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Enterprise Software Implementation as Context for Digital Innovation

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ENTERPRISE SOFTWARE IMPLEMENTATION AS CONTEXT FOR DIGITAL INNOVATION

Research paper

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Abstract

Many of the IT systems used in organizations are based on comprehensive generic enterprise software (ES) solutions. Accordingly, the process of implementing ES solutions, where generic features are configured and extended according to specific user needs represents a relevant context for digital design and innovation. Yet, besides a few exceptions, it remains little explored by IS research, and the dominant perspective on how generic solutions are implemented portrays a process with little flexibility to design and innovate digital solutions based on emerging user needs. In this paper, we address this gap by studying how innovation takes place during ES implementation. Our empirical analysis is based on data from the first phase of an ongoing case study, where we investigate the practices of five consultancy firms specialized in ES implementation. This paper contributes to the body of knowledge on ES implementation by proposing a conceptualization of how digital innovation takes place in the intersection between ES as a 'design infrastructure' and the needs of individual customer organizations.

Keywords: Generic enterprise software implementation, Digital innovation, Implementation-level design, Design infrastructure.

1 Introduction

Many of the IT systems used in organizations are based on comprehensive generic enterprise software (ES) solutions. ES are designed to fit generic rather than specific requirements (Strong & Volkoff, 2010). Following, the generic software features are configured and extended to meet specific user needs during implementation into specific customer organizations. On account of ES' prevalence, an increasingly relevant context for the design of IT involves implementing ES into particular organizations (Sedera et al., 2016). Yet, research is still limited on if and how digital innovation takes place in this context. In this paper, we refer to this context as implementation-level design (Li & Nielsen, 2019b).

The dominant perspective in IS literature portrays ES solutions as rigid and standardized organizational templates used across customer organizations (Koch, 2007; Pollock et al., 2007). The design and development of these solutions are consequently a matter of aligning heterogeneous needs, by persuading customer organizations to adapt to a standardized "best practice" software solution (Pollock et al., 2007; Wagner et al., 2006). Accordingly, the process of implementation-level design appears inflexible for local adaptation, which in turn has profound structural repercussions on organizational work processes (Davenport, 1998; Kallinikos, 2004).

However, in recent years, ES vendors' have taken steps towards opening up for innovation on top of their solutions by third-party actors (Foerderer et al., 2019; Wareham et al., 2014), increasing the potential for digital innovation during implementation-level design (Li, 2021; Roland et al., 2017). Platform strategies have extensively been pursued by vendors such as SAP and Oracle to facilitate external actors in developing functionality extensions and third-party applications (Foerderer et al., 2019; Rickmann et al., 2014; Sarker et al., 2012). Furthermore, implementation-level design is outsourced to partners that specialize in implementing and extending ES (Wareham et al., 2014). Vendors' focus is consequently shifted towards creating highly configurable, extendable, and flexible

solutions (Li & Nielsen, 2019b; Pipek & Wulf, 2009), as well as the resources ensuring access, knowledge, and competence necessary to exploit capabilities offered by the vendor (Foerderer et al., 2019; Rickmann et al., 2014), during implementation-level design.

While the line of investigation in prior studies has been geared towards examining the social dynamics and challenges experienced by customer organizations during implementation of ES, little attention has been directed towards the potential for digital innovation during implementation-level design (Berente et al., 2019). We see this as an important gap in research.

This paper addresses this gap by examining the following research question:

- How does digital innovation take place during implementation-level design?

We explore this question by reporting from the early stage of an ongoing interpretive case study (Myers, 1997; Walsham, 2006), where we have studied the design and innovation practices of five prominent consultancy firms operating as SAP Partners in Norway. This paper seeks to contribute to the body of knowledge on the nature and potential for (digital) innovation during implementation of ES (Badewi et al., 2020; Kharabe & Lyytinen, 2012; Lokuge & Sedera, 2018a; Sedera et al., 2016) with a conceptualization of how digital innovation takes place through what we coin as a two-sided monitoring process conducted by partners. Based on this, we propose five avenues for further research. The rest of the paper is organized in the following manner: First, we present existing literature on digital innovation in the context of ES design and implementation. Second, we describe our methods before we present our empirical case analysis. Finally, we answer our research question and discuss how it relates to prior literature before we conclude.

