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Research paper

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Abstract

In a digital world in which firms struggle with digital transformation, moving beyond the mere introduction of technologies to leveraging their transformational potential becomes increasingly relevant. Technochange, i.e., the strategic use of IT to derive organizational benefits by integrating IT introduction and complementary organizational changes, presents a promising approach in the context of digital transformation. Yet for the IT function, conducting technochange requires a fundamental change in the way IT work is done. Despite previous research that addresses the particularities of technochange, no research has been conducted on the challenges faced when IT projects transition after applying a TC approach and on strategies to overcome them. In answering this question, we apply socio-technical systems theory as a conceptual research lens to study the transition process of an IS infrastructure project in a mid-size omni-channel retailer. The results of our longitudinal in-depth case study suggest that this transition process is characterized by challenges of exported problems and structural issues that can be overcome by intervention strategies of bricolage, borrowing competence, and building alliances. Our research contributes to technochange literature by outlining the transition from IT to technochange projects and provides practical guidance on how to manage this transition.

Keywords: IT project management, Technochange, Socio-technical systems, Digital transformation

1 Introduction

In a digital world, firms are faced with both challenges and opportunities emerging from digital technologies. The nature of digital technologies is inherently disruptive (Karimi and Walter, 2015) and leads to an alteration of consumer expectations and disruption of the competitive landscape (Vial, 2019). Especially pre-digital companies that previously relied on predominantly analogue value propositions perceive pressure to build new technology-enabled business capabilities in order to stay competitive in an increasingly digitalized environment (Sebastian et al., 2017). This strategic response of firms to a digitally disrupted environment that aims at an alteration of the firms' value creation paths and management of associated structural changes and organizational barriers, is commonly referred to as digital transformation (Vial, 2019). While at the one hand, digital technologies are perceived as existential threat to firms, they on the other hand also offer game-changing opportunities for firms (Sebastian et al., 2017). In their strategic response to disruption, firms leverage on the transformative potential of digital technologies in order to create new and differentiated value (Mithas et al., 2013). The digital transformation of firms is thus also referred to as the usage of new digital technologies in order to enable major business improvements like enhancing and transforming an organization's portfolio of products, services, processes and business models (Singh and Hess, 2017). In light of this intentional usage of technology to drive organizational change, digital transformation can be depicted as evolution of IS-enabled organizational transformation (Riasanow et al., 2017, Vial, 2019).

The deliberate usage of technology to drive organizational change has been profoundly studied in the rich literature stream of IS-enabled organizational transformation (OT) research (Besson and Rowe, 2012). Within this research and related fields, e.g. benefits realization management, the prevailing view is that value stems not from the IT artefact itself but from the organizational change accompanying its introduction and thus IT introduction necessarily needs to be accompanied by organizational change (Doherty et al., 2012, Venkatraman, 1994). While from this literature, we have gained a detailed understanding of the effects of IT on OT, potential success factors, and detailed descriptions and explanations of failures, the role of agency (Besson and Rowe, 2012) and project management issues of IS-enabled OT have received less attention (Beldi et al., 2010, Iveroth, 2010). One suggested approach to manage IS-enabled OT projects that explicitly addresses necessary change endeavours is technochange (Markus, 2004). Technochange (TC) describes a management strategy for using IT to derive organizational change by integrating complementary organizational changes to IT introduction in the project's design to leverage potential benefits from IT (Chae and Lanzara, 2006, Markus, 2004). This consolidation of integrated IT and business activities mirrors the central characteristic of digital transformation requirements (Bharadwaj et al., 2013, Matt et al., 2015), proposing TC to constitute a valuable approach for managing IT projects in digital transformation and worth revisiting.

Since the introduction of TC, a small body of literature has emerged that sheds light on the particularities of TC projects such as TC perspectives and TC competencies (Harison and Boonstra, 2009, Jackson and Philip, 2010). This research concludes that in order to successfully conduct TC, the way IT work has been done requires a fundamental change. Switching to a TC approach could thus profoundly affect the IT unit. In pre-digital firms, the IT function was traditionally rather a supportive function and were thus found to be structurally and procedurally unprepared for their role in digital transformation (Urbach et al., 2019). Following a TC approach would mean that the IT unit has to leave behind a technology-centred approach to project management, as it becomes essential to move beyond the mere introduction of digital technologies but to leverage their transformational potential so that the company will benefit from it and see organizational transformation (Horlach et al., 2016, Sebastian et al., 2017).

Thus while TC promises to be a valuable approach to redefine the IT units role in digital transformation, the IT unit will inevitably be faced with challenges when switching their project management approach. But despite this recognition, no research has investigated the challenges that IT units face after applying a TC approach and how to overcome them. Yet to successfully follow a TC approach for managing IT projects in a digital world, it is essential for organizations to understand the transition process from IT to TC projects and the ensuing challenges. We address this research gap and aim to provide practical guidance by answering the question: *What challenges arise during the transition process from IT to TC projects? And what are strategies to overcome these challenges?*

In order to answer this question, we applied an explorative, qualitative-empirical approach by conducting a longitudinal in-depth case study of a mid-size omni-channel retailer that re-focused an ordinary IT infrastructure project to follow a TC approach as part of its digital transformation. We investigate this transition process through a socio-technical (ST) research lens and identify challenges and interventions of this process along the punctuated socio-technical information system change (PSIC) model (Lyytinen and Newman, 2008). We present our findings in the form of a structured, detail-rich narrative of the transition from an IT to a TC project. We identified two causes that underlay the challenges: exported problems and structural issues. We also identified three intervention strategies to overcome those challenges: bricolage, borrowing competence, and building alliances. Thereby, we contribute to literature on TC and IT project management in the context of digital transformation and provide practical guidance for firms on how to manage the transition to a TC approach.

