Breaking or keeping the habits: exploring the role of legacy habits in the process of discontinuing organisational information systems

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Abstract

Users develop habits in relation to information systems (IS) to reduce the cognitive and behavioural efforts needed for using them. However, when these systems have to be discontinued, users face challenges regarding how to stop relying on their legacy habits. Despite their importance, we know little about how legacy habits shape the way users discontinue a legacy system. Through a comparative case-study approach, in a large mortgage firm and an international telecommunication company, we identify three roles that these habits play during the discontinuance process. We demonstrate that legacy habits not only play an ‘inhibiting’ role by keeping users attached to legacy systems; they also play a ‘bridging’ role by acting as a common ground for users to start working with a new system and a ‘deterring’ role when users resent certain habits of working with the legacy systems, despite their orientation to keep relying on these habits. We contribute to the IS habit literature by extending the roles of legacy habits beyond an inhibiting role. We also enrich the conceptualisation of legacy habits beyond the individual level by showing that the socio-technical conditions in which the habits are embedded...
impact the emergence and evolution of their roles during the discontinuance process. We discuss the implications of our findings for theorising and managing IS discontinuance process.

KEYWORDS
discontinuance process, information system discontinuance, legacy information systems habits, process view

1 | INTRODUCTION

Over the last half century, much attention has been paid to the development, implementation and adoption of new information systems (IS) (Jasperson, Carter, & Zmud, 2005). However, we know far less about how organisations discontinue their legacy IS that is, incumbent systems that are approaching or beyond their useful life in organisations. Organisations need to discontinue their outdated legacy systems to remain competitive, cope with market and regulation changes and adapt to new business conditions such as mergers and acquisitions (Hainaut, Cleve, Henrard, & Hick, 2008). In this respect, IS discontinuance refers to ‘the cessation of the use of an information system’ (Furneaux & Wade, 2011, p. 574). Failing to discontinue obsolete systems commits organisations to huge maintenance costs and prevents them from being agile and adaptive to changes (Van Oosterhout, Waarts, & van Hillegersberg, 2006).

Literature on the subject of IS discontinuance is emerging (Furneaux & Wade, 2011). Scholars have studied individual and organisational intentions to discontinue legacy IS (Furneaux & Wade, 2011; Recker, 2016). Although important, knowing users’ intentions provides limited insight into how users actually stop using these systems. Empirical evidence and psychological theories indicate that users’ intentions are often inaccurate predictors of their actual behaviour, especially when users have accumulated habits in relation to legacy systems (Bhattacherjee & Sanford, 2009; Polites & Karahanna, 2013; Sheeran, 2002).

Legacy IS habits are defined as default and unconscious ways of thinking about and working with an incumbent system (Polites & Karahanna, 2013, p. 223). This provides a powerful concept to examine how users handle their tendency to rely on the habits they have developed in their use of these systems and how these habits play a role in the process of discontinuing them.

Hence, we seek to answer the following question: ‘How do legacy IS habits shape the discontinuance of a legacy information system?’ Through a multiple case-study approach, we study two organisations that attempted to discontinue the legacy systems, which were central to their daily practices. In one case, the discontinuance process progressed with the gradual migration of the users to the new system. In the second case, we observed a complex discontinuance process in which users initially resisted the discontinuance, later actively engaged in creating hybrid solutions consisting of components of the legacy and the new IS and eventually adapted the legacy IS, instead of discontinuing it entirely.

We articulate three roles that legacy IS habits play in the discontinuance process. We show that besides their inhibiting role, which is often suggested in the literature (Polites & Karahanna, 2012), legacy habits play two other roles: a bridging role: enabling users to transfer to the new IS by relying on some habits that are relevant for using the new system and a deterring role: enhancing users’ dissatisfaction with their legacy IS habits, thus triggering them to abandon their use of a system.

Through cross-case analysis, we explain under which configuration of socio-technical conditions these roles emerge. We show the roles that legacy IS habits play are contingent on (1) the technological similarities and differences between the new and legacy IS, (2) whether users are oriented towards a standard, stable working approach or
actively embrace change, (3) how routine or creative users’ work practices are and (4) the extent to which the work is structured around individual practices or requires collective interaction and coordination. We propose that only considering habits in terms of their contents (what is the habit about) and subjects (who carries the habit) is insufficient for understanding their roles; we have to theorise legacy IS habits as embedded into their broader socio-technical context (Lyytinen & Newman, 2008).

Our study contributes to the current debates on IS habits and IS discontinuance in three ways. First, the extant literature focusses on habits as reinforcing the status quo in IS use: either by positively influencing IS continuance (Amoroso & Lim, 2017; Cheung & Limayem, 2005; de Guinea & Markus, 2009; Gefen, 2003; Kim, Malhotra, & Narasimhan, 2005; Limayem, Hirt, & Cheung, 2007) or by negatively influencing the adoption of new IS (Hsieh & Lin, 2018; Polites & Karahanna, 2012, 2013; Zhang, Guo, Wu, Lai, & Vogel, 2017). Our study finds that there are actually also roles of habits in letting go of the status quo: through their bridging and deterring roles, habits can contribute to the discontinuance of old systems and the adoption of new ones. Consequently, it is not always necessary to disrupt habits in order to establish IS change (Hou, Kim, Kim, & Ma, 2019; Polites & Karahanna, 2013)—such change may very well require that habits that play a bridging or deterring role be maintained and leveraged in the discontinuance process. Second, where previous studies on IS habits have primarily studied these habits in terms of the interaction between individual users and IS, our study includes the broader socio-technical context in which habits emerge, offering a richer explanation of the roles IS habits play compared to previous work. Finally, we contribute to the literature on IS habits and IS discontinuance by extending the relevance and role of IS habits beyond the continuance and acceptance of a new IS but also their roles in the discontinuance of legacy IS. With that, our work also speaks to the literature on IS discontinuance. Where the extant literature on IS discontinuance tends to primarily focus on users’ intentions to discontinue, our study analyses users’ actual behaviours and how these are influenced by the different roles of their IS-related habits.

2 | LITERATURE REVIEW AND THEORETICAL BACKGROUND

To examine how legacy IS habits play a role in the discontinuance of legacy systems, we turn to the literature on IS habits and IS discontinuance. Since IS discontinuance is an IS change process, we use Lyytinen and Newman’s (2008) socio-technical framework of IS change to contextualise the role of IS habits in this change process and identify socio-technical conditions that may shape this role.

2.1 | Legacy IS habits

IS habits are defined as automatic responses, which users develop by repeating certain ways of thinking and acting in relation to an information system (Verplanken, Aarts, & Van Knippenberg, 1997). Habits manifest themselves as repetitive, learned actions, which are triggered by certain cues in the environment (Gardner, 2015). Underneath, habits are rooted in cognitive schemata and unconscious processes that are often not immediately present and accessible to their beholders (Ouellette & Wood, 1998). Hence, they are recurring and stable patterns of action, which tend to become the default courses of action and shape the way people navigate in their environment (Aarts & Custers, 2009).

IS habits refer to situations where ‘people tend to perform behaviours (use IS) automatically because of learning’ (Limayem et al., 2007, p. 709). By developing habits, individuals can efficiently apply their cognitive resources and reduce the required mental effort for working with a system. This, in turn, allows for conscious attention to be directed towards aspects that are new and/or require attentive decision-making (Simon, 1945). Thus, the concept of habits is clearly related to behaviour, but in a specific way, the focus is not on a particular behaviour at a specific time and place but on the tendency to repeat a particular behaviour over time in an automatic way.
Technology-related habits are formed when users of a technology gradually develop stable patterns of thinking and acting that are automatically triggered and unconsciously executed under a certain working context (Ashforth & Fried, 1988). These patterns are initially conscious, but when repeated frequently, under stable conditions and with satisfactory outcomes, they become automatic responses to specific situations (Polites & Karahanna, 2013).

Polites and Karahanna (2013) conceptualise legacy IS habits as habits that are developed in relation to incumbent information systems. Legacy IS habits are developed by each and every user of an incumbent system and thus reflect the specific way each user thinks about and works with the system. Therefore, habits are more personalised than organisational routines, which are common ways of conducting work (Limayem et al., 2007). Focussing on habits enables us to capture the nuanced differences among users, especially if they have different degrees of familiarity with and experience of working with a system.

Scholars distinguish between ‘general’ IS habits, which are triggered by the presence of an entire system (e.g., the general habit of making objective decisions when certain decision support systems are introduced), versus ‘specific’ IS habits, which focus on a particular technological feature or function (Limayem et al., 2007). For instance, the habits of ‘ignoring a warning message’ and ‘keeping the cursor in a certain part of the interface’ pertain to specific aspects such as the user interface. We focus on specific IS habits to capture the heterogeneity of the habits that various users develop in relation to different aspects of a legacy system.

### 2.2 IS discontinuance and legacy IS habits

Previous studies primarily discuss IS habits in relation to IS continuance (Cheung & Limayem, 2005; Gefen, 2003; Kim et al., 2005; Kim & Malhotra, 2005; Limayem et al., 2007) and the acceptance of new IS (Hsieh & Lin, 2018; Polites & Karahanna, 2013; Polites & Karahanna, 2012; Zhang et al., 2017). Regarding IS continuance, habits moderate the relation between users’ intentions and behaviour: as behaviour becomes more habitual, the influence of intentions on IS continuance will become weaker (Cheung & Limayem, 2005; Kim et al., 2005; Limayem et al., 2007). Although Polites and Karahanna (2012, 2013) examine legacy IS habits, their focus is on how these habits influence the intention to use a new system—not on how legacy habits influence users’ discontinuance of legacy IS.

We argue that IS habit is a rich concept for also understanding users’ behaviour in relation to the discontinuance of legacy IS. In line with the literature, we argue that users who have developed strong habits in relation to legacy IS are likely to resist the discontinuance of these systems (Ye, Seo, Desouza, Sangareddy, & Jha, 2008). In the IS implementation literature, users’ resistance to change has been related to their status-quo bias, a general preference of users to stick to their current working situation. Resistance to the use of a new system, or to the discontinuance of an existing one, stems from users’ tendency to maintain their current status or situation (the status quo) (Bhattacherjee & Hilkmet, 2007; Kim & Kankanhalli, 2009; Laumer, Maier, Eckhardt, & Weitzel, 2016). This status-quo bias is related to legacy IS habits because habits form a strong attachment between users and their established ways of working with IS (Lee & Joshi, 2017). As a consequence, habits prevent them from discontinuing these IS: users tend to repeat legacy habits, which keep them connected to legacy systems. These attachments can be so strong that, even if users intend to move to new systems, they fail to discontinue the legacy system (Rezazade Mehrizi, Rodon Modol, & Zafar Nezhad, 2019).

The inhibiting role of legacy habits in IS discontinuance implies that successful discontinuance of legacy IS requires disrupting the habits that users developed in relation to an incumbent system (Polites & Karahanna, 2013). Assuming that users have the agency to reflect on, critically evaluate, and potentially stop their reliance on their habits, users can break legacy IS habits through at least three mechanisms (Polites & Karahanna, 2013).