2 Related Research

In the following section, we define digital innovation, before we elaborate on two streams of literature that portray the potential for digital innovation in this context in two different ways.

2.1 Digital innovation

We define digital innovation as the process, as well as the result, of combining and recombining digital components that enable change and create novel value (Henfridsson et al., 2018; Øvrelid & Kempton, 2021; Yoo et al., 2010). This encompasses innovation that enhances physical product functionality with software capabilities (Yoo et al., 2010), that recombines collections of digital resources for generating value paths for individual users (Henfridsson et al., 2018), and that uses pervasive digital technology to create novel socio-technical entities (Yoo et al., 2012). One common trait in the literature on digital innovation is centered around digital innovation as afforded by generative technology (Henfridsson & Bygstad, 2013) and socio-technical relations (Msiska & Nielsen, 2018), concepts that refer to properties that enable novel combinations (Nambisan et al., 2017).

2.2 Implementation of ES

The dominant perspective on implementation of generic ES presented in IS literature portrays a process with limited potential for digital innovation. ES is frequently illustrated as inflexible for local adaptation and to have profound structural repercussions on organizational work processes (Davenport, 1998; Kallinikos, 2004; Mousavidin & Silva, 2017). In line with this view, the emphasis is on the misalignment between a contextually conditioned organization and the software's logic. Numerous researchers within the IS literature are thus occupied with examining the organizational impact of ES (Berente et al., 2016; Soh et al., 2000; Strong & Volkoff, 2010). These studies tend to be more concerned with what takes place *after* implementation (Sykes & Venkatesh, 2017; Williams & Pollock, 2009), where what seems like inevitable and inherent 'misfits' between what the software offers, and the needs of specific customer organizations are investigated (Mousavidin & Silva, 2017). Although we see this general critical tendency in research concerning organizational fit, studies have also explored vendors' pre-conditions for the design process; creating generic solutions that can be implemented across

heterogeneous organizations will reduce complexity for vendors in their futile efforts towards catering to all particular needs, as well as reduce cost on the individual level (Gizaw et al., 2017; Koch, 2007). Accordingly, a common strategy employed by vendors is to align a large potential customer base of user organizations to inform the generic design (Li & Nielsen, 2019b). Prior studies suggest that identifying what the generic core should consist of is a matter of aligning the abundance of needs (Pollock et al., 2007), in contrast to supporting the contextual differences. By persuading customer organizations to adapt to a standardized "best practice" workflow supported by a standardized software solution, differences in heterogeneous needs may be eliminated by making minimal software changes (Farhoomand, 2007; Wagner et al., 2006). This illustrates a tension in terms of changing the organizations to fit the software solution or vice versa.

One approach to reconciling the conflict between generic solutions and contextual conditions for organizational fit has in recent years been widely pursued. ES vendors have taken steps towards strengthening the technical flexibility of their solutions to support diverse needs (Foerderer et al., 2019; Wareham et al., 2014). By opening up their solutions and increasingly pursuing platform business models, innovations can arise by allowing external actors to develop functionality extensions and third-party applications (Li, 2021; Rickmann et al., 2014). These efforts present a value network of cocreation between different roles contributing to the generic design (Sarker et al., 2012). Hence the dependency of the relationship of vendors concerning their complementors and partners has become a more central perspective for investigation in recent years (Engert et al., 2021; Rickmann et al., 2014). Furthermore, facilitating design and innovation in customer organizations is outsourced to partners that specialize in implementing ES (Wareham et al., 2014). These partners are positioned in the intersection between business and IT, guiding their customers in technology-driven organizational change and performance improvement (Markus, 2004). Yet, the perspective of partners in addressing particular customers' emergent needs through implementation-level design remains to be investigated (Jæger et al., 2020), particularly in their role of facilitating digital innovation through the novel potential that platforms offer.