2 Literature Background

2.1 Technochange vs. IT Projects

The notion that IT has transformational potential is by no means new (Zuboff, 1988) and the investigation of the effects of IT on organizational change is central to IS literature (Markus and Rowe,

2018). The rich literature stream of IS-enabled OT deals with the leverage of the transformative potential of IT, i.e. the intentional usage of IT to derive change (Besson and Rowe, 2012). Since its emergence, IS-enabled OT research has moved beyond a magic bullet thinking and calls for complementary organizational change accompanying IT implementation in order to fully leverage the potential of IT (Venkatraman, 1994). While we gained insights on the effects of IT on organizational change, potential success factors, and detailed descriptions and explanations of failure, our understanding of agency (Besson and Rowe, 2012) remains yet scarce as only few empirical researches have dealt with project management issues and the practice of leading IS-enabled change (Beldi et al., 2010, Iveroth, 2010).

The related literature stream of research on IT project management has historically applied a rather technology-focused approach to IT project management, neglecting organizational change and would thus not be applicable to transformative efforts. IT projects are typically understood as involving the development of a single IS and as narrowly focused on delivering a defined output within specific budgetary and time constraints (Gregory et al., 2015, p. 58). Even when acknowledging that IT projects should take a more systemic approach, e.g. a people, process, technology approach, gained insights remain rather focused on the technology aspect of the project. As a recent example, Gregory et al. (2015) studied the challenges involved in IT transformation programs. They identified six ambidexterity areas for management all of which were related to the IT artefact rather than change management.

One approach that explicitly accounts for the change aspect of IS-enabled OT was proposed by Markus (2004) around the concept of technochange. Technochange (TC), short for technology-driven organizational change, describes significant transformations in organizational areas like organizational processes, business units, and management changes driven by large-scale IT introductions (Markus, 2004). TC situations, i.e., strategically using IT to drive organizational change, can be either planned or emerge unplanned throughout a project. To manage such situations, Markus suggested a technochange management strategy – from now on, we will refer to IT projects conducted under this TC approach to drive organizational change simply as TC projects. The main distinction between IT and TC projects is that rather than aiming for an in-time and in-budget delivery of functioning IT, TC projects aim at deriving IT-driven impacts on "the users" (people, processes, and organizational performance) – thus the management of TC necessarily needs to involve change management. Yet neither IT project management nor organizational change management approaches (alone or together in parallel) are sufficient to ensure successful TC (Markus, 2004). The demands of successful TC require a complete and aligned solution to capture the potential benefits of improved organizational performance (Markus, 2004). TC, therefore, at its very core calls for an alignment between organizational characteristics and the new IT system. TC thus requires a different approach than approaches to managing IT projects or organizational change with regard to the features of the solution and the change process (Markus, 2004).

	IT projects	**Technochange projects**
Target outcomes	Technology performance within time and budget	Improvement in organizational performance, enabled and facilitated by new IT
The solution	New IT	New IT applications in conjunction with complementary organizational changes
Basic approach	Temporary projects that are expected to produce an outcome that meets specifications within time and budget	Program of change initiatives, typically including an IT project followed by aligned change efforts

Table 1.   IT vs. Technochange projects (based on Markus, 2004; Harison and Boonstra, 2009).

In her seminal work on TC, Markus (2004) presents a sequential, four-phase TC lifecycle with prescribed activities in each phase as TC management strategy, but proposes an iterative implementation approach - TC prototyping - as a potentially more rewarding approach to TC. TC prototyping involves both the testing of new IT functionality and related organizational changes throughout the phases of a TC lifecycle and reduces the risk of a misaligned solution. Since the introduction of the concept of TC, a small body of literature has emerged that further sheds light on the particularities of TC projects. TC projects shall apply a techno-cultural emergence perspective to account for both technical and cultural

issues arising over the TC lifecycle and to prevent cultural misfits of the TC solution (Jackson and Philip, 2010). In doing so, in addition to having the competencies necessary to accomplish the IT-related project tasks, TC project members further need to master organizational change, which requires knowledge and skills regarding organizational change activities (Harison and Boonstra, 2009). The project team thus plays a central role for the effectiveness of TC (Beldi et al., 2010).

From these insights it becomes clear that TC requires a fundamental change in the way IT work is done. Yet despite the fact that the benefits of TC have been clearly outlined and the particularities of TC projects have been researched, no research has been conducted on the challenges faced by IT projects after applying a TC approach. Thus the transition process from an IT to a TC project, its challenges, and how to overcome them remain a black box. In answering this question, we apply socio-technical systems theory as a conceptual research lens to study the transition and identify challenges and interventions.

2.2   Socio-Technical Systems Theory as a Conceptual Research Lens

With our research, we aim to develop a better understanding of the transition process from ordinary IT to TC projects. We thus take a processual viewpoint on organizational change. Contrary to a variance-based approach, we do not aim to explain the difference in organizational entities over time by investigating the causal effects of variables, but seek to explain why events, more explicitly challenges, occur and how they can be overcome (Ahmad et al., 2011, Van de Ven and Poole, 2005). To examine the transition to TC projects, we selected socio-technical systems theory as the underlying research lens. The ST perspective enables a holistic view on transformation while taking into account that organizational change is an interplay of the social and technical, thus providing a suitable lens for the investigation of the subject matter (Alter, 2013, Sarker et al., 2013). As the integration of the social and technical lies at the very centre of TC, a socio-technical perspective is the most suitable for outlining the complex transition process and its challenges.

Specifically, we structure our research with the punctuated socio-technical information system change (PSIC) model as elaborated by Lyytinen and Newman (2008). The PSIC model conceptualizes an ST system as four highly interdependent, interacting, and aligned components: structure, actors, technology, and task (for definitions see table 2). According to the ST paradigm, a harmony between the ST components is essential for a system to function efficiently, and a change in any one component will affect the others (Sarker et al., 2013). The PSIC model is multi-layered with the central system under investigation being the building system. Put simply, in the context of IS-enabled change, the building system is in charge of building the IT solution and delivering IS change (Alter, 2013, Lyytinen and Newman, 2008). The model further recognizes external interactions by accounting for the influence of broader systems, namely organizational environment and environmental context.

