequence of activities, but also their frequency (e.g. how often to meet) and duration (e.g. how long particular activities should last) (Zerubavel, 1981). Thus, we found that designers had to change their work duration, timing, frequency, and sequence (Aguinis and Bakker, 2020). As a result, they became much more aware of the "need for synchronizing" (Staudenmayer et al., 2002) with other project teams and project participants so as to guarantee on-time delivery and their continued participation in subsequent iterations of the project. Those iterations were needed to ensure that the solutions developed were tested against the current overall model and that other project members were provided with precise and up-to-date revisions derived from local problem-solving exercises (Lindkvist et al., 1998).

At Advanced Construction, the new temporal order provided more structure for the daily activities of project participants because time requirements were enforced in a fairly rigid manner. Many of the engineers and designers working on the project remarked that the temporal shift had made them recognize that their previous modes of working could be problematic or even destructive if attempted under the new approach. So, in accord with Ancona and Waller (2007), our findings suggest that there are multiple ways in which rhythm-changing events can encourage workers to pause and reflect on their temporal routines and practices (Orlikowski and Yates, 2002).

The present-focusing role. The scope of change induced by the altered temporal order affected nearly everyone in the organization, since the new "rhythm" (Ancona and Waller, 2007) and "sequence of work" (Zerubavel, 1981) did not match any of the organization's previous cycles nor those of its collaborators. Our study demonstrates that the temporal
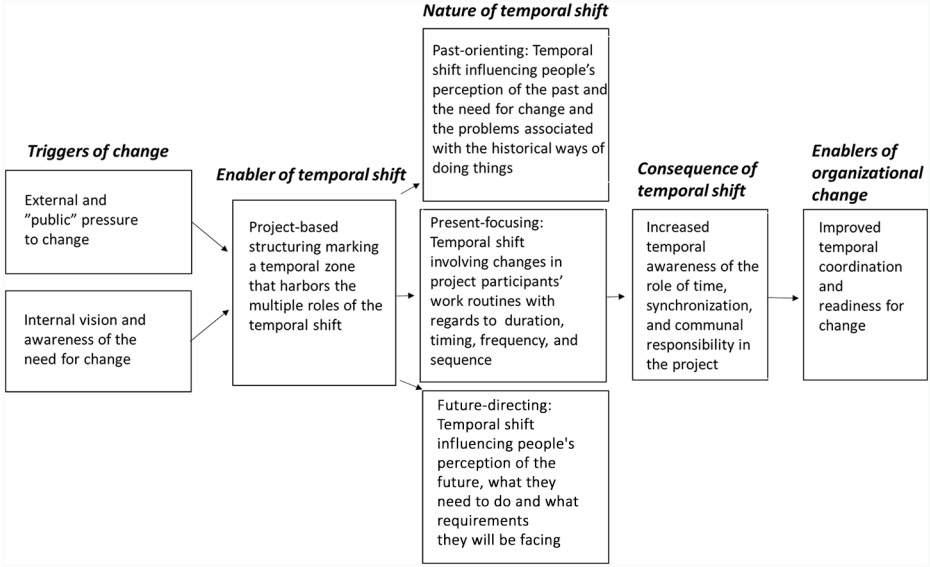
Figure 1. Temporal shift and organizational change.

Table 2. Three roles of the temporal shift.

	Past-orienting	Present-focusing	Future-directing
Purpose	The temporal shift makes people aware of how they have historically done things and what problems they are now facing.	The temporal shift makes people more aware of how their own actions influence others.	The temporal shift makes people more aware of how their current actions should be adapted to face future challenges and requirements.
Effect	Making sense of the need for change. Why is change needed?	Improved temporal coordination. What needs to be changed?	Making sense of the direction of change. Where is this taking us?
Examples	People engage in the process of comparing the new ways of working with the historic ways of doing things. They realize the difficulty of the previous ways of working, given the new challenges that the organization is facing.	People obtain a better understanding of how their own actions affect others in the organization. They also obtain a better understanding of how other people work in terms of duration, timing, frequency, and sequence. For these reasons, they seem better equipped to coordinate temporally with other organizational members.	People obtain a better sense of what the organization should be doing in order to respond to future challenges and requirements. They engage more in activities that are directed toward understanding future needs of clients.