To summarize, we define digital innovation as the process of combining and recombining components that enable change and novel value. The dominant perspective in existing IS literature portrays implementation-level design as a context with limited potential for digital innovation. An emerging stream of literature reports how vendors increasingly organize their generic solutions as platforms. However, the focus is limited to how partners are engaged in *generic* innovation on ES platforms. A relevant gap remains in understanding how digital innovation takes place through interaction between a partner and a customer organization during implementation-level design.

3 Theoretical lens

As pointed out in existing research, design and development of ES are distributed across organizational boundaries (Dittrich, 2014). To analyze design and development activities involved in the implementation of ES, we employ a conceptual framework from Li and Nielsen (2019). The framework describes two key types of design processes, involved in making ES usable and relevant to a customer organization.

3.1 Design on two levels

Vendors of ES are met with diverse needs when attempting to develop functionality that is perceived as relevant to a diverse set of customer organizations (Li & Nielsen, 2019b; Soh et al., 2000). While one common approach involves strategies for aligning the needs of the customer organizations to inform the generic design (Gizaw et al., 2017; Pollock et al., 2007), developing solutions that can be customized, configured, and tailored by actors "closer" to the actual use context is another well-established strategy (Baxter & Sommerville, 2011; Pipek & Wulf, 2009). Accordingly, vendors' efforts to facilitate the external actors in accessing the resources necessary to do so are strategically important in innovation networks such as enterprise platforms. Part of the strategy involves creating highly configurable, extendable, and flexible solutions (Li & Nielsen, 2019b; Pipek & Wulf, 2009). Furthermore, it involves designing boundary resources that enable and control the development of extensions or 'apps' to build

novel functionality and user interfaces (Foerderer et al., 2019; Rickmann et al., 2014). We adopt the term "generic-level design" (Li & Nielsen, 2019b) to refer to design efforts aimed at developing generic software features and other resources relevant to multiple customer organizations. These efforts encompass the magnitude of configurability, creation of resources, and flexibility of components (Pipek & Wulf, 2009). Accordingly, pre-conditions afforded by the generic-level design define the flexibility, the starting point, as well as the limitations, for the process of implementing the software into particular organizations (Sommerville, 2008). We refer to the latter process as "implementation-level design" (Li & Nielsen, 2019b).

We refer to the collective resources built through processes of generic-level design as a 'design infrastructure' (Li & Nielsen, 2019c). These resources include generic software features, adaptation capabilities, and resources that build capacity and support to leverage these. The design infrastructure provides a basis for implementation-level design to configure and extend the generic features according to the needs of specific customer organizations (Li, 2021).

4 Research approach

We report from the first phase of an ongoing interpretive case study (Myers, 1997; Walsham, 2006), where we thus far have conducted six in-depth interviews with consultancy firms operating as SAP Partners in Norway. We will briefly introduce the software solution, its vendor, and associated partners, before describing our methods for data collection and analysis.

4.1 Case - Norwegian SAP partners

Our empirical basis is a study of the practices of one important type of actor within the SAP ecosystem. SAP is one of the largest vendors of ES and has been dominant in this domain for decades. They deliver three distinctly different ES-suites (SAP S/4 HANA, SAP Business By Design, and SAP Business One), with their SAP S/4 HANA suite being central in their current strategic investment. SAP is a relevant actor for investigation in this context, due to its market position. SAP has a significant apparatus of partners. SAP has created an apparatus of partners (approximately 4,500 partners globally) to which they have outsourced the task of implementation-level design. The perspective of these partners is the object of inquiry in the present investigation. The partners are governed through strict demands for continuous certifications and are facilitated through extensive resources and technical flexibility. SAP's strategy has been to create a wide range of standardized software solutions, each aimed at supporting an industry-specific segment. Accordingly, a partner is often specialized within one or few industry segments to manage the vast complexity of the expertise needed within each segment.

The partners of focus in our study all have significant experience and expertise with SAP implementation and adoption of SAP in their customers' organizations. These firms are specialized within retail and wholesale in the Norwegian business sphere and play the role of SAP partners as members of SAPs PartnerEdge program.