ST element	Definition
Tasks	Goals and implementation tasks, i.e., which artefacts and rules will be used and in what way they will be embedded in the work system as outlined in the project's charter, e.g., configuring the software, training, and hiring people.
Technology	Available methods, tools, and infrastructure to design, build, and implement the solution.
Actors	Key organizational members and stakeholders who are involved in the development process can set forward claims or benefit from the project, e.g., consultants, users.
Structure	The project's organization, i.e., the system of communication, authority, and work flow, e.g., decision making, implementation methodologies.

Table 2.   Components of a socio-technical building system (after Lyytinen and Newman, 2008).

The PSIC model derives middle-range process explanations via event sequences. Previously balanced components of an ST system could become incompatible, creating structural misalignment called *gaps*: "any contingency in the system which, if left unattended, will reduce the system's performance" (Lyytinen and Newman, 2008, p. 595). Events that generate a gap are labelled *critical incidents* and are often abrupt, e.g., key people leaving or the introduction of a new tool. Critical incidents create the

necessary conditions for a system state to change as they threaten or significantly decrease the system's performance. Two types of system responses result from gaps: incremental alignment of components to restore balance, or punctuated radical change by rewriting the system's composition rules, thereby allowing it to exhibit new properties (Lyytinen and Newman, 2008). Attempts to remove gaps are events labelled as *interventions* comprising measures targeted at one or more ST elements with the goal of mitigating gaps. Figure 1 depicts how a systems-punctuated ST change can be modelled as process.
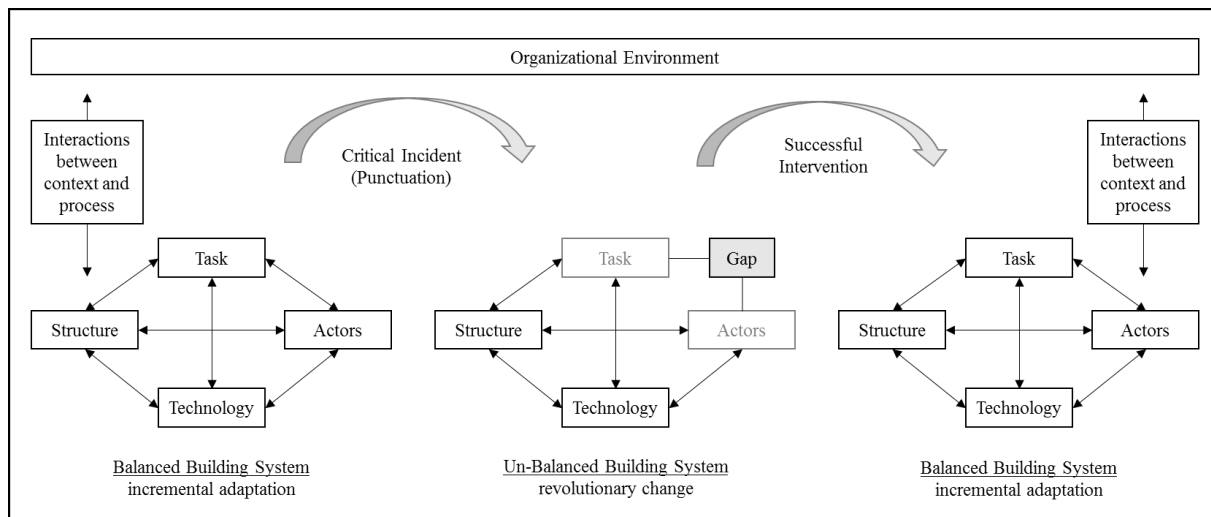

Figure 1.   Processes of the PSIC model (adapted from Lyytinen and Newman, 2008).

To investigate the transition process to TC, we apply the PSIC model to identify challenges (=gaps in the PSIC model) emerging during this process and measures to overcome them (=interventions in the PSIC model). Applying an ST research lens, we were able to capture the co-evolution of social and technical subsystems and can derive process explanations for the transition. Our central object of investigation was thus the building system, i.e. the TC project, and the changes within its ST elements.

3   Research Method

3.1   Research Design and Data Collection

For the purpose of gaining insights into the transition from ordinary IT to TC projects and ensuing challenges, we applied an in-depth case study with ethnographic elements, as case studies are a suitable instrument to study context-rich ST systems and causal relationships from a process perspective. In particular, we employed a single case study research design under an interpretative epistemology following the recommendations of Myers (2009), Klein and Myers (1999), and Walsham (1995). Following the interpretivist research paradigm allowed us "to understand the deeper structure of a phenomenon, which it is believed can then be used to inform other settings" (Orlikowski and Baroudi, 1991, p. 5). We will thus provide findings in the form of rich insights regarding a process theoretical understanding of the transition to TC projects (Walsham, 1995).

The main purpose of this research was to investigate the socio-technical changes in the transition process from an ordinary IT to a TC project. The key case selection criterion was thus the requirement that a previously technologically focused IT project had been refocused to integrate organizational change. Firms were contacted through our professional network, which should ensure that we would have continuous and long-term access to the firm. We ultimately chose an IT infrastructure project at an omni-channel retailer that at the date of contact had just decided to pursue a TC approach. Initiated as an ordinary IT project merely intended as a system update, the firm decided along the way to accompany the system implementation with an integrated change program.