Table 3. Dimensions of the temporal shift at Advanced Construction.

Dimension	Temporal shift
Three temporal roles of the temporal shift	
Perception of the past (Hernes and Schultz, 2020). People's attitude toward how the organization has historically related to time.	People's improved understanding of the problems associated with the previous ways of organizing facilitated the novel approach's success. People began to realize the importance both of delivering digitalized solutions and of changing the organization's approach to design in order to become more digitalized.
Sense of time pressure in the present (March and Olsen, 1976; Reinecke and Ansari, 2015). People's sense of externally imposed urgency to accomplish tasks.	The nature of time pressure changed; there was an increased urgency to meet deadlines. People realized the consequences of not delivering things on time and the ramifications of a late-running project. People had a better understanding of the client's situation and so became more aware of the consequences of late delivery.
Perception of the future (Dougherty et al., 2013). People's view of how the organization needs to work with their clients in the future.	People became more interested in considering the future of digitalization and began addressing—to a greater extent— how customers are affected by digitalization and how this, in turn, influences what projects employees work on and how those projects would be delivered to clients.
Temporal dimensions changed by the temporal shift	
Sense of duration (Zerubavel, 1981). People's sense of how long activities should take to accomplish.	People changed their views about how long certain activities should last. Several key activities began taking much longer to accomplish but others took considerably less time than before. People began to reflect much more on accurate duration estimates—that is, instead of simply sticking to conventional understandings about how long things would take.
Sense of sequence (Aguinis and Bakker, 2020; Amis et al., 2004; Zerubavel, 1981). People's views on the proper order of activities.	People understood the need to establish the most sensible order of activities. People began to change in the sense that certain activities were now performed much earlier in the process than before the shift—although other activities were now performed later. These changes led to participants adopting a different perspective on the entire project process.
Sense of frequency (Aguinis and Bakker, 2020; Zerubavel, 1981). People's views on the ideal frequency of key project activities.	Several activities had to be done much more frequently. Key integration and coordination activities were now performed on a weekly basis, which resulted in the project having a markedly different pace (than before the shift) for doing things.
Sense of timing (Aguinis and Bakker, 2020; Zerubavel, 1981). People's views on the temporal positioning of key activities.	People became increasingly aware that delivery times had to be honored and that deadlines were important. People also realized, to a greater extent, the importance of time accuracy and that timing played an important role in organizational coordination and performance.
Outcomes of the temporal shift	
Temporal awareness (Staudenmayer et al., 2002). How people experience the importance of time-related factors for organizational performance.	People became more interested in their colleagues' work cycles, durations, and sequences. They reflected on how they could support others in a better way by reconsidering their own work sequence and pace.
Temporal coordination (Moore, 1963; Staudenmayer et al., 2002). People's views of temporal coordination within the organization.	Temporal coordination became stricter and somewhat more centralized under the "no-design time" regime. This change also encouraged people to reconsider how their local problem-solving sequences and paces would be affected.

shift affected the sequence of work, which was an essential element of the new temporal order to which project participants had to adjust. Note also that designers working on the project addressed problems through reflexivity (Sankowska and Söderlund, 2015) and experimentation (Lenfle and Loch, 2010), instead of simply running their individual design loops faster. The enforced adoption of NDT also provided project participants with a rhythm that indicated the need for an atmosphere conducive to collective experimentation (Edmondson, 2002), both before submitting design solutions for the new release and after receiving the next iteration from model managers. These procedures also showed designers the logic behind the new work sequence—individual designs were to be completed prior to experimentation, followed by testing, and then by a period of reflection—before ultimately commencing the next design–experiment–test cycle.