4.2 Data collection and analysis

We initiated the research project with an interest in the process of implementation-level design, and how it was enabled and constrained by generic resources. Our focus on design and innovation further developed through abductive cycles of empirical data analysis and investigation of existing academic literature. We have conducted six in-depth semi-structured interviews, illustrated in Table 1. The interviews were conducted with members with varying roles and positions in five consultancy firms operating as SAP partners, and with one ES-expert who advises customers in ES implementation across partner organizations. There are currently thirty-one SAP partners operating in Norway, and our informants were partly chosen through SAP's websites, and partly from recommendations that appeared during interviews. Our initial approach to the data gathering process was to investigate how SAP facilitates partners in their implementation efforts. As data was gathered, digital innovation became a recurring and consistent theme that emerged from the data. Our focus was consequently shifted to how

partners facilitate innovation in their customers' organizations. The continuing process involved identifying the partners' practices during implementation-level design, what tools and resources they are leveraging from the design infrastructure, how they cooperate with their customers, and how they communicate with SAP as the vendor of the solution they work with. The analysis was continuously carried out by using the concepts of generic- and implementation-level design to frame our understanding of where, and by whom, design activities are performed. Inductive cycles were then conducted in light of this conceptual framework as new insights were acquired. This was carried out by categorizing the empirical data into abstract concepts that captured the activities of the implementation-level design process that could be applied across partners, and how and what flexibility these activities depended on to cater to specific needs.

Position	**Number of informants**
Leader in a partner organization	2
Department manager in a partner organization	2
ES author, conference host, and expert in the Norwegian market	1
Developer in a partner organization	1

Table 1. Positions and numbers of informants.

5 Case analysis

We now turn to our analysis of implementation-level design as a context for digital innovation. We begin by looking at how implementation-level design unfolds to cover the activities in the process that shapes the potential for digital innovation.

The process of implementation-level design is initiated through negotiations regarding the scope and scale of a project. This occurs during the procurement process, which will be leading for the following design and construction of the solution(s). A typical implementation-level design process starts when the partner is awarded a contract with a customer. The customers' point of departure for hiring a partner is preferably motivated from a business development point of view. They might enter with a business angle as to how to meet the changing needs of the market they operate in, as well as how their services are expected to be exposed. The partner's task is to meet strategic opportunities and goals with technological innovations. The aim is to build a solution that possesses the capacity to take advantage of novel innovations, based on SAP and the technological opportunities afforded by the design infrastructure. While partners' practices differ, we highlight five activities of the implementation-level design process that are identified in our empirical investigation as important and general across partners and projects. These are illustrated in Figure 1 and are used to structure our analysis. These steps can reoccur, often as a result of new innovation opportunities, in various order, and may also take place simultaneously.

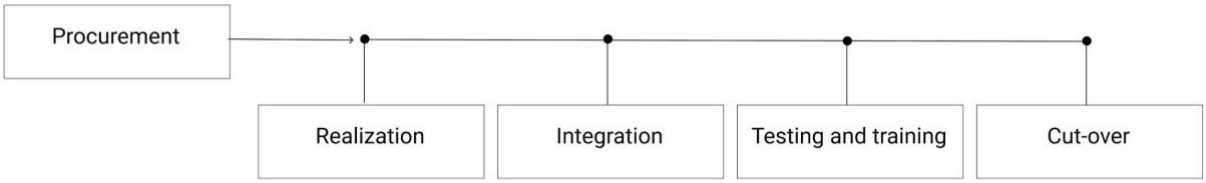

Figure 1. Key activities of the implementation-level design process.

5.1 Procurement

What we term procurement comprises the tender process where initial negotiations take place. Normally, the procurement process involves various partners competing in gaining the customer's project. It is vital for the partner to be competitive in terms of budget. Here, solutions from earlier projects may be used to showcase a specific proposition as to how to solve the challenges and support organizational needs. Customers have two main approaches when choosing a partner. They may either have a comprehensive requirement specification, or an outline of their main strategic organizational objectives. The latter approach gives the partner a greater space for using the generic technological possibilities part of the design infrastructure to solve the customer's issues. As mentioned by a leader in one partner organization, "*This is way more modern, and one does not limit ourselves to the present situation but opens up for using technology for real innovation. Not just smaller adjustments, but real innovation".* Furthermore, the procurement process ends with negotiating the overall estimation of cost and development time. The chosen approach and results of the negotiations have repercussions for the flexibility throughout the design process, limiting or enabling the space for adjusting the solution based on organizational needs.