Collecting data, we combined impartial observation and ethnographic elements to maximize the benefits of both approaches. Ethnographic research is one of the most in-depth research methods possible, as its

defining feature of participant observation enables researchers to gain rich insights into the human, social, and organizational aspects of IS development and application (Myers, 1999). To gain in-depth insights, one researcher followed the transition for four months as a participatory observer. This allowed us to closely keep track of the transition process, ensured constant access to the case, and helped to gain interviewees' trust. In the traditional model of anthropological ethnography, the researcher observes and participates but does not actively seek to change the situation. We thus took care to not intervene or actively participate (e.g., influence managers' decisions). The other researchers, not involved in the organization, acted as impartial observers, assessing the interpretations of organizational members and filtering this information through their own conceptual considerations (Walsham, 1995).

Data source	Description	Amount
Interviews	Semi-structured interviews with project team members and relevant stakeholders	14 interviews (length: 30–90 minutes; mean: 50 min)
Informal interviews & observations	Field notes of direct observations as well as informal, unstructured interviews	12 informal interviews 21 field notes
Archival data	Internal and external documents on the project and the organizational context, e.g. presentation slides, photo protocol of workshops, training materials…	64 documents analysed

Table 3.   Overview of the data.

Data collection took place from April 2018 to October 2018, with one researcher collecting ethnographic field data from May to September. To ensure validity, we combined data from different sources using different data collection methods to gain a broad picture of the case. Relevant events shaping the transition were identified through direct observation or in retrospective reconstruction of events via interviews. Participant observation is regarded as one of the defining features of ethnographic research (Myers, 1999) and provided our main source of data. For example, we sat in team meetings, which allowed us to observe the team's daily routines and conduct informal unstructured interviews in which interviewees freely expressed their emotions and thoughts, revealing information that would not have surfaced otherwise. Observations and informal interviews were documented in field notes immediately after the interaction. As a second important data source, we conducted interviews with all members of the IT team and important key stakeholders who were identified over the course of our research, e.g., members of cooperating departments, external service providers, and consultants. Designing our semi-structured questionnaire, we adapted the questionnaire of Seidel et al. (2013) as a good example for gaining insights regarding transition processes. The interviews were conducted face-to-face (except three via telephone), were recorded, and transcribed verbatim. To enhance the rigour and construct validity of our study, we triangulated data from observations and interviews with archival document analysis. The collected data was stored, organized, and coded in a comprehensive case study database employing ATLAS.ti software (Miles et al., 2013).

3.2   Analysis

We oriented our data analysis along the operational steps of the PSIC process analysis (Lyytinen and Newman, 2008), following standard criteria recommended for qualitative research (Miles et al., 2013, Myers, 1999). In the first round of descriptive coding, we built an initial understanding of the case and identified events, their antecedents, and outcomes. We identified events according to their property, whether they could potentially punctuate the systems structure by generating, sustaining, or removing gaps (Lyytinen and Newman, 2008). For each event, we descriptively coded its antecedents, i.e., the "set of temporal and other dependency relationships between the ST elements that preceded the event and could be viewed instrumental (i.e. necessary) in producing it" (Lyytinen and Newman, 2008, p. 599), and its outcomes. This first step resulted in a detail-rich narrative, revealing relevant events, their chronological order, and causal relationship. To ensure reliability, this narrative was given to two members of the project team to check for correctness of order, completeness of events, and to solve

ambiguities. In a second round of coding, we analysed the events by coding them using ST theoretical terms and definitions as suggested by the PSIC model (Lyytinen and Newman; 2008). This step was conducted by iteratively going through the data in a hermeneutic cycle (Klein and Myers, 1999) until no further gaps or events were identified. Events were subsequently contextualized, i.e., we investigated whether the event, its antecedents, or outcomes were impacted by the organizational context.

We present the results from both coding rounds in the form of a narrative, an approach that has proven particularly useful for conducting process-oriented field research related to IT-enabled change (Pentland, 1999). Narratives are an effective way to conduct longitudinal case-based research as they allow for outlining an ST change process as it unfolds and reveals the process's underlying patterns (Pentland, 1999, Wagner and Kandathil, 2016). Further, narratives are central to process theory as a source for identifying events in an interpretive act (Markus and Robey, 1988, Pentland, 1999). From a processual viewpoint, insights are derived based on an understanding of the sequence of events and their interrelatedness. To obtain a narrative flow, we will not explicitly state ST relations but adopt the notation of Lyytinen and Newman (2008) and refer to the ST element and relations in brackets, i.e., we will mark gaps between ST elements as (ST-ST), interventions as (I) and the resulting outcomes, i.e., a change in the ST system as ($\rightarrow$ ST). E.g., hiring a consultant (I) due to a lack of experience needed for the task (Task-Actors) will be marked as a change in project members ($\rightarrow$Actors).

4 Results

The case organization is a German based mid-size omni-channel retail and media company that we will call OmniR. The firm's product portfolio is dominated by fashion and beauty products that are sold to customers via telephone or online. OmniR was launched in German-speaking Europe during the mid 1990s, and since its foundation has been rapidly growing in size and revenue, with revenues about to surpass one billion € in 2018. This revenue is still predominantly generated through OmniR's legacy sales channels, yet in 2017 almost 60% of new customers were acquired via digital channels, increasing the digitalization pressure on OmniR. We focussed on OmniR's German headquarters, which has around 900 employees with highly heterogeneous technology affinity levels. Being private-equity owned, IT was predominantly perceived as a cost centre within OmniR, and IT infrastructure was run at minimum cost resulting in the outsourcing of central activities. This reduced the IT infrastructure team to three persons and resulted in a low recognition within the firm and an outdated system infrastructure.