At Advanced Construction, the NDT initiative triggered alterations in the designers' understanding of when interactions should occur and of the appropriate times for "local problem solving" (Lindkvist et al., 1998) and individual "quiet time" (Perlow, 1999), which had a strong effect on the quality of the firm's temporal coordination (Moore, 1963). As mentioned previously, project participants rescheduled their work week and adjusted many of their other activities to match the rhythm set by the project. One factor facilitating these changes was the attention that managers devoted to the modified workflows needed in order for all actors to follow the new "beat of the project" (Ancona and Waller, 2007). Thus, the project-based approach on which Advanced Construction relied had the effect of facilitating a temporal shift by making project participants more aware of their communal responsibility for overarching deadlines (Lindkvist et al., 1998). Shared deadlines contributed to establishing a temporal zone, which was paramount for individuals' adjustment to the new temporal order.

Yet, even as the NDT initiative contributed to increased deadline pressure (Lindkvist et al., 1998), it also led to fewer competing demands on project participants' time—allowing more time for re-evaluation and reflection. Therefore, as noted also by Perlow (1999), the pace of work in the new temporal order actually seemed less frantic and progressed with fewer interruptions. These changes helped designers allocate time for more comprehensive considerations of problems and for the development of possible solutions. Thus, the temporal shift clearly affected how individuals related to their present circumstances. For example, it served to connect project participants with different knowledge bases and backgrounds as well as to institute what Staudenmayer et al. (2002: 592) called a "synchronized readiness for change". The temporal shift at Advanced Construction accordingly facilitated the implementation of change activities in a highly coordinated fashion. Our interviews also indicated that it would have been difficult, absent a temporal shift, to capture the attention of a critical mass of significant actors, which was a prerequisite to achieving actual change.

The temporal shift observed in this study clearly induced, in project participants, a greater temporal awareness and an understanding of time as a valuable resource (Staudenmayer et al., 2002). For instance, after Advanced Construction suspended its old rhythm of work—especially via the NDT initiative—those working on the project were then increasingly aware that the time available for reflection and experimentation was finite (Lindkvist et al., 1998). Project managers insisted on dedicated time periods for such activities, and project participants gradually developed a better sense of how long

those periods should last. Hence, "the clock of the project" was always ticking, not only during design cycles but also during breaks and interruptions. Thus, the temporal zone that the project established provided a "liminal space" (Söderlund and Borg, 2018) that made project participants realize how little time there was to waste before making changes. Toward that end, the temporary organization instituted a temporal zone that clarified how individuals depended on each other with regard to frequency, pace, sequence, and timing.

The new and somewhat stricter temporal order (supported by the new management structure), together with its weekly iterative cycle to which people had to adjust, made it practically impossible to continue using the conventional design approach. Hence, designers had to divide their work into separate "design packages". At the same time, other project participants were compelled to divide their work in a similar fashion— making adjustments to their own local problem-solving cycles (Lindkvist et al., 1998) while bearing in mind the "overall rhythm" (Sayles and Chandler, 1971) set by the NDT imperative. The altered temporal order encouraged workers to focus on their own design cycles while retaining the project communality and the overall beat of the new temporal order.

The future-directing role. In order to address its digitalization challenge, Advanced Construction enforced an alteration of the temporal order and thereby ensured that project participants realized that change was needed (Staudenmayer et al., 2002). This alteration also triggered the awareness that change was closely associated with the firm's temporal order, enabling it to meet future challenges within the industry and to devise adequate responses to current and future system requirements. This dynamic seems to have encouraged reflection by which people viewed their current actions from a future-oriented perspective (Dougherty et al., 2013). Hence, employees were presently "locally focused" in adopting the rhythm while being future oriented and "globally directed" in their search for new avenues and rationales for action. It is evident from our empirical account that individuals engaged in "future perfect" thinking (Weick, 1995) and that this made them, inter alia, better able to understand (a) how other stakeholders would act in response to the challenges presented by digitalization and (b) why and how organizational change was integral to Advanced Construction's preparations for those future challenges.

