A CASE STUDY OF ENTERPRISE-WIDE DIGITAL INNOVATION: INVOLVING NON-IT EMPLOYEES

Research Paper

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Abstract

Today's incumbent organisations are under pressure to proactively leverage their resources for digital innovation. Enterprise-wide initiatives hold potential in this regard by enabling employees across departments to contribute their knowledge, skills, and creativity towards digital innovation. However, IT units often struggle to transfer the ideas of non-IT employees into marketable digital solutions. Our understanding of how organisations coordinate and integrate employees' contributions to digital innovation is limited, yet critical to their survival and growth. Taking a resource-based approach, we identify three complementary competences –orchestration, self-orchestration, and choreography– that support enterprise-wide digital innovation. Specifically, we report how these competences helped an incumbent organisation initiate digital innovation with its non-IT employees while making efficient use of its IT resources. Our study further shows that building these competences requires the strategic use of digital artefacts and their multiple roles in the innovation process.

Keywords: Digital Innovation, Orchestration, Competence, Employees.

1 Introduction

In today's highly competitive and dynamic environments, successful organisations leverage digital technology to continuously renew and transform their work routines, processes, and business models (Legner et al., 2017). The growing pressure for digital innovation has transformed the demands placed on employees (Peppard, 2018), especially in incumbent organisations (Svahn et al., 2017). On the one hand, IT employees, whose primary role pertains to maintaining the existing technology landscape, are now also required to apply their technical skills and knowledge to develop innovative ideas into marketable digital solutions (Urbach et al., 2017). On the other hand, non-IT employees, whose primary role revolves around business processes and customer needs, are expected to generate innovative ideas through their day-to-day use of digital technology (Shao et al., 2021). While IT employees are readily understood as core digital innovators, non-IT employees generally sit at the periphery of digital innovation activities (Opland et al., 2021) where they "are assumed to innovate without being supported by well-designed innovation practices" (Neyer et al., 2009, p.415). Enterprise-wide initiatives can help unlock non-IT employees' neglected potential for the initiation of digital innovation and combine the complementarity contributions of IT and non-IT employees (Opland et al., 2020).

Enterprise-wide initiatives for digital innovation, such as internal crowdsourcing contests and idea campaigns, aim to involve employees across functional departments in the rapid development of marketable digital solutions (Zuchowski et al., 2016; Reibenspiess et al. 2020). Tapping into the wealth of knowledge that non-IT employees hold can, however, result in diverse, emergent, and ill-defined

contributions that IT units struggle to act upon (Blohm et al., 2013). This challenge is exacerbated by the inherent ambiguity of digital technology, coupled with the limited digital expertise of non-IT employees, and the highly iterative nature of innovation development (Arvidsson and Monsted, 2018). Failing to adequately coordinate and integrate employees' contributions can trigger inefficiencies in the use of IT resources, notably when ideas are to be transferred into marketable digital solutions by IT staff (Ciriello et al., 2019). Such inefficiencies can undermine the success of the enterprise-wide initiatives and ultimately hamper incumbents' ability to respond to digital trends (Kohli and Melville, 2019).

As digital innovation continues to be generated primarily within organisational boundaries (Mamonov and Peterson, 2021), understanding how employees can contribute their knowledge, skills, and creativity is essential to incumbents' survival and growth (Peppard and Ward, 2004; Peppard, 2018). Despite recent studies into how employees navigate the digital innovation process (Arvidsson and Monsted, 2018; Svahn et al., 2017), research on the initiation of digital innovation remains scarce (Kohli and Melville, 2019). Similarly, research on non-IT employees' involvement in digital innovation is still in its infancy (Opland et al., 2020). To better understand how incumbents generate digital innovation and strengthen their competitive advantage with internally available resources, we ask: *How can incumbent organisations coordinate and integrate their employees' contributions to digital innovation?* We build on the capabilities and orchestration literature, which we aim to enrich with exploratory insights into how employees can efficiently contribute to digital innovation.

We address our research question with a case study of digital innovation at an incumbent organisation in the fragrance industry. Specifically, we study its organisational initiatives that aim at initiating digital innovation with employees across functional departments. At the time of the study, the case organisation employed roughly 7'000 employees worldwide in its main business units (i.e. fragrances and flavours) and transversal support units (i.e. human resources and information systems). The case constitutes a revelatory example of how well-established and traditionally structured organisations, whose core business is not historically built around digital technologies, involve non-IT employees to seize digital innovation opportunities. The digital innovation initiatives we studied derived from the case's overall strategy for digital transformation and thus benefited from strong top-management support. This support provided the newly created department for digital innovation with freedom to gradually refine how contributions had to be coordinated and integrated. This in turn enabled the organisation to develop three competences for enterprise-wide digital innovation: orchestration, self-orchestration, and choreography. The organisation further learnt that harnessing the different roles that digital artefacts enact in the innovation process is key for these competences to take shape and grow. We view the identification of these three organisational competences and supporting role of digital artefacts as our main research contributions.

This paper is structured as follows. We first review the capabilities literature for enterprise-wide digital innovation and articulate orchestration as our analytical lens. We then outline our methodological approach and demonstrate how our case developed three competences to coordinate and integrate employees' contributions to digital innovation while making efficient use of its IT resources. We further show how developing these competences critically relied upon the strategic use of digital artefacts in the innovation process. We conclude by discussing theoretical implications for digital innovation and IS strategy research and practical implications for managers who wish to foster digital innovation in an enterprise-wide manner.