5.2 Realization

The realization activities involve designing and constructing the software solution. The starting point of this activity involves using a standardized solution, or a template from an earlier project, as a base for localizing the software to fit the needs of the particular organization. The flexibility to localize the generic solution is provided by means of one or a combination of three alternative approaches:

1. Configuration - setting standard parameters.
2. Customization - changing the source code.
3. Building or using third-party extensions (apps).

The existing organizational business processes are reviewed individually in collaboration with the customer. The partner investigates whether the needs may be accommodated through the existing configuration possibilities. However, as one informant issued, "*I have never experienced a project where everything can be solved solely based on the configuration possibilities. They can never solve all obstacles".* These partners manage large customers, often unwilling to settle for a standardized solution. The flexibility to solve these customers' needs by tailoring the solution initially depends on:

1. The customer's willingness or ability to pay for the expenses of tailoring.
2. Whether the implemented solution will rely on an on-premise or cloud solution.

An on-premise SAP S/4 HANA solution offers nearly unlimited flexibility for tailoring the solution to fit the particular organizational needs and is built by creating a unique program library where the program code of the core is overridden by custom code. The expense is however greater in terms of maintenance regarding the task of operating the software and is often fit for large customers in need of the reliability and security this model offers. Meanwhile, SAP S/4 HANA Cloud consists of a standardized configurable core, lowering the operational cost and the maintenance cost of new features and updates. This choice will accordingly affect the content and tasks of the continuing partnership. The core of the cloud solution is shared between multiple customers, hindering the possibilities for customization. However, the partner generally avoids changing the source code of the core systems, mainly consisting of parts that handle transactions. As one informant points out, "The core is more or less tight and as for SAP, the core is highly flexible in terms of their vast richness of configuration possibilities". As such, the core may be configured within the premises set by SAP to be cost-effective regarding maintenance efforts. As articulated by a partner, "The point is that innovations are released every day, or every week and we have to be able to handle them. This is the reason why we can't change the source code, and if we do so, novel innovations become meaningless". Accordingly, partners need to build a solution that can handle the iterative innovation requirements. They do so by building new or

identifying and retrieving existing extensions. The set of resources that the partner has available during the construction of a solution, which we refer to as the design infrastructure, can be categorized into:

1. Functionality, boundary resources, and documentation developed at the generic level and offered by SAP.
2. Extensions developed and distributed in the ecosystem of certified SAP complementors.
3. Options and resources for building extensions (The UI library SAP Fiori, SAPs programming language ABAP, APIs, boundary resources, documentation, and learning material).

Extensions are dependent on a rich and well-documented API, allowing, and enabling flexibility for partners to exploit technological innovations and merge them with organizational needs. As reflected on by an informant, "*I would say that the vendor that offers the richest, most well-documented, and accessible API-capacity also provides the biggest opportunity-space for innovation, because they give their customers unlimited opportunity space to connect whatever it may be of pre-composed and self-developed extensions".* Figure 2 illustrates how resources from the design infrastructure are localized through implementation-level design. Partners need to be aware of, navigate, and consistently monitor these technological innovations and possibilities afforded by the design infrastructure, to effectively support their customers through this process.