In the following, we present the results of a longitudinal in-depth case study of an IT infrastructure modernization project at OmniR. Specifically, the firm planned to change its operating system from Microsoft Windows7 to Windows10 (internally called "W10") in line with the switch from Office2010 to the Office365 suite (internally called "O365"). Initially the project was conceptualized as an ordinary IT infrastructure project. But as new O365 features like video conferencing of cloud-based storage were not established within the firm, it was belatedly decided during the project to accompany the system implementation with an integrated change program in order to derive organizational change. In the following, we outline the events along this process in a narrative structured according to the PSIC model.

4.1 From Project Initiation to the Decision for TC

The IT infrastructure project was initiated in April 2017 as a re-investment project, triggered by the discontinuance of support for the W7 operating system. In line with the W10 update, OmniR decided to switch from Office2010 to the cloud-based O365 version to meet current market trends and stay competitive. Initially a three-part budget allocation for the development of the software client, technology implementation, and change management was proposed for the project. Although the risk of user alienation due to differences in features and appearance of the new version was acknowledged, the budget for change management was not approved because it was thought that accompanying measures could be conducted internally by the IT team. The project thus continued under a mere technology focus. In September 2017, the IT team started working on the W10 prototype client with the goal to conduct a pilot test in December 2017. With the project focus until then predominantly having been on the

development of a W10 prototype and testing it for functional quality in a pilot user group, the O365 suite had been largely left unattended, and decisions concerning its final set of features were postponed.

Triggered by external pressure to digitalize, both the corporate and IT department's strategy substantially changed, resulting in a reorientation of the project's goal. The IT strategy shifted from "expenses first" to "employees first," resulting in higher IT budget allocations and creation of job positions within the IT department. In January 2018, OmniR's newly established corporate strategy was announced, targeting digital transformation and "to enable us with the appropriate technologies and processes." With the realization that the firm's vision suggested strategic relevance for the project, the IT team conducted vision and scoping workshops in February. As an outcome of the workshops, the project's vision was aligned with the corporate strategy in order to contribute to the digital transformation of the firm. The project goal was defined as "to enable employees to work remotely, more efficiently and collaboratively." The, until then postponed, decision of which O365 features was finalized to include Skype for Business, OneDrive, and to promote OneNote alongside the introduction.

This change in the project's goals meant the IT team had to complement the IT introduction with change initiatives: *"We realized we could continue this as an implementation project with some communication alongside - or, we use this project as a lever to create medium- and long-term benefits and change the meeting culture, communication and ways of working... and at this point, we grew aware how big this topic actually is"* (interview_teammember6). In line with the project's goal to contribute to the firm's digital transformation, the previous deliverable of an IT artefact was insufficient, as a more collaborative and remote way of working and a more efficient meeting culture required behavioural and also organizational change. This realization lead the IT department head to decide in March 2018 to accompany the project with an integrated change program, thereby changing the project's scope to TC.

4.2 Socio-Technical Events following the TC Decision

As a result of the decision to include a change program in the project's deliverables, the project team faced several challenges: project members largely had an IT background with no prior experience in change projects (Task-Actors), necessary resources/manpower and tools/methods (Task-Technology) were not available to conceptualize and conduct the change program, and necessary communication and structures were not present within the firm (Task-Structure).

Overcoming lack of expertise and resources. Due to the lack of experience with change initiatives and inadequate manpower, the project team approached the firm's change facilitator (an intern position at HR for learning and change management) (I). But while receiving input on how to conceptualize a change strategy, no operating support was provided. Thus, the team decided to internally re-staff personal and introduced the position of change manager (I), who was solely responsible for crafting and conducting the change accompanying the IT introduction ($\rightarrow$Actors). The change manager started her support of the project team in March but due to a transition period was officially staffed only in June. Additionally, budget was reallocated (I), and an external change consultant familiar with the introduction of W10/O365 was engaged in June (I; $\rightarrow$ Actors). The consultant provided an initial roadmap for the change and proposed measures and standardized content for communication ($\rightarrow$Technology), allowing the team to work on the change with increased speed.

Crafting change initiatives out of user feedback. Three blocks of change initiatives (communication, training, and internal marketing) were defined for which the project team planned to build on the standardized best practices identified by the change consultant. The project manager anticipated early on that those measures would have to be adapted to the firm's culture in order to mitigate resistance. Yet the project team lacked a precise understanding of the firm's culture and users' techno-affinity and needs to do so. Due to outsourcing of central user communication channels, e.g. the IT helpdesk, the IT department lacked feedback channels, got disconnected from its users (Task-Structure), and further failed to integrate users into the project's conceptualization (Task-Actors). In a first attempt to gain user insights, the focus of the pilot was extended (I), and pilot users were invited to participate in focus groups in May. In addition to the feedback on the technical quality of the pilot client, pilot users were asked about their expectations for the mass rollout and the required extension of accompanying change

measures (→Technology). Additionally, the team started conducting a pulse check (I), i.e., they interviewed organizational members from all business areas on their work routines, technology usage, as well as wishes and pain points. The goal was to develop an improved understanding of the users' technology-affinity and to derive user stories, i.e., users' pain points that could be addressed with the planned O365 release (→Technology; →Actors). With these insights, the change manager conceptualized a rollout map for change measures and their content. Communication measures focused first on informing users of the system update and update process, then on providing tips and tricks for the new features. These tips and tricks were crafted out of O365 features that matched user pain points and were in line with the organization's digitalization strategy, e.g., Skype for Business was heavily promoted for its chat features in order to reduce the volume of emails.