The temporal shift, which was activated by the NDT principle, allowed for new patterns of interaction, and for greater attention devoted to team processes and temporal coordination (Moore, 1963), and to advances in collective problem solving (Edmondson, 2002); it also brought diverse project participants, who were accustomed to setting their own work schedules and rhythms, into greater synchronicity (Lindkvist, 2005). These changes, in turn, enabled various teams to make organizational changes while also encouraging them to adopt the new design approach. The preeminence of this "rhythm change" (Ancona and Waller, 2007) functioned as an entrée to the new temporal order. Managers and designers both emphasized (in meetings and written communication) how critical it was to meet project deadlines. This emphasis signaled to project participants that time was the project's scarcest and therefore most valuable resource. Managers did legitimize temporal breaks during the extremely time-sensitive production routine, but

they made sure that project participants and managers were aware of the need to be adaptive and flexible.

By intentionally altering the pace and rhythm of work, management demonstrated its belief in the value and benefits of reflexivity for triggering change (Sankowska and Söderlund, 2015). As our empirical account confirms, the temporal shift affected how project participants interpreted their respective altered schedules (Edmondson, 2012). As they came to realize that their work rhythm needed to change, they became more aware of the content of change and of what activities were necessary to move things forward. In this respect, the new temporal order not only offered project participants a better understanding of the need for and benefits of adopting the digitalized approach, but it also made clear what activities were needed to adopt this approach. Our findings thus underscore that temporality is an essential feature of organizational change—an aspect that organizations ignore at their peril (George and Jones, 2000). This study demonstrates that understanding temporal shifts may very well be the *sine qua non* of understanding change itself.

Zooming in on the temporal zone

The case study highlights that the project mode of organizing fosters the creation of a temporal zone, which is needed to facilitate the multiple roles of a temporal shift. As already mentioned, the clearly defined deadline was one marker of this temporal zone; maintaining that zone through various project-related activities, such as deadlines and milestones (Lindkvist et al., 1998), contributed to ensuring that it was operational and continuing to induce reflection on past, present, and future actions (Emirbayer and Mische, 1998).

Our findings also reveal that the co-location (Allen, 1977) of core teams was key to establishing the temporal zone, which played a major role in implementing the temporal shift. Co-location offered the project a physical space in which project participants could meet to exchange ideas and concepts (Kellogg et al., 2006)—a space that consultants and external designers were invited to share. Moreover, the project-based approach provided a concrete delivery deadline along with a temporary organization (Burke and Morley, 2016); and co-location increased the attention paid to time, which contributed to participants' willingness to work under the new temporal order and in accordance with the new procedures. Thus, the temporal zone amounted to a conspicuous break in the spell (Gersick, 1995) that allowed project participants to consider how much time was actually needed and, in so doing, develop a greater awareness of time considerations overall (Okhuysen and Eisenhardt, 2002).

A defining aspect of the temporal zone was that it stimulated local and also collective processes of temporal reflexivity (Lindkvist et al., 1998). Even when teams were not co-located physically, they remained interdependent (Thompson, 1967). This interdependence was a crucial aspect of the temporal zone, since every local action induced a rapid global response in the digital model. Hence, it was impossible to escape interdependence, a fact that increased everyone's involvement in maintaining high levels of responsiveness throughout the organization. Thus, interdependence called for constant alertness to actions in the temporal zone, which enabled that zone to harbor the temporal shift's

multiple roles. Project milestones further increased the need for rapid adaptation and allowed little time for long-winded negotiations. This fast-response setting was characterized by temporal uncertainties until the new temporal structures, routines, and boundaries were in place—as orchestrated by the new roles of model, content, and equipment managers—and could ensure perpetuation of the temporal zone.