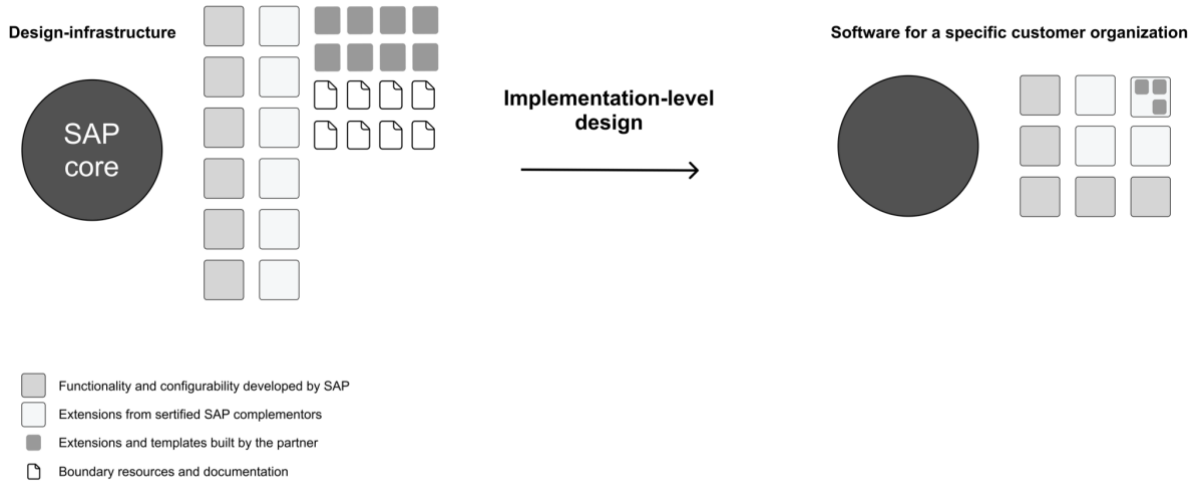

Figure 2. Resources from the design infrastructure are localized through implementation-level design.

5.3 Testing, training, and cut-over

Before the solution can be released, all functionality supporting individual business processes needs to be tested. Testing and training is a joint task between the partner and the customer. Some partners provide an educational program including an exam that the end-users need to take before the solution can go into use. Sufficient staff training is a critical success factor to minimize the risk of the inevitable organizational changes in the existing practices. One central element at this stage involves the partner preparing the customer for what's to come concerning expectations of increased turnover. As one partner puts it, "*It gets worse before it gets better [...] It is common with a dip in productivity before it goes very well after a few months".* It is also vital to create a cultural mindset for new ways to work, among the customer's employees.

Once all processes are tested and sufficient training is completed, all prior data from old systems are transferred to the new solution before going into the cut-over phase. The customer now has a fully integrated solution ready for use, and a platform with robust systems with capacity and capabilities for future expansion.

5.4 Continuous implementation-level design

For some customers and projects, the process of implementation-level design may last through the entire life-cycle of the solution. One partner has worked with a market-leading company within its business segment for a decade, constantly aware of their emerging business needs while monitoring the design infrastructure for relevant technical solutions. As the partner reflects regarding their cooperation with this customer:

"*They demand daily innovation releases. Now we don't do that daily, we do it weekly because new solutions must be tested first, but it means that we release new innovations consecutively all the time. And that is because this technology makes that possible",* and "*When we work with [customer organization], we are concerned with how [customer organization]'s customers experience things [...] and we are occupied with analysis, and how to succeed regarding the end-customers".*

Additionally, the capacity for innovation is dependent on the customer's willingness and ability to change, either within the limits of the technological opportunity space of SAP or to new features potentially beneficial for the customers' organization. Therefore, a comprehensive task is for the partner to negotiate with the customer, and either try to justify the cost benefits of choices made or extensions to be added, or to explain why it is wiser to stick to the configuration possibilities provided in the design infrastructure. The partner plays an important supportive role through this decision process. The main elements in this role include facilitating innovative solutions by possessing comprehensive knowledge and competence on the one side, in the customer's industry segments and organizations, and on the other the technological opportunities. As exemplified by a partner, *"We try to understand the intention behind a need, how the customer works, and provide input on how to solve an issue. We have for instance worked with a customer who needed to inspect various objects and needed an inspection plan. Instead, we proposed that they should use sensor technology to count the number of visits, and the number of tremors so that they could inspect when the sensor had counted a fixed amount. This resulted in innovation for the customer because they could go out to inspect less often, and when needed".*

To summarize, we have examined the process of implementation-level design through the perspective of the partner, by exploring their role in realizing ES potential for digital innovation in individual customer organizations and their local practices. We now turn to the discussion.

6 Discussion and Conclusion

We started with the following research question: How does innovation take place during implementation-level design?

We will explicitly address and discuss our research question by proposing a conceptualization of how digital innovation takes place during implementation level-design, a context which the dominant perspective within IS literature portrays as unfavorable for digital innovation (Strong & Volkoff, 2010). Based on our conceptualization, we will define five avenues for further research.