Putting the project on the digitalization agenda. While the project's change manager was able to rapidly conceptualize and develop the change initiatives with the help of the change consultant, the project lacked the infrastructure needed for testing and rolling out these measures (Task-Structure). Due to the cost-centred IT strategy, the team had been limited on a workable minimum, focusing on keeping the business running and hardly communicating with the organization, thus lacking organizational standing and awareness. With many digitalization initiatives already existent in the firm, the team realized it didn't have to invent and build from scratch but could use existing channels and platforms to increase the project's visibility and secure a place for it on the organization's digitalization agenda. In May 2018, together with the HR department as his sparring partner, the head of IT infrastructure initialized one of 12 official digitalization initiatives created to support the organization's strategy (I; →Structure). The aim of this initiative was to transform the workplace, and the W10/O365 was docked in this initiative as one of the IT department's contributions. This was a major step for the project, as it was thereby put on the official digitalization agenda, increasing its visibility while at the same time creating a platform for IT-business cooperation. The initiative further provided the project with an internal brand for communication and promotion (→Structure) and new options for implementing the IT-driven change (→Technology). In July, using the initiative as a platform, the project's rollout ideas were pitched to the organization's digital transformation steering group (→Actors), a cross section of firm employees from all levels up to the CEO, receiving support for the project and the proposed change. Leveraging the initiative as a platform, the project was promoted to the entire workforce at the firm's mid-year town hall meeting in July, during which the initiative was voted as "most important initiative" by the employees. At the same time, the change manager integrated the firm's communication department as a project sparring partner (I). Starting in May with initial meetings, this exchange was continued in weekly meetings throughout the duration of the project to get input and feedback not only on the content and form, but also on the rollout of communication concepts (→Technology; →Structure).

TC prototyping. Communication and work routines of the project changed incrementally. At the beginning in May, the project's change manager and IT project manager were not in touch, but by early July, with the change agency kick-off meeting, they began collaborating. The collaboration increasingly intensified with the change manager joining routine IT team meetings, and by September, collaboration was taking place on a daily basis (→Structure). This stands symptomatic for an observed consolidation of IT and change workstreams, as well as an increased awareness of the necessity of change within the IT department. Analogously, the project was increasingly conducted with the help of iterative prototyping of IT as well as change solutions (→Technology). Whereas initially the project's IT deliverables were defined without user involvement, change measures, their content, and the combined techno-change rollout scenario were prototyped to obtain user feedback and integrate it into the final TC solution. For this approach, the project team started creating its own feedback loops and integrated the user interviewees into a sounding board for feedback on future ideas (→Technology; →Actors). Further, an email address for inquiries related to non-technical feedback about the rollout was set up, while also technical feedback from the external IT helpdesk was collected.

The TC solution. The rollout strategy of the TC solution was finalized mid-August 2018. Taking into consideration the possible upcoming sale of OmniR, the number one priority was that users could continue working without major interference during the system update. It was therefore decided to install the system in waves of 30-50 users on weekends. Updated users were offered a basic voluntary training

on new functionalities on Mondays. Additionally, two training sessions on new work opportunities enabled by the update were offered weekly, promoting new technical possibilities and triggering behavioural change in order to support an effective meeting management and increased team collaboration as targeted by the organization's digital transformation strategy. The training sessions were piloted by the IT team in September with the first rollout wave, and external trainers took over in October, although with the understanding that both technical rollout and change measures would be adapted iteratively based on the feedback from each rollout wave. The rollout was accompanied by extensive communication, ensuring that users were fully informed at each step of the integration. A detailed intranet presence was set up for FAQs, but it also provided educational material and tips and tricks for new features. The content for these measures was largely provided by the change consultant and adapted by the change manager to the organization's culture based on input from the user stories.

5 Discussion

As the above narrative outlines in detail, project management faced several challenges that were resolved by a number of interventions during the transition from IT to TC. We examined this process through a ST research lens and applied the PSIC model to identify challenges (=gaps in the PSIC model) and measures to overcome them (=interventions in the PSIC model). In the following, we discuss the underlying mechanisms of these challenges and interventions.

5.1 Analysis of Challenges – Exported Problems and Structural Issues

We identified two underlying causes of the challenges. First, challenges caused by what Markus (2004) calls "exported problems" related to earlier phases in the project's lifecycle. Second, challenges caused by structural issues that extended beyond the project's lifetime and were more fundamental in nature.

Exported Problems. Markus (2004) outlines the lifecycle of TC projects in four phases that differ in their prescribed activities and key actors. Exported problems are problems that arise during a phase of the life cycle but either are not recognized or not solved. Instead, they are exported and show up in later phases when it becomes increasingly expensive and more complicated to fix them (Markus, 2004).

OmniR illustrates what Markus calls a classic example of an exported problem: failing to recognize TC and initially conceptualizing the project as a mere IT project. Initially, OmniR's project lacked a business case because it had been started as only an infrastructure update. Yet a business case is the essential prerequisite for outlining change initiatives accordingly. Aligning the project's goal with the organization's digital strategy during the vision and scope workshops in February made it possible to create a business case and establish behaviour change goals as well as arrive at suitable IT solutions. Conceptualized as an IT project, neither budget, manpower, nor expertise for conducing change were allocated to the project. These challenges were overcome by extending the budget and hiring a consultant who specialized in the change initiatives needed for the successful introduction of O365.

These interventions stand in contrast to Markus's proposition that exported problems, even once recognized, are more likely to be exported to the next phase than solved in the phase they surfaced. One reason is that project managers avoid rescoping their projects, as it could be interpreted as their inability to handle the project. Moreover, often actors change over phases and thereby either lack the knowledge to recognize a problem, or if recognized, refrain from solving exported problems because it is perceived as politically dangerous to interfere with their colleagues' decisions. Our contrary observations can be traced back to first, the situation that key actors did not change as drastically as Markus suggests. The project was initialized within the IT department and although new stakeholders were integrated, the majority of actors remained constant throughout the phases. Due to this consistency of actors and authority, the risk of political fallout for interfering with colleagues' decisions was minimal. This observation was further supported by the small size and non-hierarchical structure of the IT department. Second, the project's organizational context strongly supported a TC approach. Rescoping for TC enabled managers to position the project as a contribution to OmniR's digital transformation strategy and thereby increased the IT department's visibility and standing within the organization. These strategic benefits outweighed the potential risks of overstretching time and budget. In fact, the rollout delay was

deliberately tolerated, as is apparent in one member's reaction to the unexpected sick leave of indeterminate length of the change manager: *"we have to see how we will proceed—but we will not continue without change! If necessary, we will postpone the project"* (fieldnotes_CallConsultancy).