2 Background

2.1 Building enterprise-wide capability for digital innovation

The resource-based view and capabilities literature have established themselves as the most widely used theoretical frameworks for the study of digital innovation within the Information Systems (IS) discipline (Mamonov and Peterson, 2021). Anchored in the field of strategic management (Mahoney and Pandian, 1992), the resource-based view argues that competitive advantage derives not primarily from industry characteristics but from the valuable and rare resources that organisations possess and that are difficult

for competitors to substitute or imitate (Wade and Hulland, 2004). The capabilities literature adds that it is not the mere possession of such resources but their strategic use that leads to superior performance (Eisenhardt and Martin, 2000; Teece et al., 1997). Accordingly, organisational capabilities are generally defined as organisations' ability to generate value by leveraging skills, technologies, and processes for strategic differentiation (Wade and Hulland, 2004). As such, they tie together a set of interrelated organisational competencies. In the IS discipline, organisational competencies have been defined as organisations' ability to deploy valuable resources (i.e. information, systems and technology, knowledge, and skills) via dedicated processes, roles, and structures (Peppard and Ward, 2004). The concepts of capabilities, competences, resources, and the relationship between them, offer a coherent framework to understand how organisations can leverage their resources for digital innovation and competitive advantage (Peppard, 2018).

The capabilities literature shows growing consensus that non-IT resources critically contribute to sustainable competitive advantage, particularly in contexts of fast-paced digital innovation (Kohli and Melville, 2019). Early studies in IS had already reported that digital technology by itself cannot yield a sustainable competitive advantage (Clemons and Row, 1991). Just as little can the IT unit possess all the necessary resources for digital innovation (Peppard and Ward, 2004). Indeed, managerial skills (Mata et al. 1995), business resources (Powell and Dent-Micallef, 1997), and business vision (Feeny and Willcocks, 1998) are recognised non-IT variables for IT-driven competitive advantage. More recent work reported on how non-IT employees, that is employees acting outside a formal IT role, critically contribute to developing digital innovation as ideators (Shao et al., 2020), corporate entrepreneurs (Arvidsson and Monsted, 2018), and subject matter experts (Svahn et al., 2017). Fostering such an enterprise-wide approach to digital innovation calls for organisational capabilities that support employees' efforts beyond the boundaries of the IT unit (Opland et al., 2020).

Existing research into the capabilities for digital innovation has provided valuable insights in this regard, yet from a remarkably high level of abstraction and with limited attention to contributing actors (Mamonov and Peterson, 2021). The dominant focus on a general and high-level digital capability may help explain current misalignments between market demands and organisational capabilities for digital innovation (Kohli and Melville, 2019) and incumbents' failure to respond to digital trends (Kane et al., 2015). High-level abstractions seem to offer only limited guidance to practitioners, and we focus instead on the competences that help organisations leverage their internal resources for digital innovation. More specifically, we focus on non-IT employees and how their knowledge, skills, and creativity can contribute to digital innovation (Shao et al., 2020). Moreover, we consider the coordination and integration of non-IT employees' contributions with the IT unit, since IT employees generally transfer ideas into marketable digital solutions (Ciriello et al., 2019). In our quest for more granular insights into the competences that support enterprise-wide digital innovation, we next turn to orchestration as a potential lens to study the integration and coordination of employees' contributions to digital innovation.

2.2 Orchestrating contributions to digital innovation

Leading scholars in innovation management have pointed at orchestration as a potent conceptual lens to capture the coordination and integration of value co-creation in collective innovation efforts (Dhanaraj and Parkhe, 2006; Nambisan and Sawhney, 2011; Nambisan et al., 2017; Wind et al., 2009). While its conceptual roots can be traced back to musical performance (Adler, 2016), orchestration first found its way into the IS literature in studies of service architecture (Daniel and Pernici, 2016) and more recently gained momentum in digital innovation management research (Vega and Chiasson, 2019). Considering its inherent focus on the coordination and integration of heterogenous and dynamic contributions, orchestration may provide a valuable lens to investigate how digital innovation forms and evolves with distributed innovation agencies (Lyytinen et al., 2016; Yoo et al., 2010). Specifically, there have been calls to study how orchestration unfolds in the context of digital innovation, how organisations can organise for it, and what role digital artefacts play in shaping, enabling, and constraining orchestration (Nambisan et al., 2017).

Orchestration has already proven useful to the study of a broad range of phenomena related to the management of digital innovation, such as (1) innovation networks (e.g. Dhanaraj and Parkhe, 2006), (2) problem-solving organisations (e.g. Nambisan and Sawhney, 2011), and (3) employee-driven innovation (e.g. Opland et al., 2020). The study of innovation networks (1) approaches orchestration predominantly from an inter-firm perspective, with scholars investigating how "hub firms" centrally coordinate and integrate organisational contributions in innovation networks. Dhanaraj and Parkhe (2006) for instance define network orchestration as "the set of deliberate, purposeful actions undertaken by the hub firm as it seeks to create value (expand the pie) and extract value (gain a larger slice of the pie) from the network" (p.659). Accordingly, orchestration is concerned with how distributed innovation agencies can be governed (Nambisan and Sawhney, 2011) for their diverse knowledge to be successfully integrated (Dhanaraj and Parkhe, 2006). Wind et al. (2009) notably find that effective orchestration requires a delicate balance between control and empowerment of firms within the innovation network.