6.1 How innovation takes place

We adopted the definition of digital innovation as the process and the result of combining and recombining digital components that enable change and create novel value (Henfridsson et al., 2018; Øvrelid & Kempton, 2021; Yoo et al., 2010). We have shown through our case that implementation-level design is a professional software development context with potential for digital innovation through combining technological possibilities available within a design infrastructure of generic resources to respond to organizational needs that create novel value in the customers' organizations. We see digital innovation as a socio-technical phenomenon (Msiska & Nielsen, 2018), where partners serve as a generative property aimed at realizing the possibilities and potential that are located partly in the technology, and partly in the organizations where the technology is applied. The partner is positioned to bridge the gap between technological possibilities and the emerging needs of specific customer organizations. They do so by consistently monitoring, on the one hand, the technological opportunities

afforded by the design infrastructure, and on the other, the evolving business needs and opportunities of each of their customers. We conceptualize this process as a two-sided monitoring process that partners consistently perform to effectively cater to their customers' organizational needs and challenges (illustrated in Figure 3).

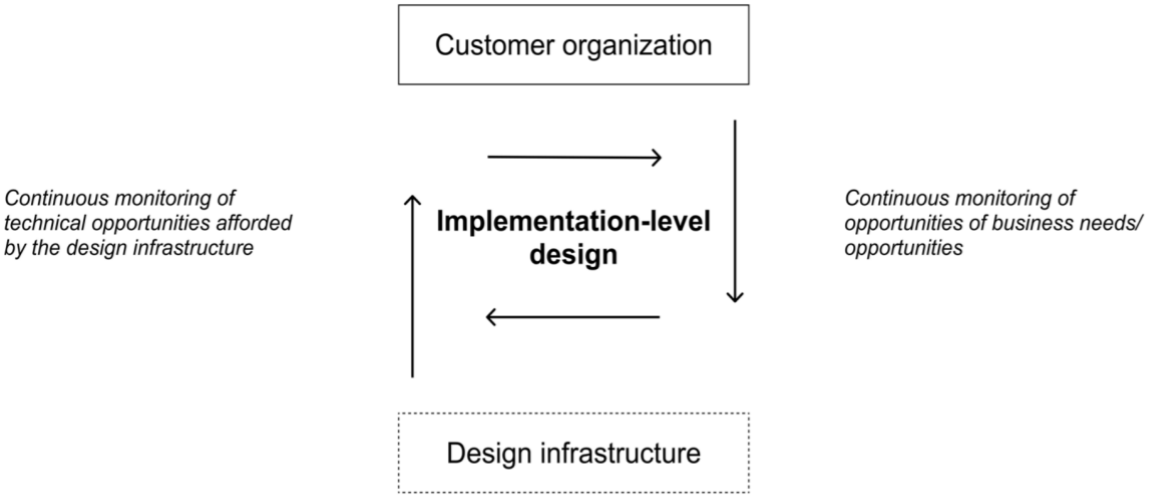

Figure 3. Digital innovation during ES implementation takes place through a two-sided monitoring process.

Digital innovation takes place when the partner combines and recombines digital components from the design infrastructure in response to particular user needs through the process of implementation-level design. This activity is motivated by customers' challenges and needs and aimed at solving them through creating novel value when new functionality is introduced in the customers' organizations. An important element that enables the prospects for novel value to be generated is afforded by vendors pursuing platform strategies, opening up to external innovation (Foerderer et al., 2019). This requires the necessary flexibility that APIs and technical resources provide (Wareham et al., 2014). The partners utilize the flexibility afforded by the platforms to build specialized solutions that fit their customers' contextually conditioned needs. It is well established that platforms have accelerated the opportunity space for digital innovation, as shown in influential studies (Foerderer et al., 2019; Rickmann et al., 2014; Wareham et al., 2014)**.** However, the generativity that they provide is central in the present investigation regarding the potential for implementation of ES to foster digital innovation (Li, 2021). While acknowledging the reported issues in ES research, we may also emphasize the opportunity space emerging from novel technology and outsourcing of design and innovation (Roland et al., 2017). The opportunities for combinations and recombinations afforded by the generative technology capacitates localization of ES to contextual conditions. Our findings contradict the portrayal of these solutions as rigid packaged solutions incapable of local adaption (Koch, 2007; Strong & Volkoff, 2010; Wagner et al., 2006), and supports the view of realizing ES as an enabler for digital innovation (Badewi et al., 2020; Kharabe & Lyytinen, 2012; Lokuge & Sedera, 2018a; Sedera et al., 2016).