Structural Issues. In addition to exported problems, we identified a second cause of challenges: structural issues. These challenges extend beyond a project's lifecycle and are related to the approach and way IT work is conducted in general, thus structural in nature. Having outsourced all of its user interfaces to an external service provider, the IT infrastructure team lacked mechanisms for communication with end users and became increasingly detached from OmniR's business units. In previous IT projects, e.g., the introduction of Wi-Fi, this was less of an issue because they could be successfully conducted without accompanying change. Yet with the project approach shifting to TC, the lack of user knowledge became a problem because the IT team needed to know the users' technology affinity and reaction to IT so that it could change introductions in order to craft the change measures effectively. On the other hand, the IT team lacked channels and platforms for communicating with end users and other OmniR units. These issues were solved by obtaining user feedback via user story interviews and building intra-corporate alliances with the HR and corporate communications departments, "borrowing" their experience and platforms. Further, the project team applied a prototyping approach, integrating the users as stakeholders in the further development of the TC solution. These interventions fundamentally reshaped the way IT work was done, making it increasingly user-centric, aligned with the business and iterative in nature.

5.2   Analysis of Interventions – Bricolage, Borrowing, and Building

To overcome the above challenges, the project team conducted a series of interventions. We identified three coping strategies underlying these interventions and now discuss them in relation to the literature.

Bricolage. Initially with no further resources appointed to the project, the team conducted a series of interventions that relate to a concept referred to in literature as *bricolage* – the application of whatever resources are available at hand to new problems (Senyard et al., 2014). In IS, organizational transformation, and entrepreneurial literature, bricolage is seen to be an effective measure to achieve goals, especially in situations of resource constraints (Baker and Nelson, 2005, Ciborra, 2009, Senyard et al., 2014). In that sense, the project team made use of whatever tools and contacts to users they had and shifted the project's focus from techno-centric to driving behavioural change. Specifically, the focus of the pilot user group shifted from receiving technical feedback on the W7 client to obtaining feedback on users' techno-affinity and needs in order to craft matching change measures, thereby increasing the inclusion of pilot users as project stakeholders. The team thus used the existing tools (pilot) and actors (pilot users) for a new task (technology-focus → change-focus), following a bricolage approach.

Borrowing. In a second series of interventions, the team responded to challenges of inadequate expertise and lack of structures by *internal and external knowledge integration*, thus "borrowing" competencies, technologies, and structures from other actors. In an attempt to accelerate the development and subsequent implementation of change measures accompanying the IT introduction, the project team first unsuccessfully approached the intra-company's change facilitator, then an external change consultant was hired. This new stakeholder brought experience with change projects, a toolbox of best practice roadmaps, and basic communication content into the project. This input was adapted to suit the firm's culture using the user interviews, and it allowed the team to rapidly catch up with the development of change measures as they did not have to start from scratch. Integrating internal and external knowledge is essential for the performance of large-scale IT projects, as they require specialized knowledge that is often fragmented (Mitchell, 2006). This is potentially even more relevant for TC projects as they require an even broader set of competencies (Harison and Boonstra, 2009).

Building. As a third coping strategy, the project team started building their own, mainly structural, competencies for conducting change. First, with the newly established role of change facilitator, both resources for and acquired expertise in change were integrated into the IT department's composition, even beyond the project's duration. Second, IT feedback and communication channels to the end users were built up by conducting a pulse check of users' techno-affinity and needs and subsequently using

the interviewees as a sounding board. Most notably, the project team built alliances with units throughout the organization through the digitalization initiative developed with HR as a sparring partner. Intra-organizational alliances can provide IS change agents with material resources, as well as social capital and organizational influence beyond their own position and can thus foster the success of an IS change even if resources are limited (Ngwenyama and Nørbjerg, 2010). For OmniR, the digitalization initiative provided the project team with a platform for officially putting the project on the organization's digitalization agenda, thus increasing its visibility throughout the organization and ensuring top management support. Regarding the IT team's history of low visibility within the organization, this step was vital for the project as it allowed for increased possibilities of influence and access to resources.