First, the working conditions can be modified to reduce the need for and the chance of engaging in a certain habit (‘interference’). For instance, to prevent users from modifying the layout of a report, the functions related to editing the layout are made less visible. Managers can change the tasks of users in such a way that they perform certain habits less frequently.
Second, legacy IS habits can be disrupted when users are confronted with alternative ways of working, which then distract them from performing certain habits (‘distraction’) (Schank & Abelson, 2013). Whenever users habitually click on a link to the legacy application, a pop-up can distract them from pursuing their habit and redirect them towards the new system (Polites & Karahanna, 2013). Both interference and distraction work on the assumption that repetition strengthens habits and that disrupting habits goes through an unconscious process.

A third mechanism of disrupting habits relies on bringing habits back to the conscious domain and critically examining them. For instance, monitoring and giving critical feedback can confront users with their habits (Wood, Quinn, & Kashy, 2002). By the same token, training can help users become critical of their habits (Polites & Karahanna, 2013). Once these interventions are strong and long-lasting enough, users can reduce their reliance on legacy IS habits.

2.3 Legacy IS habits in a socio-technical context

Understanding the role of legacy IS habits requires examining them within the broader context of IS work and change, in which these habits are embedded (Polites & Karahanna, 2013). We define IS discontinuance as a process of information systems change: a process of ‘generating a deliberate change to an organisation’s technical and organisational subsystems that deal with information’ (Lyytinen & Newman, 2008, p. 590). Discontinuance is part of the process of an organisation’s IS renewal, which is ‘inherently paradoxical’ because it requires the simultaneous removal of obsolete technologies (and technological foundations) and implementation of new technologies (Wimelius, Mathiassen, Holmström, & Keil, 2021). This is a socio-technical process, as it is a change that involves four interacting components: actor (which in our study means users of an IS), technology, task and structure (Lyytinen & Newman, 2008). The decision to discontinue a legacy system is then a critical incident, which creates a change in the state of the socio-technical system and can lead to a gap or misalignment among the four components in the system (Lyytinen & Newman, 2008).

For examining the role of legacy IS habits in IS discontinuance, we explicitly consider the larger socio-technical context in which the habits are embedded. Our interest lies in the habits that users develop in relation to technologies as they are involved in particular tasks and that are influenced by the larger structures in which they are embedded. Accordingly, we conceptualise the components of the socio-technical system as conditions that shape the role of legacy IS habits in the discontinuance process.

Regarding the users, studies on IS implementation and resistance suggest psychological variables that play a role in users’ acceptance of or resistance to an IS change. For instance, Laumer et al. (2016) focus on users’ dispositional resistance to change, which has four dimensions (Oreg et al., 2008): (1) routine seeking, the preference for stable and routine environments and avoiding novelty; (2) emotional reaction, the extent to which individuals have negative feelings such as stress and uncertainty in response to a change (Murungi, Wiener, & Marabelli, 2019); (3) short-term focus, the focus on direct inconveniences over potential long-term benefits of the change, and (4) cognitive rigidity, the unwillingness to consider alternative ideas and perspectives. As we have previously argued, IS habits can lead to resistance because they are related to users’ status-quo bias. Routine seeking is explicitly described in terms of a ‘reluctance to give up old habits’ (Laumer et al., 2016, p. 69), and cognitive rigidity reflects a lack of openness for anything that deviates from the status quo. Although all four dimensions are relevant in understanding user resistance, these two are especially relevant as they explicitly relate (dispositional) resistance to IS habits. Thus, a user’s dispositional resistance to change is likely to influence their perception of an IS change (as either an opportunity or a threat), which determines whether they are willing and/or able to let go of their extant habits or will stick to these habits and resist the change actively or passively (Bhattacherjee, Davis, Connolly, & Hikmet, 2018).

There is also a collective dimension to resistance, when we consider the ‘work culture’ in an organisation—the shared meanings of experience that are developed through ongoing, day-to-day social interaction among people in the workplace (Green, 2005). Work culture can trigger resistance to IS change (Robey, Ross, & Boudreau, 2002): a
work culture that is traditional, formal and rule-based can imply more routine seeking and cognitive rigidity and thus a stronger status quo-bias and an emphasis on habits, than one that is innovative, creative and informal. Especially, when a legacy IS is replaced with an IS that does not fit with the established work culture, this can be a significant source of users’ resistance to abandoning their habits (Bartis & Mitev, 2008; Ferneley & Sobrepererez, 2006; Jackson, 2011).

As for the technology, research on IS change consistently finds that ease of use of a new IS is a strong determinant of users’ willingness to accept a new system (Bhattacherjee & Hikmet, 2007; Laumer et al., 2016). The ease of using a new system will be much higher for a user if the interface and operation of a new system are similar to those of the legacy system (Polites & Karahanna, 2012, 2013). Having developed particular habits in relation to a system makes that system easier to be used, compared to a new system that requires users to abandon their current habits and learn new ways of working. Thus, legacy IS habits contribute to the perceived ease of use of a system (even if a new system might be more user friendly by any standard) and thus can play an inhibiting role in the discontinuance process.

Concerning tasks, there is a wealth of literature on the importance of task-technology fit (Goodhue & Thompson, 1995; Larsen, Sørebø, & Sørebø, 2009; Yang, Kang, Oh, & Kim, 2013) in explaining the acceptance, use and continuance of IS. In general, these studies find that when technological capabilities of a system match the tasks that users must perform, these users perceive the system to be useful and thus accept, use and continue working with it. This match is dynamic, something that a user establishes over time and that changes as tasks and technologies change. Discontinuance of an IS may discard the learning that users have developed, requiring them to re-establish a fit between a new system and possibly changing tasks embedded in that system (Fang, Chan, Brezinski, & Xu, 2005; Gill, 1996). Thus, the nature of tasks and the way they change due to the discontinuance are likely to influence the role of legacy IS habits in the discontinuance process. The new IS may place requirements on tasks, which make them more or less challenging, interesting, complex, creative and interactive. The extent to which users perceive these changes as positive or negative will influence the degree to which they want to stick to their existing habits or are willing to discontinue them (Lankton, Wilson, & Mao, 2010; Polites & Karahanna, 2012).

The structure component of the socio-technical system influences the change through the alignment or misalignment between institutional arrangements in the organisation and users’ needs and requirements during the change. In line with our focus on the organisational work system (Alter, 2002; Lyttinen & Newman, 2008), our main attention here goes to the way work is structured in the organisation. As Polites and Karahanna (2013) argue, users’ habits are embedded in their higher-level work routines, in task sequences that are frequently practiced in largely consistent ways. It can be assumed that the role of these habits will be stronger when work is more structured and standardised, which means that work is characterised by frequently repeated routines, without conscious thought (de Guinea & Markus, 2009). When work is more flexible, ad-hoc, based on dynamic interactions with various other actors, and tailored to different and changing situations, the role of habits in the use of IS is likely to be less prominent.

Integrating the literature on IS habits with the literature on IS change provides a rich contextualisation of the role of IS habits in IS discontinuance. The picture that emerges from our overview of this literature is that legacy IS habits primarily inhibit the adoption of new systems and the discontinuance of legacy systems: the more users rely on their legacy IS habits, the stronger their status-quo bias is, the more they will resist the IS change and the less open they are to developing novel ways of working with new systems (Polites & Karahanna, 2013). We question this assumption by exploring whether legacy IS habits indeed play only an inhibiting role in the discontinuance process or that legacy IS habits can also play other roles in transition from legacy to new systems. We seek to empirically investigate these questions in our study. Our empirical inquiry shows that legacy IS habits may not only inhibit the discontinuance of legacy IS but can also facilitate this process and act as a bridge towards a new system, depending on the specific configuration of the socio-technical conditions.
3 | METHODS

In this section, we first describe the empirical setting of our research, then we report how we collected and analysed data.

3.1 | Empirical setting

We adopted a longitudinal case-study approach (Yin, 2014), which allowed us to capture the events, actions and users’ behaviours during the discontinuance process. We examined two organisations, both attempting to discontinue and replace their core legacy systems, through which they were performing and coordinating their daily tasks. In both cases, the legacy systems had been in use for a long time, and users had developed a wide range of mental and behavioural habits. Besides being comparable in terms of the centrality of the legacy IS and the richness of legacy habits, the cases represented different socio-technical conditions in which the legacy habits are embedded. Therefore, comparing them enabled us to examine how the role of legacy habits is shaped by the IS change conditions (Lyytinen & Newman, 2008). See Table 1 for an overview of the cases.

3.1.1 | The discontinuance process at MortCo

The first case concerns the replacement of a core workflow-management system in a large, Dutch mortgage company, which we call ‘MortCo’. MortCo was founded in 1997, in the Netherlands, and is currently operative also in Belgium and Germany. Since 1998, MortCo has been using a mortgage management system (‘OldMort’). In 2007, the company merged with another mortgage firm, which had a more modern system (‘NewMort’). Although each part initially kept using its own system, in early 2015, MortCo decided to completely discontinue OldMort and migrate its 40 users to NewMort. The aim was to consistently comply with new regulations regarding the mortgage and repayment procedures and to reduce the operation and maintenance costs. The users had been using OldMort for around 18 years and developed many habits in working with the system.

In early 2015, users first heard rumours about OldMort being discontinued. Some users did not take these seriously because the discontinuance had been announced a few times before. However, after 1 month, a message was sent around, detailing how OldMort would be discontinued and when the conversions would take place. Management arranged meetings with each user to further discuss their individual migration plans.

For about 6 months and behind the scenes, the IT team started analysing, modifying and matching data stored in OldMort to be migrated to NewMort. Experienced OldMort users were asked to help in running tests and correcting data mismatches. In parallel, users were invited to workshops to become familiar with NewMort. The discontinuance team constantly updated the users about the project and engaged them in discussions on how the conversion should be executed. Besides, OldMort users were given the opportunity to sign up for ‘sit-ins’, where they could interact with NewMort users. OldMort users were also encouraged to take part in weekly presentations by the current users of NewMort to get used to their work practices.

When the actual data conversion was approaching, the users had to ensure that they finished the tasks that were due in the period that OldMort was supposed to become frozen. During the freeze period, which lasted approximately 5 days, users were not allowed to perform any activities in OldMort. When a user’s client data were successfully migrated to NewMort, she would receive a message with a training plan and the announcement that she should now move to NewMort. The migration to NewMort directly affected users’ workflow: instead of being responsible for handling the entire mortgage process for a few clients, each user now had to focus on only one or a couple of specialised tasks, for more clients. For instance, one user would be specialised in assessing the clients’ risk-level and the other user would be responsible for preparing the mortgage contracts.
Each time a group of users moved to NewMort, a specific tutor (often an experienced NewMort user) was assigned to support them during the training week. Once the users became able to confidently perform the basic tasks, their tutors assigned them more complex tasks, such as cases with multiple parameters and exceptions. Eventually, all the users migrated from OldMort to NewMort during a period of around 1 year. Around one-third of the OldMort users decided to leave the company, primarily because they felt that working with NewMort requires them to invest in learning a new tool.