While innovation networks approach orchestration from an inter-firm perspective, research on problem-solving organisations (2) takes both an intra- and inter-firm approach to the study of orchestration (Afuah and Tucci, 2012; Urbinati et al., 2021). It primarily conceives of orchestration as the matching of contributions from various actors located within or outside the firm. Nambisan et al. (2017) argue that "in problem-solving organisations, a loosely connected crowd of 'contributors' can be identified and mobilised by a digital technology or person serving—either temporarily or more permanently—to orchestrate the crowd" (p.230). The orchestrating entity integrates and coordinates contributions from a distributed innovation agency whose actors traditionally operate separately from each other (von Hippel and von Krogh, 2015). To do so, it must establish a common understanding of problems and solutions among actors with diverse backgrounds and areas of expertise (Dorst and Cross, 2001). Urbinati et al. (2021) note how adopting and leveraging digital technologies in the innovation process can help start, sustain, and shape collaboration between actors who typically show little cross-collaboration.

Finally, the intra-firm perspective of orchestration (3) finds increasing resonance in the study of employee-driven digital innovation (Opland et al., 2020, 2022), digital entrepreneurship (Nambisan, 2017) and corporate entrepreneurship (Arvidsson and Monsted, 2018). Research efforts in these fields revealed that innovative ideas with digital core components have greater levels of inherent ambiguity, making it difficult to communicate them clearly (von Briel, 2018). As a result, it is often challenging to efficiently develop and extract business value from employees' ideas for digital innovation (Blohm et al., 2013). A balanced approach between top-down and bottom-up initiatives is often needed to successfully harness employees' digital innovation potential (Svahn et al., 2017). Organisational initiatives such as idea campaigns can for instance help organisations manage innovation activities in a sub-process that is somewhat sheltered from surrounding organisational processes (Krejci and Missonier, 2020). This temporary decoupling from rigid organisational processes is essential to enable employees to iterate on their ideas before attempting to scale (Arvidsson and Monsted, 2018). Digital artefacts, that is underspecified representations of an envisaged digital solution (e.g. PowerPoint slides, software application prototypes), can support the decoupling from and recoupling to organisational processes and thereby optimise the use of IT resources for digital innovation (Ciriello et al., 2019).

To synthesise our literature overview, extant research into organisational capabilities and digital innovation has mostly overlooked the growing participation of non-IT employees in the initiation of digital innovation and the associated coordination and integration challenges. Research on orchestration provides insights in this regard by investigating how a central entity can coordinate and integrate contributions to innovation with distributed actors. It has notably highlighted the challenge of knowledge integration between actors who traditionally operate separately and the potential of digital artefacts to support such cross-boundary collaboration. It has also pointed out difficulties to align the efforts of distributed innovation actors because of their conflicting needs for empowerment and control when generating digital innovation. However, the literature remains silent on how this applies to enterprise-wide digital innovation within incumbent organisations. This gap is especially problematic as digital innovation is primarily developed within organisational boundaries, where only a minority of ideas achieving commercial success (Mamonov and Peterson, 2021; KPMG, 2020). We build on the

capabilities and orchestration literature to further investigate how incumbents integrate and coordinate employees' contributions to digital innovation.

3 Methodology

3.1 Data collection

Our overall aim with this paper is to shed light on the organisational competences that firms must possess to turn their employees' digital innovation potential into a sustainable competitive advantage. Exploring such a complex and emergent phenomenon calls for an in-depth understanding of social and technological interactions in a real-life context (Yin, 2014). We thus settled for a qualitative research approach based primarily on participant-observation and semi-structured in-depth interviews at our case organisation, and further complemented by expert interviews and secondary data for triangulation (Klein and Myers, 1999). This work is part of a larger research project aimed at understanding organisational initiatives, processes, and competences for digital innovation. When we first established contact with the case organisation in January 2019, it had set up structures (i.e. digital innovation department) and deployed initiatives (i.e. idea management programme with multiple ongoing idea campaigns, digital showroom, digital innovation workshops) specifically dedicated to generating digital innovation with its employees.

Date	Role of respondent	Duration (#minutes)
2019-05-10	Digital Innovation Director	120
2019-05-31	Digital Innovation Director	105
2019-06-13	Digital Innovation Lead EU	60
2019-06-26	HR Manager (idea campaign/workshop participant)	60
2019-07-02	Innovation Specialist	120
2019-07-09	Digital Innovation Lead AM	90
2019-07-10	Manufacturing Global Director (idea campaign participant)	30
2019-07-11	Global Creative Director (idea campaign/workshop participant)	60
2019-07-15	Product Development Director (idea campaign/workshop participant)	45
2019-07-16	Field Support Technician (idea campaign participant)	45
2019-07-23	Digital Innovation Senior Lead	30
2019-08-30	Digital Innovation Director	45
2019-10-10	Digital Innovation Lead AM	30
2019-11-07	Digital Innovation Lead EU	50
2019-11-22	Innovation Specialist	90
2020-01-17	Digital Innovation Director	60
2020-02-03	Digital Innovation Lead EU	45
2020-04-30	Innovation Specialist	60

Table 1. Overview of semi-structured in-depth interviews.

We collected our case study data between March 2019 and May 2020. In a first step, one author performed six months of participant-observation in the digital innovation department, collecting internal documents (i.e. strategy roadmaps and reports, meeting memos) and interacting with the department's digital infrastructure (i.e. intranet, idea management system, prototyping software). After having spent the first two months on site familiarising with the company's overall structure and the department's history, mission, and main activities, we acknowledged a strong fit between the case and our research interests. While participant-observation was still ongoing, a second author was therefore introduced to the case to conduct semi-structured interviews with members of the digital innovation department and employees who participated in idea campaigns and digital innovation workshops. The familiarity we had acquired with the case up to that point was highly valuable in identifying suitable interviewees,

locating additional information, and contextualising emerging insights. Over approximately one year, we performed a total of 18 interviews ranging from 30 minutes to two hours (see Table 1). We used a flexible interview guideline with an initial focus on idea development, which we gradually adapted to capture how our case coordinated and integrated employees' contributions to digital innovation in its enterprise-wide initiatives. Next to the interviews, the second authors further engaged with the case by visiting the internal showroom dedicated to emergent prototyping technologies and inhouse digital innovation projects, and by participating in a full-day workshop designed to develop innovative e-commerce solutions with employees. Both the showroom and workshop allowed for rich and informal interaction with members of the digital innovation department, employees from business and IT departments, and externally mandated designers, and offered complementary insights into our case's initiatives for enterprise-wide digital innovation. We transcribed the interviews and synthesised key insights from the participant-observations in a research report.