5.3 The IT to TC Transition Presented as a PSIC Model

Outlined as a PSIC model, the decision to follow a TC approach (triggered by the firm's digital transformation strategy) constituted a critical incident, threatening the project's performance and punctuating the system. This critical incident lead to rapid revolutionary change that ended in a rewrite of the system's deep structure that mirrors the defining characteristic of the TC approach (Lyytinen and Newman, 2008, Markus, 2004). Throughout the transition process, the system's task changed from an on-budget and in-time delivery of the IT artefact to a benefits-first focus. The system's actors included new stakeholders, e.g., end users, and their tighter integration. Regarding technology, the project team acquired and built new tools and methodologies for integrating and delivering change initiatives, e.g., adopting a piloting approach and creating feedback and communication channels. Also, the system's structure changed fundamentally, with the project team becoming increasingly connected internally but also intra-organizationally. With this new deep structure of TC, the IT team was able to successfully put the project on the firm's digital agenda, thereby officially contributing to the organization's digital transformation strategy. Conducting the project using a TC approach thereby enabled the IT function to shape its role and increased its influence, visibility as well as standing within the firm.
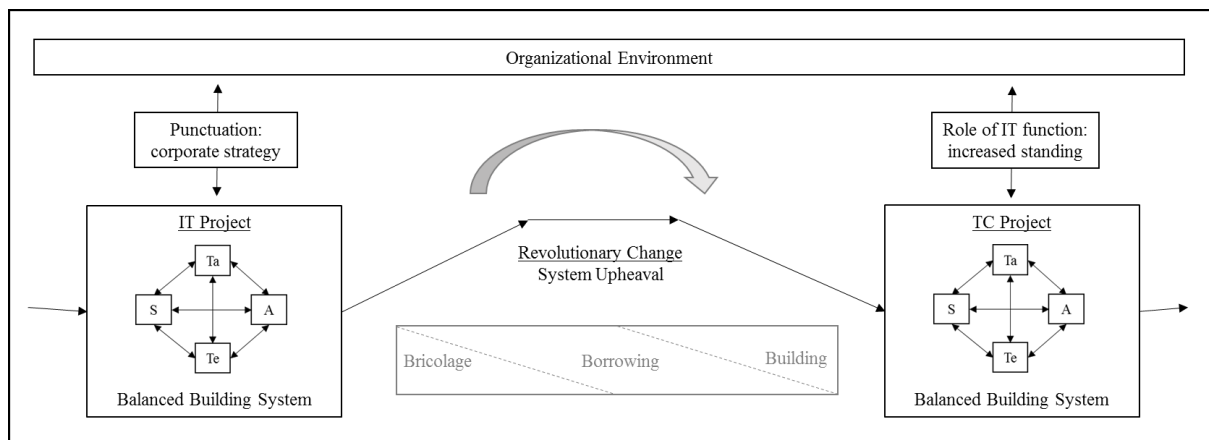

Figure 2.   Case study results as a PSIC process model.

See figure 2 for an illustration of the punctuated transition from an IT to a TC project. Within this process, the project team developed the intervention strategies of bricolage, borrowing, and building to meet multiple challenges, both from exported problems and structural issues. The team applied these strategies simultaneously rather than sequentially. However, we identified bricolage as tending to be the initial reaction in order to cope with sudden punctuation when resources were still limited. Once additional resources were allocated, the team increased its borrowing interventions. It was essentially these borrowing interventions that solved exported problems and accelerated the transition towards TC. Later during the transition process, we increasingly observed the use of building interventions. Those building interventions predominantly addressed structural challenges and thereby altered the socio-technical composition of the building system even beyond the project's duration, ultimately consolidating the system's new deep structure based on the TC approach.

6 Conclusion and Implications

In conclusion, we found the composition of the project's ST system to fundamentally change during the transition towards a TC project. The decision to follow a TC approach in order to contribute to the organization's digital transformation meant that the project team faced multiple challenges due to gaps emerging within its ST system. These challenges were caused first, by exported problems, i.e., misspecifications in earlier phases due to the prior technological focus of the project; and second, by structural issues due to the way IT work had previously been conducted. To overcome these challenges, the project team reacted with a series of interventions that we categorized into three coping strategies: bricolage, i.e., making use of what is at hand with a new focus; borrowing, i.e., the integration of internal and external competencies; and building, i.e., building structures that last beyond the project's duration.

With our research, we contribute to IT project management literature by proposing TC as suitable approach in the context of digital transformation, as it leverages on the transformational potential of technologies. We show how following a TC approach alters the IT unit's role in digital transformation and organizational impact of IT projects. We further contribute to IS-enabled OT literature by addressing the lacking focus on project management. Specifically, we provide first insights into the transition process when shifting from IT to TC project management, contributing to TC literature and hoping that our identified challenges and strategies enable practitioners in their migration to TC.

Investigating the underlying causes leading to the challenges, we found Markus' (2004) proposition, that exported problems are more likely to be exported into subsequent phases than solved, to be contradicted by our findings. We observed that close to all exported problems once resurfaced were resolved, which we ascribe to the consistency in actors and most significantly to the project's context. The organization's digital transformation framed the redesign of the project as more attractive and strategic benefits outweighed potential risks, further supporting the project's rescoping. Our findings thus suggest that Markus' (2004) proposition might no longer hold in the context of digital transformation. We identified a second cause of challenges occurring during the transition to TC that went beyond the project's lifecycle. It is these structural issues that ultimately lead to what Markus only addresses as "change in the way IT work is done" (p. 19). With our research, we provide contentual details of this change and propose that IT work is required towards a more user-centric, increasingly connected, and with business aligned approach in order to conduct successful TC. We further identified three strategies used to cope with challenges in the transition to TC. We propose bricolage as a strategy used initially to cope with new TC project requirements with limited resources, borrowing as a strategy to accelerate the TC transition, and building as a strategy to anchor TC in the IT department's structure.

Our research thereby also offers practical implications for managers by outlining an understanding of possible challenges emerging during the transition from IT to TC projects and by offering three strategies on how to overcome these challenges. Finally, our findings suggest that in the context of digital transformation, applying a TC approach can be beneficial for the IT function to cope with the increased socio-technical demands of a digital world and constitutes a promising vehicle to field the IT function as a central player within the digital transformation of firms. We call for future research on this theme since it holds the potential to spark intriguing theoretical insights on digital transformation.

Despite these implications for theory and practice, we acknowledge limitations of our study. First, following a qualitative-empirical approach, our findings might be of limited generalizability. In addition, our findings are based on a single case study and are dependent on contextual influences and might not be transferrable to other projects or organizations. Thus, further research is required to verify whether our results also apply to projects and organizations with different characteristics. Yet in support of our research approach, processual insights on complex socio-technical change require an in-depth investigation, which is best facilitated by qualitative research such as case studies (Sarker et al., 2013). We further would like to specifically point out that we do not offer best practices or holistic guidelines on how best to react to specific challenges in a TC transition. Given that this transition process is a highly complex socio-technical process dependent on context, such generalization would be inappropriate. The value of our research lies in that it is a first attempt to open the black box of the TC transition process, and we call on further research to extend our challenges and possible interventions.

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