### 3.1.2 The discontinuance process at TelCo

The second case relates to a large telecommunications company, which we call ‘TelCo’. The company was founded in 1998 and produces complex transmission and controlling systems for TV broadcasting and telecommunication...
infrastructure. The focus of the study is on the Design department, where around 50 high-skilled hardware designers work in teams of 5 to 20 members, depending on each project. Their work requires a lot of creative decisions and experimenting with new techniques and design choices.

Since the beginning, the designers had been using a core design system, called ‘OldTel’, for setting up a design, simulating and debugging it and eventually creating output that they would send to the production department. Although complex, OldTel was a powerful tool for designing telecommunication devices. OldTel allows the designers to customise, fine-tune and optimise their designs. For instance, to describe a radio transmitter, the basic parts of this device would be coded through basic mathematical and logical operators. Then, the different pieces of code would have to be assembled and debugged by senior designers and project integrators. Typically, the project manager was responsible for documenting the designed product. Since the documentation task was conducted independently from the actual design tasks, problems emerged with incomplete, inconsistent documentation and task coordination. Furthermore, OldTel required sequential execution of design steps, which limited fast iterations in the design process. This proved problematic when TelCo needed to engage customers in an agile, iterative design process. Therefore, TelCo chose to initiate a change regarding their legacy IS.

In February 2009, TelCo identified ‘NewTel’ as a tool that could help the organisation move from low-level design to high-level design. NewTel provided a graphical environment for designing a product by dragging and dropping pre-defined visual components, instead of writing detailed textual codes. The tool was able to support fast iterations among designers, project managers and customers. Furthermore, NewTel could simultaneously produce graphical documentation, which would automatically be updated when the design was modified.

In a meeting with all project managers and senior designers in May 2009, the Design Manager presented the advantages of the high-level approach and ran a demo of NewTel. This met with strong resistance from the attendees. After 2 months, a competition between OldTel and NewTel was organised, showing that each system had some shortcomings and merits. For instance, the low-level approach lacked the capacity to produce understandable documentation, whereas the high-level approach lacked the capacity to customise products.

Consequently, efforts were made to create hybrid solutions by taking some components of OldTel and linking them to the other components of NewTel. As an example, one hybrid solution was created by adding NewTel's visual documentation features to OldTel. It was meant to maintain the core design activities but streamline the documentation process. Two hybrid solutions (one primarily based on OldTel, the other primarily on NewTel) were implemented and used for several pilot experiments for nearly 2 months. This revealed various risks of mixing up two very different design approaches. In particular, constantly changing from writing detailed instructions to working with the graphical components created many errors in the product design. It was concluded that the hybrid solutions were not effective in bridging the gap between the two systems—if anything, they created more confusion and inconsistencies.

Ultimately, two senior project managers defined a series of MS-Word templates for the documentation of products and tweaked OldTel in a way that the designers could easily access these documents during the design process. This way, documentation now takes place during the design process and is graphical, which is easily understood and used by clients and managers. This allowed designers to iterate in the design process and improve the coordination of design routines involving the clients. The Design Manager formally approved this modification for the new projects. He also hired one person and appointed him as ‘documentation manager’ whose responsibility was to inform all project managers and designers about new rules of generating visual documents and to ensure that the documents are properly archived and regularly updated (see Table 2 for the summary of the two discontinuance processes).

The two cases enabled us to examine the various habits of users in relation to the legacy systems and their roles in the discontinuance process. They also offered the opportunity to examine how differences in the configuration of socio-technical conditions (Lyytinen & Newman, 2008) shape the roles that legacy IS habits play in this process. In our case organisations, these configurations were different. At MortCo, tasks were mainly routine and standard; users were oriented towards stable working processes; there was a considerable similarity between the new and
legacy technologies, and work was primarily structured around individual activities. At TelCo, on the other hand, tasks were mainly creative, users actively participated in the change process, the new technology was fundamentally different from the legacy one and the work was structured around collective interaction and collaboration.

### 3.2 Data collection

In both cases, we started the data collection when the discontinuance process had just started. Therefore, the data were collected partly retrospectively and partly as the cases unfolded. Retrospectively, we examined the history of the cases, the way users had been working with the legacy systems and how the legacy systems were embedded in their daily work and the broader structures. Being present inside the cases, we had the opportunity to observe how users worked with the legacy systems on a daily basis and ask them to reflect on their daily work with and through the legacy systems. Through semi-structured interviews with users and change actors, we captured the change story, namely how the change was introduced, what decisions were made, what discussions emerged, what actions were taken along the way and how various users experienced the change and went through it. The interviews were voice recorded and transcribed. Finally, in both cases, we were able to study the new systems that were proposed to replace the legacy ones, examine their features and functionalities and observe how the users worked with them or tried to do so (see Table 3 for an overview of the collected data).

At MortCo, we primarily relied on on-site interviews with the users who had either recently migrated to the new system or were in the middle of the transition. The interviews were often combined with observations of their work. First, 15 exploratory interviews were held to gather background information on the company and extract the chronology of events and decisions that were made prior to and during the discontinuance. In the second round of data collection, we actively collected data by reaching out to 11 users that we selected based on their current engagement in the transition, having at least 3 years of working experience with OldMort (to ensure that they had already developed habits with the legacy IS) and having differential experiences and positions (in favour or against) regarding the legacy system. These users were selected to represent the heterogeneity of the users in terms of their experience with the legacy IS and their engagement with the change process (to represent the heterogeneity of the 40 users of the MortOld). During the interviews, we asked about the ways they used to work with the legacy system, their experience at different points during the transition process and their feelings, thoughts and actions throughout

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**TABLE 2** Overview of the discontinuance processes at MortCo and TelCo

| MortCo | TelCo |
|--------|-------|
| **Initiation:** Mandated discontinuance, though delayed for several years. NewMort was already implemented and used by a group of users in another part of MortCo. | **Initiation:** Voluntary discontinuance, proposed and pushed by the top management, aimed to replace OldTel |
| **Discontinuance process:** Several rounds of migrating users, mainly based on data transfer schedule, some users took a longer time to learn: 1. Introducing the change to the users, informing them about the change plan; 2. Arranging sessions to learn how to work with NewMort. 3. Terminating the work with OldMort and freezing it when the data is migrated. | **Discontinuance process:** 1. Major opposition at the beginning. 2. Attempts to create hybrid solutions by combining some components of the legacy and new systems (to reduce the gap between the systems). 3. Discarding the hybrid solutions and eventually adapting OldTel with some components of NewTel. |
| **Outcome:** Half of the users left the company in the transition (especially those who had limited ability and interest in moving to the new system), eventually leading to complete discontinuance. | **Outcome:** Eventually modifying OldTel by adding a feature that mimicked the documentation feature of NewTel. |
the discontinuance process. We conducted these interviews mostly inside their working offices, enabling us to ask the interviewees to give examples of their daily work with the legacy and new systems. This way, our interviews were enriched with both the reflections of the users on specific habits in working with the legacy IS and observing the examples that they showed us during (and sometimes after) the interviews.

At TelCo, we had the chance to observe the change process from inside, since one of the researchers had a formal position inside the company as a senior project manager. He used to be one of the senior designers and, at the beginning of the change process, was tasked by the head of Design department to explore the possibility and feasibility of replacing OldTel and track the progress of the change and document it on a daily basis (captured through 150 pages of field notes). Another researcher, with no affiliation with the company, conducted 18 interviews with the users and active actors in the change process to understand how they had been working with the legacy IS and how they went through the change process. Following the case for 1.5 years and examining the change process from both inside and outside (Bartunek & Louis, 1996) offered a rich account of how the discontinuance process unfolded over time and how users experienced and worked with their legacy habits.

3.3 | Data analysis process

For both cases, we analysed the data through three main steps. First, we constructed the discontinuance process by mapping the key events (e.g., announcing the discontinuance plan), actions taken by different organisational actors (e.g., the managers and change leaders) and the reactions of the users over time. Thus, we integrated the data from multiple sources chronologically to understand how the process was initiated, progressed through different phases and eventually resulted in certain outcomes regarding the discontinuance of the legacy IS (see the section ‘Research Setting’ for an overview of the two discontinuance processes). To analyse the distinct temporal conditions, we identified natural phases in each case through which the discontinuance process unfolded (Langley, 1999).

In the second step, we focussed on the legacy IS habits. Habits are generally difficult to capture because users often do not notice them during their work. Yet, when users are asked to use a new technology and change their

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### TABLE 3  Overview of the data collection

| MortCo                      | TelCo                      |
|-----------------------------|----------------------------|
| **Exploratory interviews and site-seeing (February 2017 and April 2017)** | **Observations (January 2009-August 2010) ~320 hours (~150 pages of field notes)** |
| **Team Leader Mortgage**   | **First author personal notes and observations Meetings with design manager (8 meetings)** |
| **Functional manager**     | **Implementation progress meetings (32 meetings)** |
| **Program Manager**        | **Implementation events, for example, introducing the demos and launching the competition (5 events)** |
| **OldMort user**           | **Daily work observations (~36 hours weekly)** |
| **IT developer**           | **In-depth user-focussed interviews (11 interviews, av. 50 minutes)** |
| **Team Manager**           | **Formal interviews (18, av. 60 minutes)** |
| **Former OldMort back-office users** | **Design manager (2)** |
| **Combined with observing how users worked with the legacy and the new systems** | **Senior designers and project managers (9)** |
| **Documents (10 main documents)** | **Junior designers (4)** |
| **Strategic reports, online news articles, documents on the company website, OldMort manual** | **Program coordinator (1)** |
| **In-depth user-focussed interviews (11 interviews, av. 50 minutes)** | **HR manager (2)** |
| **Documents (~140 pages in total)** | **Documents (~140 pages in total)** |
| **Monthly reports on implementation (~40 pages)** | **Monthly reports on implementation (~40 pages)** |
| **Background documentation on the company structure, strategy, procedures (~50 pages)** | **Background documentation on the company structure, strategy, procedures (~50 pages)** |
| **Product design software documentation on OldSoft and NewSoft manuals (~50 pages)** | **Product design software documentation on OldSoft and NewSoft manuals (~50 pages)** |

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work, they become aware of their habits (Simon, 1945). We had the opportunity to interact with the users during the change process. Therefore, through both formal and informal interactions, we asked them to show us how they used to work with the various parts and functions of the legacy system and reflect on how these habits impacted them in their transition from the legacy to the new system (e.g., asking ‘can you still do the same activity when using the new system?’ and ‘how do you feel now when you are using the new system?’). Following our conception of habits, we looked for the (1) stable ways of thinking about and working with a system (e.g., ‘I would often send a message to my manager on Friday evenings to ask for access to the system during the weekend’), (2) the triggering features and functions of the legacy IS (e.g., ‘the possibility of modifying the repayment instalments through the software’) and (3) how this behaviour had been an autonomous way of working with the system (e.g., ‘this has been the way in which I have always introduced the data of a mortgage request into the system, for the last 5 years’).

By outlining the legacy habits of users, we coded for how these habits impacted the users’ reaction to the change, namely how they supported or hindered their departure from the legacy IS and working with the new IS. By iterating between our data and the literature, we articulated three generalisable roles that legacy IS habits played in the discontinuance processes: (1) inhibiting: when old system habits create attachments between the users and the legacy system that inhibit the discontinuance process, (2) bridging: when old system habits that are relevant in using the new system help the user to depart from the old system and adopt the new one and (3) deterring: when old system habits make the user feel negative about the old system and, therefore, make them feel less attached to it.