3.2 Data analysis

We analysed the data in the same order it was collected. We developed our initial coding scheme based on our synthesis of the digital capabilities and orchestration literature. This initial code set focused our analytic attention on competences, processes, practices, and resources that underlie the initiation of digital innovation. We allowed our initial code set to evolve and shift to account more explicitly for the involvement of non-IT employees and their use of digital artefacts in the innovation process. This enabled us to deeply explore how IT and non-IT employees' contributions were coordinated and integrated in our case's digital innovation initiatives. Specifically, we gradually added a set of inductive codes to capture how self-orchestration and choreography competences emerged from our data. We notably captured with codes how the coordination and integration of employees' contributions was critically supported by digital innovation practices performed at the level of individual employees. We further coded how digital technology, and more specifically digital artefacts, supported these individual practices, which led us to surface tensions between employee empowerment and control. Finally, we favoured a rich analysis by adding codes about our case's competitive environment, corporate structure, and strategy. We added the inductive codes as our analysis progressed and we regularly went back and forth between the literature and our data to check for existing scholarly knowledge. Two authors coded the data using the MAXQDA coding software. They started by discussing the initial coding scheme to reach a common understanding of the deductive codes and then frequently met to discuss new insights and resolve discrepancies in their understanding of the emerging codes. Next, we organise our findings according to salient managerial interventions that enabled our case to deploy and refine its enterprise-wide initiatives for digital innovation (i.e. its idea management programme, digital showroom, and digital innovation workshops). We show how these interventions were instrumental in developing three organisational competences (i.e. orchestration, self-orchestration, choreography) and strengthening our case's capabilities for digital innovation.

4 Building enterprise-wide digital innovation

Innovation at our case was historically driven by R&D activities. Like other firms in the perfumery industry, it had emphasised operational optimisation over radical rethinking of product lines. Outside of R&D, managers would oversee innovation as they saw fit. Due to tight schedules, business units would rarely act upon bold new ideas, especially when they included digital components. With the IT unit focused on maintaining the existing technology landscape, digital technology exploration largely boiled down to handling business request for software applications and data integration. Yet at the same time, digital-savvy new entrants caused turbulence in the historically stable perfumery industry. Threatened by the disruptive potential of artificial intelligence and mass customisation, major players were merging or formed alliances with technology giants in hope of fruitful partnerships. Our case's traditional corporate culture and long history of organic growth, however, prohibited such an approach. Instead, the growing competitive pressure led our case to deploy enterprise-wide initiatives for digital innovation.

4.1 Launching digital innovation initiatives

When our case announced its digital transformation strategy in March 2018, it outlined a vision for digital innovation built around five pillars: creativity (workstations), clients (e-commerce), sustainability (traceability), legacy (operations), and people (recruiting). Overall, the strategy aimed at renewing and transforming existing processes, work routines, and business models using digital technology. By disconnecting innovation from traditional R&D pipelines, it was further meant to accelerate ideas' time to market to keep pace with the competitive landscape. Until that point, there had not been a systematic approach to innovation outside of R&D departments, nor to digital innovation outside the IT unit. To help implement this digital transformation strategy, our case consolidated its team of "innovation mavericks" into a formal department for digital innovation. The department's primary mission was to marshal internal resources and apply them to digital innovation. To help fulfil this mission, it implemented enterprise-wide initiatives that would help locate such resources, before coordinating and integrating them for value creation. Most prominently, the department decided to leverage initiatives to harness non-IT employees' largely untapped potential for digital innovation. This is not to say that the initiatives were deployed as initially planned. The department indeed faced unexpected hurdles due to the diverse, emergent, and ill-defined nature of employees' contributions to digital innovation. These challenges were addressed by iterative refinements in how the initiatives were carried out, which in turn allowed for three competences to form and develop: orchestration, self-orchestration, and choreography. Labels in italic and brackets refer to Table 2 in the next section.

4.2 Structuring the digital innovation process

Upon its formation in March 2018, the digital innovation department assessed what initiatives would best support the organisation's overall digital transformation strategy. The growing trend towards co-creating innovation in other organisations suggested that internal open calls for ideas could tap into employees' business knowledge, skills, and creativity across functional departments. Various idea campaigns and an underlying idea management system indeed allowed the department to centrally harness internal efforts for digital innovation (*orchestration – marshal*). However, such an enterprise-wide approach represented a dramatic shift from how our case had traditionally practiced innovation. Specifically, innovation was no longer performed by specialised teams only but by distributed employees with a variety of functional backgrounds. Practically speaking, our case had to strengthen its ability to break functional silos, especially between business units and IT staff. The department played a key role in this regard: *"Our mission is to connect the dots internally, avoid working in silos, and integrate ideas." – Digital Innovation Lead EU*. To help coordinate and integrate contributions to digital innovation, the department structured idea development activities into a stage-gate process with predefined phases, actors, and roles. The process defined the level of involvement of non-IT employees and IT staff, with non-IT employees' involvement being strongest in the early phases of idea generation while IT involvement peaked in later phases of technical development. Furthermore, each phase was punctuated by a mandatory and scheduled stage-gate where employees pitched their ideas to managers and IT staff. The stage-gate presentations provided an opportunity to merge similar ideas, split complex ideas into multiple projects, reassign unrelated ideas to a different campaign, and discard ideas with low potential (*orchestration – channel*). The ability to successfully channel employees' contributions was strongly dependent on how well the department, managers, and IT staff would understand its conceptual and technical underpinnings. Employees were therefore strongly encouraged to illustrate their ideas with digital artefacts in stage-gate presentations. However, it turned out that employees did not use digital artefacts as initially planned: *"Employees come to the pitch saying: So, I've made some good progress, I produced a new PowerPoint [laughs]. And, as you can see from my completely imaginary business plan, this is the expected performance of my idea." – Innovation Specialist*. Although these digital artefacts proved useful to the department in helping determine which stakeholders could help develop the idea in line with the overall business strategy, it turned out to be of little value to employees and their innovation practices. This observation made the department wonder how to leverage employees' digital creativity and prototyping skills more efficiently.