The foremost outcome was that organizational members came to realize that the use of time was critical for success at making a change and for establishing the momentum needed to effect organizational change, a realization that the temporal zone exemplified and allowed. Thus, the temporal zone in which the temporal shift was embedded allowed individuals to develop a better understanding of the recursive nature of change and temporality (Orlikowski and Yates, 2002). This understanding bolstered a temporal awareness that had a positive effect on the quality of temporal coordination in the project. Examples include improved delivery timing, meeting scheduling, and work sequencing among the project participants—which made them more aware of how other project participants used time and of the importance of other problem-solving cycles for coordination within the project. That is to say, the temporal zone, through its enforcement of project-based structures and deadlines, influenced people's awareness of other participants' relations to time; that influence was a necessary condition of the temporal shift's success.

Figure 2 illustrates how the temporal shift's three roles worked together to increase awareness of the need for change and to link individuals' current activities with their future directions. The temporal zone was, in various ways, instrumental in ensuring that these three roles were integrated and aligned. Those roles made organizational members aware of the problems associated with their historic ways of working and hence of the need for change—thus giving project participants a better understanding of the content of change as well as a better grasp of the firm's direction: what it needed to become and how best to achieve that goal.

Conclusions

Our study demonstrates that implementing a temporal shift is an eminently suitable means of enabling organizational change. Yet, in contrast to the conclusions of prior
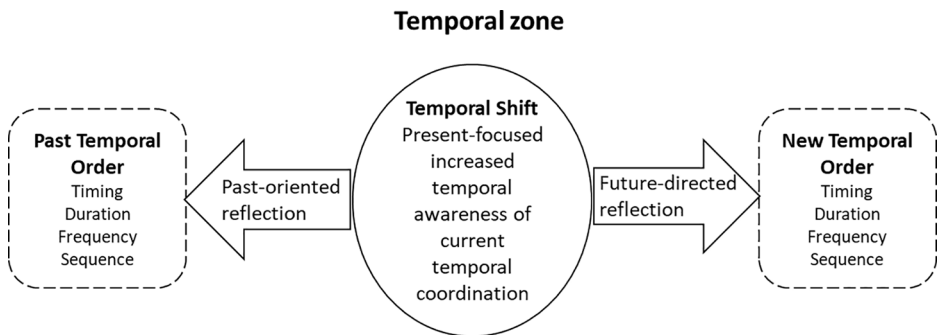

Figure 2. The temporal zone and the temporal shift's multiple purposes.

research, we document that merely establishing a change in rhythm is hardly enough to ensure that a temporal shift contributes to actual organizational change. This article also differs from prior research—which offers meager empirical evidence and yields little explanatory power—in providing a more complete explanation and presenting a model that enhances our understanding of the relationship between temporal shifts and organizational change.

To begin with, we identify temporal shifts as having multiple roles in enabling organizational change. We identify three distinct yet complementary roles of a temporal shift— one oriented toward the past, one oriented toward the present, and one oriented toward the future. Our study indicates that these three roles must work together in order to ensure that a temporal shift leads to organizational change; they do so by encouraging workers to reflect on the need for change, the activities necessary to effect change, and the direction of change.

In addition, we highlighted how the temporal zone facilitated that these three roles were aligned. A temporal zone—which is established by a clearly defined deadline and supported by a temporary organization set up to deliver the project—is evidently fundamental in giving participants an understanding of the need for and direction of change.

Our study points out that managers must engage in concerted efforts to facilitate temporal shifts and the organizational solutions that will induce them. This case study shows that greater awareness can be triggered by establishing a new temporal order that sets a beat to which project participants can adjust their own activities and problem-solving cycles. At Advanced Construction, the new temporal order made it possible for project participants to pace and synchronize their activities. One result was the development of a deeper understanding of the project's interdependencies and therefore of the change process per se. Hence, participants became more aware—than they were before the temporal shift—of the need to follow the set pace and to adopt new roles and behaviors with the aim of successfully addressing the complex problems and interdependencies at hand.

Finally, this research showcases the three roles played by temporal shifts in developing an understanding of the past, an awareness of what needs to be done in the present, and a sense of direction in terms of where the organization is headed in the future.

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