In the third step, we examined how and when each of these roles emerged in the two cases. Sensitised by our contextualisation of IS habits as embedded in socio-technical systems (Lyytinen & Newman, 2008), we examined how the different conditions regarding the nature of users’ tasks, users’ experience with the legacy system and the change, the technological characteristics of the legacy and new systems and the way work is structured. We identified combinational conditions (configurations) that explained when certain roles may emerge and how they shape the discontinuance process. We do not assume simple causal relationships between conditions and the role of IS habits. Instead, we were inspired by configurational perspective (Liu, Mezei, Kostakos, & Li, 2017; Zimmermann, Raab, & Zanotelli, 2013) to examine how certain configurations of conditions might explain the roles that IS habits play in the discontinuance process. Cross-case analysis enabled us to explain how the case conditions facilitated the emergence of these roles and the way these roles and their interactions shaped the discontinuance process (see Figure 1).

3.4 Three roles of legacy IS habits in the discontinuance process

In this section, we describe the three roles that legacy IS habits played during the discontinuance process and empirically illustrate them. We explain how different conditions shaped the emergence of these roles and their impacts on the discontinuance process across the two cases.
The most vivid role of legacy habits is inhibiting users’ discontinuance of the legacy IS because of their tendency to rely on these habits. Therefore, users hesitate, delay or avoid the migration to the new IS because their habits were inconsistent with the new system (see Table 4).

At MortCo, a majority of the users had been accustomed to using their mouse for almost all interactions with the system and most of the data entry. Thus, they developed visual and bodily habits of automatically moving the mouse towards the intended menu and constantly clicking. ‘We were used to it and knew actually where to click to, e.g., extract information, create a new account or edit information, without actively using our brain’, said an OldTel user.
Nevertheless, in NewMort, the primary way of executing functions was based on keyboard shortcuts (e.g., pressing ‘Ctrl+O’ for opening a new application case). Hence, the habit of automatically moving the mouse was now futile and often caused problems (for instance, users placing the cursor on the wrong part of the interface). To avoid these problems, OldMort users had to constantly move their hands away from the mouse and, instead, press the correct keys. It took quite some effort to make this switch. Noticing these habits in practice initially made the users anxious about the migration to NewMort—not necessarily because they were not willing to work with the new system nor because they were not motivated to stop using OldMort, but because they found it ‘just difficult to not touch the mouse and move it across the screen’.

Sometimes users were reluctant to drop certain habits not because they wanted to reduce their effort but because the legacy habits were actually more complex and challenging than the way NewMort required them to work. To illustrate this, a difference between OldMort and NewMort was the way the workflow of assessing, approving, managing and closing a mortgage was assigned. In the OldMort system, each expert was responsible for the entire workflow for a set of clients: ‘There, you had your clients, and everything about their mortgage was up to you to handle’. In the new system, each expert was responsible only for a particular step (e.g., only assessing the eligibility), instead of the entire mortgage workflow. The users were often unhappy with this change, as they were attached to their perception of mortgage management as an integrated process for which they were responsible. For them, managing the entire process was more interesting and challenging; whereas the way of working imposed by NewMort would make their work more boring because of the lack of diversity in their tasks. They were used to making trade-offs among different decisions in the various steps of the mortgage, so that overall, they would feel that the case was handled properly. With NewMort, they had to constantly prevent themselves from modifying the decisions and actions made in the preceding and proceeding steps of the workflow (which now should be done by their colleagues).

Given that most of the functionalities of OldMort and NewMort were similar and the tasks of the users did not change in principle, the frequency of relying on these habits and their inhibiting role gradually decreased as these users had limited opportunities to exercise them and were forced to learn new habits in relation to the new system. Even then, users faced situations where they mistakenly lapsed back to their legacy habits (which users referred to as moments of ‘oops!’).

At TelCo, the inhibiting role of legacy habits was salient and persistent throughout the entire process. The designers found it very challenging to embrace the high-level approach because they had developed strong habits of thinking and working based on low-level design. These users had internalised the process of product design as consisting of detailed micro-steps and were used to working on the details of their design to customise and optimise their products.

This is clearly exemplified by designers’ habit of ‘concurrent programming’. They had been trained for years to ‘be able to see what happens to all the connected chips on the board’. This way of thinking had to be applied to writing the instructions, when using OldTel for defining the product. ‘Although, you write one line of instruction after another, you have to be able to feel how the electric signals fire the chips simultaneously, when you connect the device to the power supply’ (emphasising ‘simultaneously’). Working with NewTel, however, was based on a completely different logic: sequential execution of the instruction: ‘Here (in NewTel), when you put one component first, it means that it will be executed before the next one’ (stressing ‘before’). This stark difference in the programming habits caused major errors and mistakes when some of the designers tried to experiment with NewTel.

The significance of the inhibiting role led most of the designers to initially oppose the replacement of OldTel. Although it was more complex to use OldTel, this was actually what they found interesting and engaging in their work: seeing each design project as a new challenge to ‘deal with complexities of signals and interconnections’ and ‘yet find a novel way to still design an optimum product’ (a senior designer). Even the attempts to produce hybrid solutions did not help much to close the gap between the different habits of working required by the two systems. In fact, relying on the legacy habits for working with a hybrid solution proved to be dangerous since the users were prone to mix up very different logics of designing a product. Metaphorically, it seemed like driving in a city where both right-
lane and left-lane driving are simultaneously allowed. Later on, the users found it more feasible to keep OldTel but only modify it with some more systematic documentation, which did not require major changes in their working habits.

Overall, the inhibiting role of legacy habits at MortCo stemmed from the fact that users were (initially) loath to depart from their existing mode of operation. Although this was noticeable in their early exposure to the NewMort system, they gradually discovered that the differences between the two systems were not significant. Most of the working processes and features of the two systems were similar, and MortNew actually even was simpler in terms of choices they could have in managing a mortgage. Therefore, the inhibiting role gradually faded away as they learned how to work with NewMort.

In contrast, the inhibiting role of legacy habits at TelCo was strong from the very beginning and remained salient throughout the process. This was largely due to the major differences between OldTel and NewTel, which were based on two distinct design approaches. Interestingly, the inhibiting role of legacy habits was not because the users hesitated to learn new habits (as they already tried to experiment with NewTel), nor because they wanted to minimise their effort and conscious practices. In fact, working with OldTel was preferred because it was more challenging for them, requiring them to engage in any project as a novel, creative exercise, whereas working with NewTel implied a much more routine, simple work.

3.6 Bridging role of legacy IS habits

The second role of legacy IS habits is a bridging role, where relying on their habits actually supported the users in migrating from legacy to the new system. This role emerged when certain habits, which although were initially developed for working with the legacy IS, were still effective for using some functions of the new IS. In these situations, the habits acted as a common ground, upon which users were able to work with the new system (see Table 5).

At MortCo, the new system was built in line with the same workflow as OldMort. Hence, detailed activities such as assessing the mortgage applicant and calculating the interest rate were similar. Therefore, users found it helpful to rely on the same mental and working habits. This significantly reduced their effort in migrating to the new system: ‘It is exactly the same system, but in a different format’ (a former user of OldMort). For example, to create a new client account, one should always fill in the general information first, before proceeding to the detailed mortgage details, and lastly create an account number for the client. This bridging role was further supported by the work culture, which favoured working based on standard templates and predefined procedures. This standardisation was even stronger in NewMort: working on a narrower range of tasks enabled them to seek a higher level of consistency across clients.

The bridging role was helpful mainly in the middle of the process, when users were learning how NewMort worked, for establishing a common ground between OldMort and NewMort, in order to start experimenting with the new system. However, users sometimes expected too much from the bridging role of their habits, assuming that relying on these habits is sufficient for an effective use of the NewMort. This expectation obviously was not met later in the process, when they had to learn habits that were specific to the new system.

At TelCo, the bridging role was initially negligible, since the two systems required very distinct mental and practical habits regarding the design of hardware devices. However, the creation of hybrid solutions enabled the users to rely on some of their legacy habits for working with the hybrid systems. The idea of creating one of the hybrid solutions was that the users would be able to implement high-level design by dragging and dropping pre-defined components visually, but at the same time double-click on each component and use their low-level programming skills to further customise the design. Having such a hybrid system allowed the users to see the possibility of carrying part of their habits to the hybrid systems. As the Design Manager said, ‘we initially had the idea to make these designers, who are so crazy about detailed programming and optimisation, work with a hybrid solution in which they could both do what
Bridging role: When the habits that have been initially developed for working with the legacy system become also relevant for using the new system.

| Empirical examples | MortCo | TelCo |
|--------------------|--------|-------|
| **Execution and administration of mortgage tasks**: the habits of performing mortgage administration tasks such as assessing proposals, scoring the risk, approving the mortgage, controlling payments and their sequences were still relevant for working with NewMort because both systems were designed according to the same tasks and workflow. | - Integration and holistic design: the habit of unconsciously connecting the signals, and checking the interfaces for integrating the components of the product was also relevant for using NewTel: ‘after all, we are doing the same design job, defining the functionalities, designing the components, and integrating them’ (a project manager) |
| **Analysis of the mortgage cases**: the habits of selecting certain informational clues for checking critical aspects of a mortgage proposal (checking specific numbers and information in the application form) for assessing the application was relevant for using NewMort (which used the same format of structuring and presenting information). | - Heeding design quality: the habit of having a focus on detailed quality criteria for designing effective functionalities and stable performance under various working conditions was also relevant for designing products in NewTel. |

| Shaping conditions | MortCo | TelCo |
|--------------------|--------|-------|
| **Similarity between OldMort and NewMort**: many similarities in terms of procedures and sequences of work, the parameters of the mortgage, the formula for calculating mortgage risks, the templates for communicating with the clients, etc. | - Major difference between OldTel and NewTel: limited the range of legacy habits that were still relevant for working with the new system. |
| **Users’ orientations towards stability**: supported users to keep their legacy habits and transfer them to the new system (instead of seeking new habits and practices). | - Users’ openness towards change: the active engagement of the users in the change process and their attempts to modify the technology and create hybrid systems for which some of their legacy habits can be still relevant (eg, making a hybrid version in which they can still use their coding and micro-optimisation). |
| **Routine, standard tasks**: most of the mortgage tasks and their relations are standard and rather routine, since they are clearly defined as steps, with clear check-boxes and templates; thus, helping them to automatically use their legacy habits (with limited cognitive load). | |

| Impacts on the discontinuance process | MortCo | TelCo |
|--------------------------------------|--------|-------|
| **Early on**: creates an initial momentum to make users try the new system and start from the ‘common’ aspects (acting as a bridge). | - Early on: some general design habits motivate the designers to consider practicing with NewTel. |
| **Later on**: can create the expectation that all legacy habits can be replicated in the new system (over-stretching the old to the new). | - Halfway: triggering the users to create hybrid solutions in which some of their legacy habits are still effective. |
they were used to do and see the other possibilities of designing a product through visual, high-level design. I thought if they taste the sweetness of high-level design, they would gradually drop their micro-design approach’.