4.3 Unlocking the digital creativity of employees

The early focus on idea management resulted in a predominantly linear approach to digital innovation. This was further exacerbated by the strong reliance on IT staff for technological development, which caused iterative rounds of digital prototyping to be prohibitively costly and time consuming. While the stage-gate logic provided a good fit with our case's project management practices, it ultimately made employees unable to iteratively experiment with digital technologies to explore their ideas. As a member of the digital innovation department put it: *"What we are missing is the iterative approach. I mean do we allow ourselves to redefine an idea and to reconsider the relevance of a problem? That's where it gets stuck." – Innovation Specialist*. The IT unit constituted a bottleneck that caused emergent feedback to be disregarded in fear of missing stage-gate targets. A member of the digital innovation department summarised: *"[Employees] are thinking: 'I committed budget to this idea, and people are working on it. I can't just tell them to stop everything and work on this other idea I had which seems much more promising according to external feedback'. The process is not fluid enough to allow for this." – Innovation Specialist*. Unlocking non-IT employees' creativity required digital prototyping to be more independent from the IT unit (*self-orchestration – decouple*). Some non-IT employees had started to experiment with rapid prototyping tools for themselves to help crystallise the envisioned digital solution. The department eagerly supported these isolated efforts by setting up a digital showroom featuring innovative digital technology (e.g. virtual reality headsets, 3D printers, artificial intelligence software) to provide inspiration for physical and virtual prototyping. Promoting digital prototyping activities among non-IT employees was expected to reduce the need for IT staff in the early stages of idea development and stimulate iterative development (*self-orchestration – iterate*). It indeed allowed to show prototypes to target users early on, to test multiple draft versions quickly, and to continuously learn from their feedback: *"So what we did in terms of prototyping was kind of prototyping a platform. But it since evolved… And you know that's the thing too! Sometimes these things just evolve… Some things start to shift and change as you go [laughs]. It's a constantly evolving kind of project." - Global Creative Director*. Ultimately, this gave employees the ability to orchestrate contributions to their projects on an individual level: *"I have also presented the prototype to key stakeholders within [the firm], so all the other global leads are familiar with this... Technology people here, fragrance design, people working on emotions… So, I loop them in. And that's a key part of the process, looping in all the key people who might have a role or might be able to help." – Global Creative Director*.

4.4 Consolidating digital prototyping activities

When the digital innovation department met in July 2019 to set the strategic focus for the coming year, the need to strengthen digital prototyping activities emerged as a strong priority. Indeed, several dozen prototypes had been kicked off since March 2018, yet an overwhelming majority remained stuck in various stages of development because of scarce IT resources: *"The irritating aspect for us is that we lack 'doers'. We don't have designers and we don't have developers. When we must prototype something, it's very complex." – Digital Innovation Director*. To help streamline ongoing digital prototyping activities, an UX designer joined the digital innovation department. The hire benefited the department in that it complemented the team's current expertise with low-code prototyping skills that allowed to leverage IT and non-IT employees' contributions more efficiently (*choreography – streamline*). The low-code prototyping platform featured reusable visual components for software application development. These building blocks allow to quickly develop, test, and refine functional high-fidelity prototypes in an experimental environment without running the risk of impacting the existing IT infrastructure. Inside the boundaries of the platform, ideas could be explored without the constraint of involving IT staff, yet with the benefit of creating digital artefact that could easily be understood by IT staff in later stages of technical development (*choreography – align*). Even though low-code technology had not yet been widely adopted throughout the organisation, it had proven potential for the coordination and integration of employees' contributions in digital innovation workshops: *"Our designer uses low-code when he prototypes digital applications with employees in our workshops. It really makes a difference in how we involve stakeholders. We're better able to tell IT what*

we want from them and avoid unnecessary costs… We'd like to use it at larger scale internally but for now I think we're not quite ready for it." – Digital Innovation Director.