6.2 The partner as an innovation facilitator

Given a flexible design infrastructure, the process of implementation-level design evolves into a relationship of close interactions between a partner and a customer, where emerging needs are transformed into technological solutions that require significant effort from the partner. Partners are presented with a rich environment of socio-technical components from the design infrastructure, enabling capacity and capabilities to build specialized solutions for individual customers. However,

navigating this abundance of resources demands new forms of competence and skills of the partner (Venkataraman et al., 2018). A vast selection of technological possibilities needs to be translated into organizational needs. A prerequisite is for the partner to possess comprehensive knowledge of the business segments their customers operate in. Partners tend to specialize within one or a few business segments to completely handle the complexity of this task. The design infrastructure constantly evolves with features and functions, providing possibilities that customers need to respond to. The continuing role the partner plays throughout the enduring partnership with each customer involves assessment of incoming and available options provided by the design infrastructure, and if and how these are to be assessed within the scope of specific customers' projects to foster innovation.

6.3 Avenues for further research

In this paper, we have examined and identified general elements of how innovation takes place through implementation-level design. Particularly, our analysis highlights digital innovation as emerging through a two-sided monitoring of the design infrastructure and the customers' organizational needs. The aim is to seize both strategic and technological opportunities that provide novel value to the customer organization at hand. Our findings provide a basis for several relevant avenues for further research:

1. Our analysis hints at a highly competence-intensive exercise for partner organizations, who must sustain a comprehensive understanding of both the possibilities that lie in the design infrastructure, and the emerging needs of the many customer organizations they serve. A relevant avenue for further research is to explore the competences that are needed to successfully manage such processes.
2. A second avenue would be to study specific ES implementation projects, where the two-sided monitoring process conceptualized in this paper can be examined in greater detail. While this paper addresses *how* innovation takes place, a relevant area for investigation would be the *ways* and *means* by which digital innovations materialize, and what is required from the involved parties.
3. As our analysis has illustrated, there is a close collaborative relationship between partner and customer. Questions arise as to the particular elements in that relationship from the customer's perspective. Our empirical insights suggest that the role of the customer requires an organizational culture that fosters the ability to change, adapt and interact adequately with new innovations. Hence, a relevant third avenue would be to investigate the customer's role in the implementation-level design process in terms of preconditions, competences, and particular actions.
4. From our analysis we see that the way the procurement process is structured bears consequences for the ability to innovate. If defined through extensive requirement specifications the space for novel combinations of digital possibilities and the potential for taking advantage of strategic prospects is constrained. The issue in this context, and a fourth avenue for further research, would be how procurements may be negotiated in such a way that they afford openness for innovation, while avoiding budgetary unpredictability for the customer.
5. Our conceptualization highlights a two-sided monitoring process conducted by the partner. A possible fifth avenue may address questions regarding the scope, range, and nature of the efforts, on the part of the ES vendor, to support the partner in their monitoring activities of the design infrastructure, and to provide them with opportunities by means of various knowledge boundary resources (Foerderer et al., 2019).

6.4 Contribution and Concluding Remarks

In this paper, we have explored the practices of five partners to identify how digital innovation takes place during implementation-level design. The contributions of the paper consist of, on the one hand, our empirical insights into an increasingly relevant context of IT design, and on the other, a

conceptualization of digital innovation as the result of a two-sided monitoring process conducted by partners to build specialized solutions for individual customers. Based on our conceptualization, we have proposed five avenues for further research. We argue that our conceptualization is relevant for, and contributes to, research engaged with the nature and potential for digital innovation in ES implementation (Badewi et al., 2020; Kharabe & Lyytinen, 2012; Lokuge & Sedera, 2018b; Sedera et al., 2016).

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