However, the bridging role of legacy habits vanished at TelCo when the designers and managers realised that having hybrid systems, which allowed users perform both legacy habits and the habits of high-level design, was very much error-prone and created a lot of confusion and inconsistencies. At the same time, the strong attachments to the low-level design habits did not diminish over time, leading users and managers to revert back to OldTel.

3.7 | Deterring role of legacy IS habits

The third role of the legacy IS habits is a deterring role, where users start perceiving the habits they developed in working with the legacy IS as dysfunctional, as behaviour they might want to stop. Hence, the role of habits here is to deter users from using the legacy system, as they want to abandon their ineffective and sometimes counterproductive behaviours. This role emerged in our findings as users referred to some habits in their legacy IS use as ineffective and counterproductive and reported that the introduction of new systems made them aware that a new IS enabled more effective and interesting ways of working (see Table 6).

At MortCo, there were a few habits, which over time became cumbersome and rather ineffective to many users. As an example, OldMort users reflected on situations in which they wanted to work outside office hours (eg, during the weekend or in the evenings). For some users, these hours were quite frequent and actually part of their regular working time (especially those who were dealing with sensitive clients). Every time they had to perform a task via OldMort, they had to launch an emergency request. Unless they were given permission by the organisation, they were not able to work on their tasks. An OldMort user mentioned that the approval was not always given, which meant that they were sometimes unable to process emergency requests in the evening or during the weekend. The users indicated that this was a habit that they would drop as soon as possible because they found it ‘inconvenient, cumbersome and outdated’ (he added).

The users recognised the deterring role of some of their habits during the second phase when the training and sit-in sessions required them to critically re-examine some of their habits vis-a-vis the alternative ways of working with the new system. For instance, users reflected on the fact that they had become accustomed to waiting for 10 minutes to have the system be loaded on their computers. This waiting time had been an expected part of their morning routine, though in principle, it was ‘nothing but annoying’. At the same time, this waiting time has been an expected period for the users during which they were making their morning coffee and socialising with their colleagues. Seeing that NewMort loaded much faster made them critical towards their waiting habit and therefore more willing to abandon OldMort. Interestingly, after the transition, the same users realised that they were missing their daily habit of ‘morning socialisation’, leading them to wonder ‘where is my coffee time’!

At TelCo, the deterring role was clear in the case of documentation habit. Over the years, designers were used to jotting down short, scattered lines of comments inside the design files, instead of developing standard, understandable documents. This documentation habit caused a lot of burden for checking many details to remember how they designed the products. These habits were rather widespread across the entire department, making it very difficult for the project managers to review and assemble the sub-components. ‘A major part of my time goes into asking the designers to explain to me how they defined the signals and what assumptions they had when they were connecting a multiplexer with a filter’, said one of the senior project managers. Project managers had to spend some more time to create understandable documentation for clients. The major challenge was when the clients came back with change or maintenance requests. Going back to the design, detecting the problems and fixing them was yet ‘another nightmare, unless you ask the same person, who designed that particular component in the first place, to fix it’ (he added).

Over time, the designers and managers developed resentment towards these habits, which hampered their working process and hindered their effective interactions with clients. Even the designers became critical of their own documentation habit: ‘It feels easy to skip documentation when you are so much engaged in writing your
### Deterring role: When habits that are specific to the legacy system motivate users to become critical of, and willing to discontinue, the legacy IS.

| MortCo                                                                 | TelCo                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| **Empirical examples**                                                 | **Empirical examples**                                                 |
| · Asking for remote and outside-office-time access: to work outside the office or outside the official working hours, users were accustomed to applying for exceptional access to the system, but they perceived this as a waste of time and unnecessary action. | · Casual documentation: users would only write a few sentences about the design and their assumptions inside the code. |
| · Morning socialisation: the habit of having a wait time early in the morning while the system was starting up—users resented this unnecessary delay, but at the same time, valued it as time for making coffee and socialising with colleagues, ‘It feels to me that I am missing my morning coffee time because the new system loads so quickly’ (An OldMort User who started working with NewMort). | · A lot of interactions and guessing about the assumptions and choices made by others as a way to compensate for the lack of systematic, consistent documentation. |
| · Casual documentation: users would only write a few sentences about the design and their assumptions inside the code. | · Redesigning the code of the old products, instead of improving their original code: often because understanding and tweaking the original code were too difficult due to the lack of systematic documentation and the different personal styles of coding. |
| · Redesigning the code of the old products, instead of improving their original code: often because understanding and tweaking the original code were too difficult due to the lack of systematic documentation and the different personal styles of coding. | |
| **Shaping conditions**                                                 | **Shaping conditions**                                                 |
| · System shortcomings: the legacy system had some shortcomings in supporting the tasks that users needed to perform. | · System shortcomings: the legacy system had some shortcomings in supporting the tasks that users needed to perform. |
| · Users’ orientations towards stability: reduced the deterring role by justifying the dysfunctional habits as part of the status-quo. | · Users’ orientations towards stability: reduced the deterring role by justifying the dysfunctional habits as part of the status-quo. |
| · Routine nature of tasks: users felt the deterring role of habits when they tended to stick to them, despite recognising them as dysfunctional. | · Routine nature of tasks: users felt the deterring role of habits when they tended to stick to them, despite recognising them as dysfunctional. |
| · Creative nature of tasks: led the designers to find a way to decouple the dysfunctional habits from the creative design habits; also having creative, engaging work led them to tolerate some of the dysfunctional habits (eg, linear design process). | · The shortcomings of OldTel for creating understandable documentation. The difference between OldTel and NewTel exposed the dysfunctional habits and their impacts (eg, in documentation habit). |
| · The shortcomings of OldTel for creating understandable documentation. The difference between OldTel and NewTel exposed the dysfunctional habits and their impacts (eg, in documentation habit). | · Users’ orientations towards change: strengthened the deterring role since they were willing to find ways to ditch the dysfunctional habits. |
| · The collective structure of the work, causing other colleagues to realise the deterring role of habits when their peers developed resentment about these habits. | · Creative nature of tasks: led the designers to find a way to decouple the dysfunctional habits from the creative design habits; also having creative, engaging work led them to tolerate some of the dysfunctional habits (eg, linear design process). |
| **Impacts on the discontinuance process**                               | **Impacts on the discontinuance process**                               |
| · Early on: initial willingness to discontinue the legacy system and adopt the new one; yet | · Early on: initial willingness to discontinue the legacy system and adopt the new one; yet |
| · Later on: realisation that actually breaking habits is not easy and discovering a natural tendency to lapse back to them in practice. | · Early on: triggering managers and many of the designers to consider the possibility of replacing OldTel. |
| · Early on: triggering managers and many of the designers to consider the possibility of replacing OldTel. | · Halfway: leading to design of hybrid solutions so that these habits would not be reinforced/exercised. |
| · Later-on: leading users to modify OldTel in so that some of the dysfunctional habits would not be reinforced/exercised. Unintentionally lapsing back to these habits (eg, incomplete documentation). | · Later-on: leading users to modify OldTel in so that some of the dysfunctional habits would not be reinforced/exercised. Unintentionally lapsing back to these habits (eg, incomplete documentation). |
instructions and testing the signals, but it comes back into your face sooner or later when you are asked to debug your work or transfer it to a colleague’, said a junior designer.

The deterring role of the documentation habit triggered the designers to initially consider the replacement of NewTel. During the transition, hybrid solutions were developed to integrate the visual documentation component of the NewTel with the components of OldTel. Even though NewTel was not adopted, the disadvantages of their documentation habit were so strong that led the designers to modify OldTel to support a form of visual documentation. As the Design Manager said, ‘the main gain that we had in this process was that we eventually changed our ineffective documentation practices’.

The deterring role of legacy habits often catalysed the initial willingness to discontinue the legacy systems; yet, sometimes users found it difficult to abandon the legacy system in the actual context of working with the new system. Then, they realised that, although they had strong reasons to abandon these habits, they still automatically lapsed back to them in practice, unless they were constantly reminded and would make conscious efforts to work differently.

To summarise, the two cases show how the three roles of legacy habits emerge differently under different socio-technical conditions (see Table 7). In each case, we see a specific configuration of tasks, technologies, users and work structure. These roles evolve during the discontinuance process and shape the way this process unfolds. In the MortCo case, the bridging role was relatively strong, which led the users to gradually move to the new system and learn how to work with it. However, at TelCo, the deterring role (eg, related to documentation habit) initially triggered the users to engage with the change, yet the inhibiting role of legacy habits (mainly related to low-level design) prevented them from discontinuing OldTel. Instead, they experimented with hybrid combinations of the old and new systems and eventually modified the legacy system.

4 | DISCUSSION

We examined how legacy habits play different roles in the discontinuance process and how these roles are shaped by the socio-technical conditions in which the habits are embedded. Comparing the cases reveals that certain socio-technical conditions explain the emergence and strengths of the roles that legacy habits play in the discontinuance process. First, the similarities and differences between legacy and new technologies in terms of features and functionalities determined whether the legacy habits could play a bridging role or an inhibiting role. Secondly, the extent to which users embrace the change in their existing working habits or prefer keeping their learned habits impacts the strength of the inhibiting role. Users’ orientation towards change can strengthen the deterring role of legacy IS habits, especially when users are inclined to explore and experiment with novel ways of working, compared with their legacy ones. Third, our analysis shows that the nature of the tasks around which users developed legacy and new habits influence the roles of these habits. In particular, being engaged in routine tasks, compared with creative engaging tasks, can shape the roles of legacy habits. Finally, regarding the way work is structured, we found that whether the work is structured collectively or individually can impact the roles of legacy habits and their strengths during the discontinuance process.

4.1 | The impact of socio-technical configurations on the roles of legacy IS habits

Although each of these conditions can impact the roles of legacy habits, our case study shows that the specific combinations of these conditions offer a richer explanation of how (strongly) the three roles emerge and shape the discontinuance process (Figure 1). In fact, each case represents a specific configuration of socio-technical conditions (Lyytinen & Newman, 2008). At MortCo, tasks are primarily standard and routine, the new technology shares significant similarities with the legacy one in terms of the functionalities and features; users are oriented towards stable,
standard working conditions, and their work is primarily structured around individual tasks. At TelCo, however, tasks are primarily creative, users actively participate in the change process, the new technology has major differences with the legacy one and their work is structured collectively, relying on intensive collaborations. These different socio-technical configurations allow us to explain the different ways the legacy IS habits shaped the discontinuance process. We can further explain how certain configurations of these socio-technical conditions facilitated the emergence of each role (see Table 8).