5 Discussion

Organisations that foster innovation are experimentative – eager to embrace new ideas regardless of their origins. Employees readily come up with innovative ideas relative to their day-to-day use of digital technology and therefore constitute a potent and prolific resource for digital innovation (Shao et al., 2021). Since employees' contributions to digital innovation tend to be diverse, emergent, and ill-defined, innovation research has long examined how managers can promote high quality contributions (Gerlach and Brem, 2017) and efficiently assess ideas for further development (Blohm et al., 2013). These aspects will only become more relevant as digital technology offers novel and often unexpected ways for employees to generate innovations (Arvidsson and Monsted, 2018). However, non-IT employees' increased involvement in digital innovation transforms organisational innovation in more fundamental ways (Nambisan et al., 2017). Thanks to the ability of digital artefacts to support innovation practices (Ciriello et al., 2019), orchestration processes are more likely to unfold also at the individual level, with non-IT employees taking an active role all along the idea development process. In contrast to how innovation management research has generally conceptualised employees' role as that of idea providers in a clear-cut initiation phase (Zuchowski et al., 2016), our case understood that all employees, including those with minimal technical skills, may actively contribute to digital innovation in overlapping phases of initiation, development, and implementation. These transformations in the management and practice of digital innovation required our case to reassess its capabilities for digital innovation. To explore this further, we identified three competencies that jointly enabled our case to strengthen its capabilities for digital innovation in an enterprise-wide manner: orchestration, self-orchestration, and choreography. We further observed how digital artefacts and the multiple roles they enact in the innovation process were instrumental in building these competences. Table 2 provides an overview of our analysis.

	Orchestration	Self-orchestration	Choreography
Key challenges	Employees' various backgrounds cause contributions to be **diverse**.	Employees' active involvement causes contributions to be **emergent**.	Employees' lack of digital expertise causes contributions to be **ill-defined**.
Managerial interventions	- Launch idea campaigns - Structure innovation process - Negotiate IT resources	- Acknowledge IT bottleneck - Set up digital showroom - Promote digital prototyping	- Hire UX designer - Refine innovation workshops - Optimise IT resource use
Main objective	*Oversee contributions to digital innovation.* **Marshalling** employees' ideas for digital innovation enabled the department to **channel** efforts towards strategic opportunities.	*Enhance self-efficacy for digital innovation*. **Decoupling** digital prototyping activities from the IT unit brought economic freedom via low-cost development and enabled employees to **iterate** quickly.	*Build a common understanding of digital innovation*. **Streamlining** digital prototyping activities helped **align** IT and non-IT employees' contributions to digital innovation.
Case illustration	Employees' stage-gate presentations enabled the department to guide idea development with key business and IT stakeholders.	Low-code technologies allowed employees to explore contradictory insights and pivot independently from the IT unit.	Prototyping platforms incorporated technological guidelines that eased the transition towards a deployable digital artefact.

Table 2. Overview of the narrative and competence analysis.

5.1 Competences for enterprise-wide digital capability

The *orchestration competence* builds on the idea that organisations must centrally coordinate and integrate contributions to digital innovation as innovation boundaries become more diffuse (Nambisan et al., 2017). Our case started developing its orchestration competence early on in the deployment of its digital innovation initiatives. It materialised as a deliberate effort driven by top-management to create new organisational structures for the purpose of involving non-IT employees in digital innovation. Accordingly, the coordination and integration of employees' contributions was performed centrally by the digital innovation department, with the benefit of creating a safe space where non-IT employees

could experiment with digital technology and obtain resources to develop their ideas. The idea campaigns that were launched and overseen by the department channelled employees' efforts towards a specific business opportunity. The stage-gate process directed participants' contributions by formally defining phases, actors, and roles. Accordingly, IT staff and non-IT employees were incentivised to collaborate at specific points in the idea development process and this was gradually refined to make the most efficient use of available IT resources. As orchestration stems from the need to combine knowledge and skills that are scattered across the organisation, it is important to consider how different structures help integrate knowledge in practice (Iho and Missonier, 2021). For instance, organisations increasingly deploy digital innovation labs as alternative structures to integrate business and IT knowledge (Holotiuk and Beimborn, 2019). These structures affect the roles and responsibilities of the IT unit when it comes to exploration and alter the organisation's economic and political logics regarding digital innovation (Goebeler et al., 2020). The expression and effect of orchestration competences may thus vary across organisations.

The *self-orchestration competence* extends on the idea that employees must integrate and coordinate contributions on an individual level when they develop digital artefacts. Previous research recognises the inherent ambiguity of digital artefacts (Leonardi, 2011) and the difficulty for employees to clearly communicate the purpose and potential of ideas with digital core components (Ciriello et al. 2019). In fact, digital artefacts can have divergent meanings to stakeholders with different backgrounds (Briel et al., 2018). In our case, employees experimented with rapid prototyping tools to help themselves and others make sense of ambiguous contributions. Digital technology thus served as a tool to facilitate the coordination and integration of IT and non-IT employees' contributions at the individual level, and this ultimately resulted in a more efficient use of IT resources. Table 2 notes in this regard how decomplexifying technical tasks was a critical enabler for self-orchestration as it helped non-IT employees to explore ideas themselves with their digital prototypes. Employees as active co-creators in a distributed digital innovation process has been previously observed in the literature (Mueller and Renken, 2017) and, as our case shows, requires a rudimentary understanding of IT by non-IT employees. We thus view orchestration and self-orchestration as complementary competences, especially with regards to guiding employees in digital prototyping efforts (Majchrzak and Griffith, 2021).

The *choreography competence* is for now quite poorly understood. In their study of digital innovation management at Volvo Cars, Svahn et al. (2017) suggest that organisational initiatives do not necessarily lead to successful digital innovation because of competing concerns triggered by underlying shifts in organisational logics. In our case, employees' experimentations with digital prototyping tools caused competing concerns in innovation governance because of the blurred boundaries between employee empowerment and control (Majchrzak and Griffith, 2021). Our case indeed needed to establish governance mechanisms that would guide employees' behaviour without excessively constraining their digital creativity (Wareham et al., 2014). As Table 2 notes, low-code technology was part of the answer in that it lowered the barrier for technical development by non-IT employees, while at the same time providing a guiding canvas for digital prototyping that was in line with the overall IT strategy. Choreography thus complemented orchestration and self-orchestration competences in that it helped align employees' contributions and further enhance the use of IT resources. Future research on choreography may build upon the paradox perspective (Ciriello et al., 2019) to understand how digital artefacts simultaneously enable and constrain digital innovation practices.