The inhibiting role becomes prominent when the new and legacy technologies are different and the users are oriented toward keeping the legacy habits that are inconsistent with using the new system. The inhibiting role at MortCo was generally limited to a few habits since the new and old systems were largely similar. Yet, the fact that users were generally oriented towards stable, standard working conditions, in which change in their working system was an exception, led to the inhibiting role of some legacy habits. However, the strong inhibiting role at TelCo was primarily driven by the major difference between the legacy and new IS and the fact that working with the new technology required the users to give up their challenging, interesting design tasks and get used to more straightforward and routine tasks (eg, dragging and dropping pre-defined components). Nevertheless, the openness of TelCo employees to experiment with new systems reduced the inhibiting role by encouraging users to explore alternative habits. Comparing the two cases, we see that the inhibiting role is strong when there is a significant difference between the legacy and new IS (making many legacy habits irrelevant or inconsistent with new technology); the users are oriented towards keeping their current IS work (leading users to stick to their legacy habits), and the users are becoming engaged in less engaging habits as the result of discontinuance.

**TABLE 7 Cross-case comparisons**

| MortCo | TelCo |
|--------|-------|
| **Socio-technical configuration of IS change context** | **Socio-technical configuration of IS change context** |
| - Tasks: routine and standard. | - Tasks: creative, complex. |
| - Technologies: limited differences between the legacy and new technology. | - Technologies: major differences between the legacy and new technologies. |
| - Users: mainly used to standard working conditions and adhering to routines; limited knowledge and skills about the technological details of their working systems. | - Users: mainly seeking challenge and complexity in their work; having the skills and resources to tinker with their working systems. |
| - Work structure: Individual, structured around standard workflow. | - Work structure: collaborative, project-based work; requiring a lot of coordination and interaction during the design project. |
| **Roles of legacy IS habits** | **Roles of legacy IS habits** |
| - Inhibiting (easy default): several habits regarding the way of working with the interface, making it comfortable and automatic to work in the old system. | - Inhibiting: a wide range of habits regarding how to think about the design process, how to introduce it and how to debug and test it, which all made it challenging and creative to design. |
| - Bridging: various habits mainly regarding the logic and procedures concerning tasks (mortgage process). | - Bridging: limited to only a few basic conceptual definitions about the hardware design (eg, what a ‘multiplexer’ is). |
| - Deterring: mainly in ways of getting access permission to work with the system. | - Deterring: mainly the habit of ‘documentation’, creating problems for the managers (the designers were not directly impacted). |
| **Consequences for IS discontinuance** | **Consequences for IS discontinuance** |
| - Gradual, consistent replacement of the legacy system. | - A lot of attempts to develop and experiment with hybrid systems. |
| - Users who found the change unfavourable, left the company. | - Eventually adapting the legacy IS based on some of the features of the new system. |
| - Complete replacement of the legacy IS | - Not discontinuing the legacy IS |

The inhibiting role becomes prominent when the new and legacy technologies are different and the users are oriented toward keeping the legacy habits that are inconsistent with using the new system. The inhibiting role at MortCo was generally limited to a few habits since the new and old systems were largely similar. Yet, the fact that users were generally oriented towards stable, standard working conditions, in which change in their working system was an exception, led to the inhibiting role of some legacy habits. However, the strong inhibiting role at TelCo was primarily driven by the major difference between the legacy and new IS and the fact that working with the new technology required the users to give up their challenging, interesting design tasks and get used to more straightforward and routine tasks (eg, dragging and dropping pre-defined components). Nevertheless, the openness of TelCo employees to experiment with new systems reduced the inhibiting role by encouraging users to explore alternative habits. Comparing the two cases, we see that the inhibiting role is strong when there is a significant difference between the legacy and new IS (making many legacy habits irrelevant or inconsistent with new technology); the users are oriented towards keeping their current IS work (leading users to stick to their legacy habits), and the users are becoming engaged in less engaging habits as the result of discontinuance.
As the cases show, the bridging role was relatively strong in the case of MortCo, mainly because the legacy and new systems shared ample similarities in terms of features and functionalities, as well as in the way of working. In the case of TelCo, the bridging role was limited to some basic and generic thinking habits for understanding clients’ needs. This was because the legacy and new systems had different technological configurations, as well as different logics and workflows. However, the fact that most users were actively engaged in the change process led them to develop hybrid solutions to reduce the gap between the legacy and new systems. Creating systems that were a hybrid combination of the legacy IS and the new one turned the inhibiting role of some legacy habits into a bridging role. Comparing the two cases shows that the bridging role emerges when the legacy and new technologies are similar, thus making the legacy habits still effective for working with the new system. This effect is strengthened when users are oriented towards change, thus they are willing to rely on their legacy habits for working with the new system (instead of remaining attached to the legacy system). Being engaged in routine work, on the hand, may help users save their cognitive and attentional resources for exploring how they can use their habits for working with the new system (as we see in the case of MortCo) but can also demotivate them to use their legacy habits for working with a new system that reduces their engagement with creative, interesting work (as we see in the case of TelCo).

The deterring role mainly stems from the fact that users are dissatisfied with some of their legacy habits and want to abandon these. At MortCo, this role was limited to a few functional and working procedures, but given that the new and legacy technologies were quite similar, these limited dysfunctional habits were enough to trigger them to
depart from the legacy system, even though these users were not generally seeking change. At TelCo, the deterring role was quite salient (there were continuous problems of documentation and maintaining products), and combined with their orientation to experiment with alternative ways of working, triggered users to engage in the discontinuance process. However, realising that the replacement of the legacy IS would make their work less creative led them to find ways to abandon the habits that were dysfunctional, yet keeping their creative work. Hence, looking across the cases, we can explain that the deterring role is strengthened by the users’ orientation towards change, unless departing from dysfunctional habits would mean that they also have to abandon the specific characteristics that they enjoy in their work (like creativity, challenges, etc.).

Finally, the way work is structured moderates the impact of the legacy habits on the IS discontinuance. When the work is structured individually (the MortCo case), the role of legacy habits for each user is relatively independent from the other users. For instance, one or some group of users were able to discontinue the legacy system (eg, through the bridging role), without impacting other fellow users and without being pulled back by others. However, when the work is collectively structured (the TelCo case), the roles of legacy habits are interdependent among the various users (a kind of collective self-reinforcing mechanism). When work is collectively structured, the inhibiting role is strengthened because when one person sticks to her legacy habits, other users are also inclined to keep their legacy habits. At the same time, this interdependency can support the discontinuance, for example, when the dissatisfaction of some users triggers other users to reflect on their dysfunctional habits and thus create a collective momentum for driving the discontinuance forward (as we see in the case of documentation habit).

4.2 The co-evolution of the legacy IS habit roles during the discontinuance process

Our analysis also shows that the legacy habit roles co-evolve during the discontinuance process (represented in the middle part of Figure 1). The inhibiting role creates an initial resistance, but it gradually fades away as users learn how to work with the new system. Nevertheless, the inhibiting role may re-surface when users try to work with the new system fast and rather mindlessly (eg, making mistakes when using hybrid systems at TelCo).

Although the bridging role can trigger users to initiate their experimentation with the new system, sticking too strongly and exclusively to these habits can backfire when users are unwilling to develop new habits for using the new system and when users re-incarnate the same old ways of working in the new system.

The deterring role also evolves over time, both in strength and in how it shapes the IS discontinuance. Dysfunctional habits (eg, the documentation habit, at TelCo) trigger users to consider alternative systems and engage in the discontinuance process. At the same time, users may maintain their attachment to these habits even though they are already fed up with the associated problems and shortcomings. This tendency to unconsciously laps back to these habits can emerge later in the process.

The three roles interact with each other during the discontinuance process. In addition, the relative strength of these roles at each time and in each case is proportionate to the ‘relative salience’ of the associated habits. For instance, at MortCo, the dysfunctional role of ‘asking for permission’ was limited for some users who had to very occasionally work outside office hours, whereas, this same dysfunctional role was stronger for other users who happened to work with clients with frequent requests outside office hours. Similarly, the importance of documentation habit became gradually more salient as TelCo was increasingly engaged in designing complex systems and interactive design processes.

Depending on how strongly these roles emerge (relative to each other) and how they coevolve over time, the discontinuance process can be differently shaped (the right side of Figure 1). At MortCo, the inhibiting role of legacy habits emerged primarily early in the process. During the transition, the bridging role of the legacy IS habits facilitated the discontinuance, especially given that the new and old systems were largely similar. Thus, the discontinuance process progressed rather seamlessly: each group of users went through a rather linear process of being informed, experimenting with the new system and being disconnected from the legacy system. Besides, a natural
consequence of this rather straightforward process was that a portion of users who did not want to go through the process left the company. At TelCo, the significant difference between the new and legacy IS, combined with the creative nature of tasks and the collaborative work structure, created a complex process through which users went back and forth between the legacy and new systems, created hybrid solutions and eventually did not discontinue the legacy system, but rather modified it. This was, in part, due to the fact that users encountered a strong inhibiting role of legacy habits related to low-level design. So much so that the deterring role of documentation habits and bridging role of some of their working habits were not strong enough to drive the discontinuance process towards a complete replacement.

5 | THEORETICAL CONTRIBUTIONS

Our study contributes to the debates in IS habit literature (Polites & Karahanna, 2013) by extending the roles of legacy habits beyond the inhibiting role and enriching the conceptualisation of legacy IS habits as not a merely individual phenomenon, but one that is situated in the socio-technical conditions of working and organising. We also contribute to the emerging research stream on IS discontinuance (Furneaux & Wade, 2011) by showing how legacy habits and their roles can deepen our understanding of the dynamics of the discontinuance process. In the following paragraphs, we elaborate on our contributions.

6 | BEYOND THE INHIBITING ROLE OF LEGACY IS HABITS

Our findings extend the current debate on the role of legacy IS habits in the IS change process (Polites & Karahanna, 2013) by articulating two additional roles that legacy IS habits can play. The literature so far has dominantly framed legacy IS habits as a force that positively influences the continuance of IS and thus undermines users’ intentions to change and adopt new IS (Limayem et al., 2007). Legacy IS habits, previous studies found, create inertia, which then hampers the replacement of legacy systems and, therefore, stand in the way of effective adoption and use of new systems (Polites & Karahanna, 2012). Based on this framing, the literature tends to discuss legacy IS habits as a phenomenon that needs to be disrupted in order to stimulate the adoption of new systems and the discontinuance of legacy IS.

We add further insights into the inhibiting role of legacy IS habits, by distinguishing between two different mechanisms behind this role. One mechanism that is often considered in the literature is that users tend to unconsciously and effortlessly rely on their learned habits (Wood et al., 2002). We also encountered a second inhibiting mechanism: the tendency to be attached to challenging and engaging working habits embedded in the legacy system. For example, the reason that users in the TelCo case wanted to keep their low-level design habits was not that they sought to minimise their efforts and working challenges but rather to keep these challenging and engaging habits.

Furthermore, our study finds that next to this inhibiting role, legacy IS habits can also play two other important roles: a bridging role, which creates a common ground for users to start working with a new system based on some of their legacy habits that are effective in using this new system, and a deterring role, which prompts users to become critical towards their dysfunctional legacy habits, and thus motivates them to discontinue the legacy IS. We show that focussing merely on the inhibiting role (Polites & Karahanna, 2013) offers an incomplete understanding of the role of IS habits in the IS change process. Although the bridging and deterring roles generally support the discontinuance process, they involve distinct mechanisms and unfold differently during the process.

Thus, we contribute to the IS habit literature by articulating two additional roles. First, the bridging role shows that legacy habits can in fact support the discontinuance of legacy systems when certain habits are actually used as a leverage for the initial transition to the new system. The legacy habits are then repurposed and reapplied in the new IS work context. This process requires organisations and users to distinguish between the socio-technical conditions
that they work in and the habits that they have developed as stable patterns of performing certain actions. Psychological theories of habit change show that changing the conditions under which habits develop can help people break habits when the environment does not provide the rewarding outcomes (Wood, Tam, & Witt, 2005). Relying on this mechanism, we can explain that the bridging role is facilitated when users can find some aspects of the new system that are compatible with their habits, enabling them to reconnect their habits to the new IS work setting (a process of rewiring the connections between the environmental triggers and the habits). This process of reconnecting existing habits to the new working conditions seems to be more feasible than breaking habits and developing new ones (Polites & Karahanna, 2013). At the same time, the feasibility of transferring legacy habits to working with a new IS can run the risk of overly and exclusively relying on the historical habits, thus hampering the process of learning new habits. Here, specifying the scope and boundaries of the bridging role is crucial to ensure that legacy habits are not overly imposed on the new IS work.

Next to the inhibiting and bridging roles, we also contribute to the IS habits literature by articulating a somewhat paradoxical role of legacy habits: the deterring role. Although dysfunctional habits related to IS use have been researched before (Chen, Zhang, Gong, Lee, & Wang, 2020; Soror, Hammer, Steelman, Davis, & Limayem, 2015), previous studies often focus on subjects like mobile phone use and do not explicate the role of dysfunctional IS habits in the IS discontinuance process. Especially, early on in the transition process, the deterring role supports discontinuance by providing cognitive, emotional and practical justifications for users to depart from the legacy IS. The habits that were initially developed under certain rewarding conditions, gradually become dysfunctional as the working context changes. Although, over time, these habits may become dysfunctional and users can suffer unfavourable consequences, these habits are stable and deeply rooted in the users’ subconsciousness. Psychological studies show a similar situation for smoking addiction, when addicts suffer from their smoking habits and are determined to stop, and yet find it extremely difficult to actually do so (known as the ambivalence of bad habits (Erickson, 1939)). This role brings to the fore a paradoxical dynamic: on the one hand, these habits create a sense of resentment every time that users face problems in performing their work, but at the same time they are habits, which means that they are deeply rooted in the users’ minds and practice. Therefore, on the one hand, they can drive the users forward in discontinuing the legacy IS, but on the other hand, they can also cause tensions when users need to stop working with a system. Hence, for this role to positively contribute to the discontinuance process demands both individual perseverance (eg, refraining from casual documentation in the TelCo case) and organisational arrangements (eg, established procedures to prevent users from lapsing back to their old documentation habits).

From an IS discontinuance perspective, distinguishing between the three roles means that legacy IS habits do not necessarily have to be ‘broken’ in order for discontinuance to be successful; this very much depends on the particular role that these habits play in the process. It may well be that the bridging and deterring role of legacy IS habits need to be embraced and mindfully leveraged to support users’ journeys from the legacy to the new system. To understand and explain the discontinuance process, it is not enough to know how strongly legacy IS habits inhibit users’ departure from the legacy IS. We also need to examine how certain habits offer opportunities for the users to bridge from the legacy IS to the new one and how certain legacy habits may even motivate users to discontinue the legacy IS.

7 | UNDERSTANDING USERS’ BEHAVIOUR DURING THE IS DISCONTINUANCE PROCESS

Secondly, our study contributes to the IS discontinuance literature by responding to the call for moving beyond users’ intentions to discontinue a legacy system (Furneaux & Wade, 2011). The concept of legacy IS habits enabled us to expand our understanding beyond users’ intentions and more deeply unravel the underlying dynamics that users experience when they engage in the discontinuance process.
Legacy IS habits are a powerful concept to examine users’ behaviour, particularly through the three distinct roles that these habits can play during the discontinuance process. Our study shows that depending on the (relative) strengths of these roles and how they coevolve over time, we can explain how the discontinuance process unfolds. These roles, which can emerge at different times in the discontinuance process, together explain how users may stop using a legacy IS and manage to migrate to a new system. Depending on when these roles emerge in the discontinuance process, and on their relative strengths, we can also explain how and when users may struggle to depart from the legacy IS and even lapse back to their old ways of working, despite their intention to discontinue. Our findings show that these habits not only influence whether users adopt new systems (Polites & Karahanna, 2012) but also how users discontinue legacy systems in practice.

In particular, the inhibiting role can create initial resistance among users to ditch a legacy IS. At the same time, they can trigger them to actively participate in modifying the technology and their work to reduce their inhibiting role (eg, by creating hybrid technologies). Since we focus on the individual level, we consider resistance as the situations in which the inhibiting role of habits (for each user or a group of them) outweighs the bridging and deterring roles. As resistance literature has shown, resistance can be sometimes healthy and lead to unintended consequences (Rivard & Lapointe, 2012). In our story, we see that, for example, the initial resistance of designers at TelCo (caused by the strong inhibiting role of their habits) led users to create hybrid systems to alleviate the resistance by increasing the bridging and deterring roles.

Although the bridging role of legacy IS habits can catalyse the early progress of users in working with the new system, it may make them expect that relying on these habits would be enough to effectively use the new system. As a result, users may fail to effectively adopt the new system, only partially use it or simply carve their ineffective legacy working habits into the new system. Finally, the deterring role of legacy habits can motivate those users who are critical of certain ways of working with a legacy IS, to cease their use of that system. This can reinforce users’ intentions to discontinue the legacy IS. Yet, this initial intention (more as a cognitive and emotional state) is not sufficient to drive the users through the discontinuance process. Even it can give them a sense of frustration in the process when they realise that despite their cognitive and emotional determination to break their legacy habits, they still tend to rely on them. This paradoxical dynamic extends our understanding of the role of habits beyond their ‘formation’ or ‘execution’ phases (Gardner, Phillips, & Judah, 2016), but actually when they are not offering the initial rewards in the changed working condition.

8 | THE EMBEDDEDNESS OF HABITS IN THE SOCIO-TECHNICAL CONFIGURATIONS

As a third contribution, we show that the way legacy IS habits shape IS change in general, and IS discontinuance in particular, requires us to situate our analysis of the habits into the broader socio-technical conditions in which these habits are embedded. As we showed across the cases, the configuration of the socio-technical conditions in terms of users, technology, tasks and structure exerts a clear influence on the roles that legacy IS habits play in the discontinuance process and on how these roles evolve over time.

With this broader contextualisation of the role of legacy IS habits, we demonstrate the importance of moving beyond an individualistic analysis of the habits, which often focusses on the content of habits and the characteristics and history of the users. Extant literature on IS habits tends to predominantly focus on individual users and their characteristics (eg, de Guinea & Markus, 2009; Kim et al., 2005; Kim & Malhotra, 2005; Limayem et al., 2007; Polites & Karahanna, 2012). We extend this literature by examining habits as embedded in (and shaped by) the socio-technical context of IS change. As we showed, certain habits can play an inhibiting role for some users, whereas for other users, they play a deterring role (eg, managers who were dissatisfied with the low-level design habits at TelCo). The technological configuration of the legacy IS and its relations with the new one shape how strongly habits play an inhibiting role (eg, when the legacy and new technologies are dissimilar) or a bridging role (eg, when the legacy and new technologies are similar). Placing habits in their socio-technical context allows for a richer and more nuanced analysis of their roles in the IS change process.
9 | PRACTICAL IMPLICATIONS

Our findings suggest that managers should not assume that the habits that users have developed in relation to the legacy systems play only an inhibiting role. In fact, managers should also recognise and leverage the bridging role of the legacy habits for creating a common ground for users to start working with the new systems. Nevertheless, they should be careful about the tendency of users to overly expect that their legacy habits play a bridging role. In addition, managers should recognise the importance of the deterring role that legacy habits can play for stimulating users to discontinue the legacy IS. Yet, they should be careful about the fact that the users may still tend to rely on them, despite being cognitively and emotionally detached from them. Whether management should break users’ habits or keep them very management depends on a nuanced assessment of the role of these habits.

At the same time, our findings stress the importance of socio-technical conditions in shaping the roles of legacy IS habits. Managers should take the specific configurations of these conditions into account in any intervention they plan with regard to users’ legacy habits. For instance, noticing how the new and legacy systems are similar is crucial to recognising how legacy habits can play an inhibiting or bridging role. Managers can better understand and support different users depending on their tendency to embrace changes to their habits or favour sticking to the status quo. Also, the way the working practices are routine or flexible, and structured around individual tasks or collective collaboration can make a major difference in terms of how legacy habits play a role in the transition from legacy systems.

The different roles that legacy IS habits play can also inform the way new systems can be designed and implemented. Firstly, recognising the inhibiting habits can inform the design and implementation of new systems in such a way that the inhibiting roles of legacy IS habits are minimised. Secondly, the bridging role of legacy habits can help organisations design and implement new systems in a way that users can more smoothly move to these new systems. It is a known practice in system design and development that new applications are designed to minimise users’ surprise and maximise the smooth transition from the legacy to the new systems (eg, the idea of ‘skeuomorph’). At the same time, recognising the dysfunctional habits can guide designers and implementers of the new systems to leverage them as ways to make the users critical of the legacy systems and therefore facilitate their transition toward a new system.

10 | BOUNDARY CONDITIONS AND DIRECTIONS FOR FUTURE RESEARCH

Our findings emerged from rich, yet specific, cases, which mainly represented two specific configurations of the IS change conditions. It is still interesting to examine cases that represent other configurations. It is interesting to examine the various configurations of the work-system conditions especially when there are contradictory forces at play, for instance, the legacy and new technologies are quite different, but the nature of tasks is comparable in the new and legacy systems. Ideally, conducting configurational analysis would be interesting to reveal further insights into how the roles of legacy habits are shaped by the IS change conditions. Although we followed the users during and shortly after the discontinuance process, we did not study their long-term behaviour after the discontinuance. How users acquire new habits and integrate them with the legacy habits are interesting questions for future research.

11 | CONCLUSIONS

We examined how legacy habits developed in relations to legacy IS shape the discontinuance of these systems. Our analysis of two companies showed that legacy habits not only inhibit users from abandoning the legacy IS, they can also act as bridges for migrating to new systems (bridging role) and even motivating the users to stop working with the legacy systems (deterring role). We showed that the configuration of work-system conditions regarding the
extent to which new and legacy technologies are similar or different, tasks are routine or creative, users are oriented toward keeping the current situation or embracing change and work is organised collaboratively or individually, impact how (strongly) each role emerges, evolves and shapes the discontinuance process.