Finally, we find that digital artefacts simultaneously served as an avenue to guide development and implementation, to uncover needs and assumptions, and to align understandings and interests in digital innovation initiatives (Ciriello et al. 2017; von Briel et al., 2018). Table 3 illustrates the multiple roles of digital artefacts. Owing to this multiplicity of roles, non-IT employees could free themselves from traditional innovation processes in streamlined innovation practices. As such, digital technology may constitute both a liberating and a constraining force for employees. While we have started to gain a better understanding of how digital artefacts support individual innovation practices in recent years (Ciriello et al., 2019), research is far from conclusive on how organisations should address this tension. Our case organisation demonstrated the benefits of orchestration, self-orchestration, and choreography in this regard. However, the use of digital artefacts in employees' innovation practices may differ

significantly and organisations may therefore need to consider complementary competences to successfully mitigate the tension between employee empowerment and control. As digital artefacts offer tremendous potential for digital innovation, future research would do well to investigate the relationship between their use in innovation practices and organisational competences for digital innovation. In particular, understanding nuances in how the plural role of artefacts enhance the use of IT resources in digital innovation may constitute a promising avenue for research (Ciriello et al., 2017; Nicolini et al., 2012; Nambisan et al., 2017).

Role	Definition (Ciriello et al., 2017; Nicolini et al., 2012)	Case illustration	Competence
Activity object	Activity objects embody different types of knowledge, thereby generating contradictions, triggering collaboration, directing activities, and sparking innovation.	The department leveraged digital artefacts to oversee idea development and enhance its fit with strategic interests *(guide development and implementation)*.	Orchestration
Epistemic object	Epistemic objects embody what one does not yet know and thereby generate desire and attachment through their unfulfilled nature.	Employees used low-code prototyping technology to unearth needs and challenge assumptions with key stakeholders *(uncover needs and assumptions)*.	Self-orchestration
Boundary object	Boundary objects enable collaboration by developing and maintaining coherence across social worlds.	Prototyping platforms promoted a shared understanding of the envisioned solution and helped guide technical implementation *(align understandings and interests).*	Choreography

Table 3. Overview of digital artefacts' multiple roles and related competences.

5.2 Implications for research and practice

The focus of capabilities research in the IS discipline has significantly evolved over the last decades (Wade and Hulland, 2004). While research initially aimed to understand how IT resources could provide a sustainable competitive advantage (Clemons and Row, 1991), subsequent studies also recognise the strategic potential of non-IT resources (Mata et al., 1995). The focus consequently shifted from how to set up IT units (Bharadwaj et al., 1998; Feeny and Willcocks, 1998) to how to develop enterprise-wide capabilities for digital innovation (Peppard, 2018). Today, it is clear that innovating with digital technology is a complex phenomenon that requires organisations to reassess their approach to innovation management (Vega and Chiasson, 2019; Kohli and Melville, 2019). Considering the disruptive potential of digital technologies, numerous calls have been made to examine how organisations can strategically harness their IT and non-IT resources to strive in such dynamic environments (Arvidsson and Monsted, 2018; Nambisan et al., 2017; Svahn et al., 2017; Shao et al., 2021).

The three competences we have identified suggest several implications for IS research and practice. To underline the novelty and impact of our research, we discuss our main findings with regards to three emerging trends in IS strategy research as described in Teubner and Stockhinger (2020).

First, IS strategy research is reassessing its understanding of IS strategy development (Teubner and Stockhinger, 2020). Rather than being driven solely by top management and the exploitation of existing technologies and use cases, IS strategy is increasingly acknowledged to derive from the explorative use of technology at all levels of the firm (Peppard et al., 2014). Our findings add to this by highlighting the role of digital artefacts for enterprise-wide experimentation and learning "with a sense of direction and purpose" (Teubner and Stockhinger, 2020, p.4). Specifically, our case encouraged non-IT employees to contribute their exclusive and highly contextualised business knowledge to digital innovation using digital prototypes such as low-code applications. Harnessing non-IT employees' digital creativity with digital artefacts put our case in a better position to identify and act upon opportunities that top managers would have missed. We argue that non-IT employees participate in IS strategizing when they transform their ideas for digital innovation into implementable concepts with the help of digital artefacts. Our case understood that extending strategy development to non-IT employees calls for a digital innovation governance that creates a safe space for employees to flexibly develop their ideas, while guiding their

creativity to ensure the efficient use of available IT resources. Other organisations can learn from our case in this regard, especially when it comes to balancing empowerment and control with orchestration, self-orchestration, and choreography competences and digital artefacts, such as low-code development platforms. Managers would do well to reflect on how the structures they implement enable and constrain non-IT employees' participation in IS strategy development.

Second, IS strategy research increasingly acknowledges the blurring of IT and business capabilities and the need for IT-enabled business capabilities (Teubner and Stockhinger, 2020). In a world where digital technologies lie at the heart of doing business, digital innovation often originates outside the IT department and viewing IS as a separate organisational unit thus no longer reflects the reality of digital innovation management (Peppard, 2018). Our findings concur that the initiation of digital innovation is not confined to the perimeter of the IT unit. We further argue that capabilities that bridge the language, culture, and skills gap between IT and non-IT employees are key to digital innovation and superior performance. Specifically, our case developed orchestration, self-orchestration, and choreography competences to integrate and coordinate contributions to digital innovation stemming from its IT and non-IT employees. Doing so allowed our case to address the malleability and ambiguity of digital technology (von Briel et al., 2018) and to efficiently deal with the emergent and iterative nature of the digital innovation process (Nambisan et al., 2017). However, much remains to be understood about non-IT employees' increased involvement in IT-enabled business capabilities. In particular, little is known about the challenges non-IT employees face when they perform digital exploration alongside their traditional business role (Holotiuk and Beimborn, 2019) and about the underlying cognitive burden and behavioural requirements they face when switching between exploitation and exploration activities (Iho and Missonier, 2021). While not focusing on the individual level per se, our study supports these research efforts by pointing out managerial interventions that can support non-IT employees' digital innovation practices.

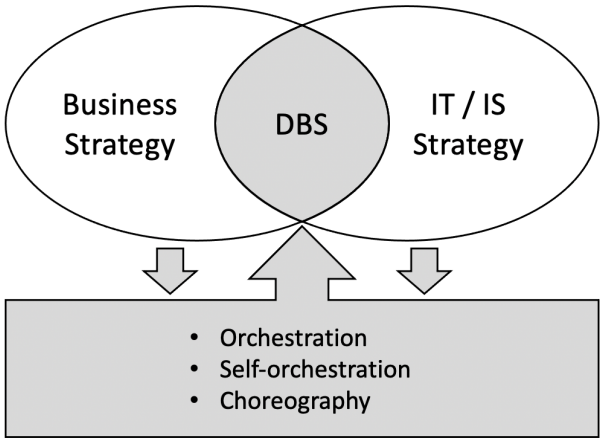

Figure 1. DBS at the intersection of business and IT / IS strategy (adapted from Teubner and Stockhinger, 2020).

Third and last, IS strategy research increasingly acknowledges the interconnectedness of business and IT on a strategic level (Teubner and Stockhinger, 2020). The concept of digital business strategy (DBS) captures how digital technology has become an integral part of business strategy (Bharadwaj et al., 2013). While recognising the importance of business strategy and IT strategy independently, DBS specifically focuses on their intersection and "new concerns in business strategy making that arise from digitalisation" (Teubner and Stockhinger, 2020, p.10). Our findings highlight the participation of non-IT employees in the initiation of digital innovation as one such concern. Specifically, our case had to understand how non-IT employees can make valuable contributions beyond the idea generation phase by leveraging digital technology. It learned to think of non-IT employees' contributions as resulting from the interaction between organisational structures and individual innovation practices, and the supporting role of digital artefacts. We argue that orchestration, self-orchestration, and choreography

competences helped strengthen our case's DBS (i.e. arrow from competences to DBS). Specifically, our case leveraged these three competences to direct non-IT employees' digital innovation efforts towards strategic business opportunities (i.e. arrow from business strategy to competences) while making sure their digital prototyping practices fit with the overall IT strategy (i.e. arrow from IS/IT strategy to competences). At the same time, non-IT employees indirectly shaped our case's business and IT strategies by contributing to DBS (i.e. DBS intersects with business and IS/IT strategy). Figure 1 provides a visual representation of how non-IT employees initiate digital innovation at the intersection of business and IT strategy thanks to orchestration, self-orchestration, and choreography competences.

6 Conclusion

In markets characterised by fast-paced innovation and frequent disruption, organisations long for a sustainable competitive advantage that effectively shelters them from market turbulences and ensures long-term profitability. According to the resource-based view (RBV) of the firm, it is the resources they own and the competences they possess that allow organisations to build distinct capabilities that competitors cannot easily imitate or acquire. Although it is just emerging, we are getting glimpses of how involving non-IT employees in digital innovation critically transforms capabilities for digital innovation from being mostly confined to the IT unit into "enterprise-wide" drivers for competitive advantage.

To explore this aspect, we studied the case of an incumbent organisation and its initiatives for initiating digital innovation with employees. We focused on how the organisation orchestrated employees' contributions over time, especially in terms of how it integrated and coordinated the ideas employees shared, the feedback they received, and the prototypes they built. We view our main contribution in the identification of three competencies that jointly enabled the organisation to create digital innovation with non-IT employees and to strengthen its enterprise-wide capability for digital innovation while making efficient use of its IT resources. The competences we identified –orchestration, self-orchestration, and choreography– underline the shift from employees as a mere source of innovative ideas to employees as active contributors throughout the innovation process and to the organisation's digital business strategy. This shift evidences the need for organisations to actively harness the plural roles of digital artefacts in the innovation process.

We acknowledge limitations to our study. A first limitation is inherent to our single longitudinal case study design. While it is an adequate fit for the emergent nature of the phenomenon and the exploratory nature of our research, investigating a single organisation entails limitations regarding the generalisability of our findings. The reader should thus acknowledge our case's specific context and characteristics before transferring our findings to other organisations. A second limitation lies in our narrow analytical focus on orchestration competences. We acknowledge that other competences may critically underlie enterprise-wide digital capabilities. Yet, we purposefully chose to zoom in on orchestration as we suspected it to constitute a particularly relevant, yet poorly understood, competence for digital innovation with employees. Furthermore, we remained alert to complementary competences (i.e. self-orchestration and choreography) by allowing for novel insights to emerge during our analysis.

This paper aims at providing interesting insights to scholars who study how digital innovations form and evolve within incumbent firms, and how digital artefacts supports this evolution. Whereas our analysis was primarily developed with research in mind, we hope that our findings will also prove useful to managers who wish to gain competitive advantage with digital innovation initiatives that involve employees across functional boundaries. We see fruitful research avenues in investigating orchestration, self-orchestration, and choreography competences in other organisational settings. We thus strongly encourage our fellow researchers to build on our study to further validate, amend, and enrich our understanding of organisations' much-needed capabilities for digital innovation.

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