Our study contributes by Firstly showing that legacy habits do not only inhibit the IS change; they can also motivate the users and facilitate their transition to the new systems. Second, a rich understanding of IS change requires us to not only examine how users adopt a new system but also stop using the legacy systems that are not effective anymore and can even compromise the adoption and use of new systems. Third, we theorised how different socio-technical configurations shape the emergence and evolution of legacy habit roles. Finally, we offered insights regarding how managers can take advantage of the bridging (as a medium for facilitating the transition to a new system) and deterring roles (reducing the attachment to the legacy system) in leading the discontinuance process.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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REFERENCES
Aarts, H., and Ruud, C. (2009). Habit, Action, and Consciousness. In Encyclopaedia of Consciousness, edited by W. P. Banks, (Vol. 1, pp. 315–328). Oxford: Elsevier.
Alter, S. (2002). The work system method for understanding information systems and information systems research. Communications of the Association for Information Systems, 9(1), 90–104.
Amoroso, D., & Lim, R. (2017). The mediating effects of habit on continuance intention. International Journal of Information Management, 37(6), 693–702.
Ashforth, B. E., & Fried, Y. (1988). The mindlessness of organizational behaviours. Human Relations; Studies Towards the Integration of the Social Sciences, 41(4), 305–329.
Bartis, E., & Mitev, N. (2008). A multiple narrative approach to information systems failure: A successful system that failed. European Journal of Information Systems, 17(2), 112–124.
Bartunek, J. M., & Louis, M. R. (1996). Insider/outsider team research. Sage Publications.
Bhattachjee, A., Davis, C. J., Connolly, A. J., & Hikmet, N. (2018). User response to mandatory IT use: A coping theory perspective. European Journal of Information Systems, 27(4), 395–414.
Bhattachjee, A., & Hikmet, N. (2007). Physicians’ resistance toward healthcare information technology: A theoretical model and empirical test. European Journal of Information Systems, 16(6), 725–737.
Bhattachjee, A., & Sanford, C. (2009). The intention–behaviour gap in technology usage: The moderating role of attitude strength. Behaviour & Information Technology, (28)(4), 389–401.
Chen, C., Zhang, K. Z. K., Gong, X., Lee, M. K. O., & Wang, Y. (2020). Decreasing the problematic use of an information system: An empirical investigation of smartphone game players. Information Systems Journal, 30(3), 492–534.
Cheung, C., & Limayem, M. (2005). The role of habit in information systems continuance: Examining the evolving relationship between intention and usage. Paper presented at ICIS 2005 Proceedings. p. 39.
de Guinea, A. O., & Markus, M. L. (2009). Why break the habit of a lifetime? Rethinking the roles of intention, habit, and emotion in continuing information technology use. MIS Quarterly, 33(3), 433–444.
Erickson, M. H. (1939). Experimental demonstrations of the psychopathology of everyday life. The Psychoanalytic Quarterly, 8(3), 338–353.
Fang, X., Chan, S., Brzezinski, J., & Xu, S. (2005). Moderating effects of task type on wireless technology acceptance. Journal of Management Information Systems, 22(3), 123–157.
Ferneley, E. H., & Sobreperrez, P. (2006). Resist, comply or workaround? An examination of different facets of user engagement with information systems. European Journal of Information Systems, 15(4), 345–356.
Furneaux, B., & Wade, M. (2011). An exploration of organizational level information systems discontinuance intentions. MIS Quarterly, 53(3), 573–598.
Gardner, B. (2015). A review and analysis of the use of “habit” in understanding, predicting and influencing health-related behaviour. Health Psychology Review, 9(3), 277–295.
Gardner, B., Phillips, L. A., & Judah, G. (2016). Habitual instigation and habitual execution: Definition, measurement, and effects on behaviour frequency. *British Journal of Health Psychology, 21*(3), 613–630.

Gefen, D. (2003). TAM or just plain habit: A look at experienced online shoppers. *Journal of Organizational and End User Computing (JOEUC), 15*(3), 1–13.

Gill, T. G. (1996). Expert systems usage: Task change and intrinsic motivation. *MIS Quarterly, 20*(3), 301–329.

Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS Quarterly, 19*(2), 213–236.

Green, T. K. (2005). Work culture and discrimination. *California Law Review, 93*, 623.

Hainaut, J.-L., Cleve, A., Henrard, J., & Hick, J.-M. (2008). Migration of legacy information systems. In *Software evolution* (pp. 105–138). Springer.

Hou, J., Kim, K., Kim, S. S., & Ma, X. (2019). Disrupting unwanted habits in online gambling through information technology. *Journal of Management Information Systems, 36*(4), 1213–1247.

Hsieh, P. J., & Lin, W. S. (2018). Explaining resistance to system usage in the PharmaCloud: A view of the dual-factor model. *Information Management, 55*(1), 51–63.

Jackson, S. (2011). Organizational culture and information systems adoption: A three-perspective approach. *Information and Organization, 21*(2), 57–83.

Jasper, J., Carter, P. E., & Zmud, R. W. (2005). A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems. *MIS Quarterly, 29*(3), 525–557.

Kim, H.-W., & Kankanhalli, A. (2009). Investigating user resistance to information systems implementation: A status quo bias perspective. *MIS Quarterly, 33*(3), 567–582.

Kim, S. S., & Malhotra, N. K. (2005). A longitudinal model of continued IS use: An integrative view of four mechanisms underlying postadoption phenomena. *Management Science, 51*(5), 741–755.

Kim, S. S., Malhotra, N. K., & Narasimhan, S. (2005). Research note—Two competing perspectives on automatic use: A theoretical and empirical comparison. *Information Systems Research, 16*(4), 418–432.

Langley, A. (1999). Strategies for theorizing from process data. *The Academy of Management Review, 24*(4), 691–710.

Lancton, N. K., Wilson, E. V., & Mao, E. (2010). Antecedents and determinants of information technology habit. *Information Management, 47*(5), 300–307.

Larsen, T. J., Særbe, A. M., & Særebø, Ø. (2009). The role of task-technology fit as users’ motivation to continue information system use. *Computers in Human Behavior, 25*(3), 778–784.

Laumer, S., Maier, C., Eckhardt, A., & Weitzel, T. (2016). User personality and resistance to mandatory information systems in organizations: A theoretical model and empirical test of dispositional resistance to change. *Journal of Information Technology Impact, 31*(1), 67–82.

Lee, K., & Joshi, K. (2017). Examining the use of status quo bias perspective in IS research: Need for re-conceptualizing and incorporating biases. *Information Systems Journal, 27*(6), 733–752.

Limayem, M., Hirt, S. G., & Cheung, C. M. K. (2007). How habit limits the predictive power of intention: The case of information systems continuance. *MIS Quarterly, 31*(4), 705–737.

Liu, Y., Mezei, J., Kostakos, V., & Li, H. (2017). Applying configurational analysis to IS behavioural research: A methodological alternative for modelling combinatorial complexities. *Information Systems Journal, 27*(1), 59–89.

Lyttyinen, K., & Newman, M. (2008). Explaining information systems change: A punctuated socio-technical change model. *European Journal of Information Systems, 17*(6), 589–613.

Murungi, D., Wiener, M., & Marabelli, M. (2019). Control and emotions: Understanding the dynamics of controllee behaviours in a health care information systems project. *Information Systems Journal, 29*(5), 1058–1082.

Oreg, S., Bayazit, M., Vakola, M., Arciniega, L., Armenakis, A., Barkauksiene, R., Bozionelos, N., Fujimoto, Y., González, L., Han, J., Hrebicková, M., Jimmieson, N., Kordacová, J., Mitsuhashi, H., Mlasic, B., Feric, I., Topic, M. K., Ohly, S., Saksvik, P. O., ... van Dam, K. (2008). Dispositional resistance to change: Measurement equivalence and the link to personal values across 17 nations. *The Journal of Applied Psychology, 93*(4), 935–944.

Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin, 124*(1), 54–74.

Polites, G. L., & Karahanna, E. (2012). Shackled to the status quo: The inhibiting effects of incumbent system habit, switching costs, and inertia on new system acceptance. *MIS Quarterly, 36*(1), 21–42.

Polites, G. L., & Karahanna, E. (2013). The embeddedness of information systems habits in organizational and individual level routines: Development and disruption. *MIS Quarterly, 37*(1), 221–246.

Recker, J. C. (2016). Reasoning about discontinuance of information system use. *Journal of Information Technology, Theory and Applications, 17*(1), 41–66.

Rezazade Mehrizi, M. H., Rodon Modol, J., & Zafar Nezhad, M. (2019). Intensifying to cease: Unpacking the process of information systems discontinuance. *MIS Quarterly, 43*(1), 141–165.

Rivard, S., & Lapointe, L. (2012). Information technology implementers’ responses to user resistance: Nature and effects. *MIS Quarterly, 36*(3), 897–920.
Robey, D., Ross, J. W., & Boudreau, M.-C. (2002). Learning to implement enterprise systems: An exploratory study of the dialectics of change. *Journal of Management Information Systems, 19*(1), 17–46.

Schank, R. C., & Abelson, R. P. (2013). *Scripts, plans, goals, and understanding: An inquiry into human knowledge structures*. Psychology Press.

Sheeran, P. (2002). Intention—Behavior relations: A conceptual and empirical review. *European Review of Social Psychology, 12*(1), 1–36.

Simon, H. A. (1945). *Administrative behavior* (1st ed.). The Free Press.

Soror, A. A., Hammer, B. I., Steelman, Z. R., Davis, F. D., & Limayem, M. M. (2015). Good habits gone bad: Explaining negative consequences associated with the use of mobile phones from a dual-systems perspective. *Information Systems Journal, 25*(4), 403–427.

Van Oosterhout, M., Waarts, E., & van Hillegersberg, J. (2006). Change factors requiring agility and implications for IT. *European Journal of Information Systems, 15*(2), 132–145.

Verplanken, B., Aarts, H., & Van Knippenberg, A. (1997). Habit, information acquisition, and the process of making travel mode choices. *European Journal of Social Psychology, 27*(5), 539–560.

Wimelius, H., Mathiassen, L., Holmström, J., & Keil, M. (2021). A paradoxical perspective on technology renewal in digital transformation. *Information Systems Journal, 31*(1), 198–225.

Wood, W., Quinn, J. M., & Kashy, D. A. (2002). Habits in everyday life: Thought, emotion, and action. *Journal of Personality and Social Psychology, 83*(6), 1281–1297.

Wood, W., Tam, L., & Witt, M. G. (2005). Changing circumstances, disrupting habits. *Journal of Personality and Social Psychology, 88*(6), 918–933.

Yang, H.-D., Kang, S., Oh, W., & Kim, M. S. (2013). Are all fits created equal? A nonlinear perspective on task-technology fit. *Journal of the Association for Information Systems, 14*(12), 2.

Ye, C., Seo, D., Desouza, K. C., Sangareddy, S. P., & Jha, S. (2008). Influences of IT substitutes and user experience on post-adoption user switching: An empirical investigation. *Journal of the American Society for Information Science and Technology, 59*(13), 2115–2132.

Yin, R. K. (2014). *Case study research: Design and methods*. Sage Publications.

Zhang, X., Guo, X., Wu, Y., Lai, K. H., & Vogel, D. (2017). Exploring the inhibitors of online health service use intention: A status quo bias perspective. *Information Management, 54*(8), 987–997.

Zimmermann, A., Raab, K., & Zanotelli, L. (2013). Vicious and virtuous circles of offshoring attitudes and relational behaviours: A configurational study of German IT developers. *Information Systems Journal, 23*(1), 65–88.

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