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Design Thinking Implementation for Innovation:

An Organization's Journey to Ambidexterity

Krithika Randhawa^a

Natalia Nikolova^b

Sumati Ahuja^c

Jochen Schweitzer^d

^a krithika.randhawa@uts.edu.au (corresponding author), Tel. +61-410-911125, University of Technology Sydney PO Box 123, Broadway, NSW 2007, Australia

^b natalia.nikolova@uts.edu.au University of Technology Sydney PO Box 123, Broadway, NSW 2007, Australia

^c sumati.ahuja@uts.edu.au University of Technology Sydney PO Box 123, Broadway, NSW 2007, Australia

^d jochen.schweitzer@uts.edu.au University of Technology Sydney PO Box 123, Broadway, NSW 2007, Australia

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Biographies

Dr Krithika Randhawa is Senior Lecturer of Innovation, Strategy and Entrepreneurship at the Business School, University of Technology Sydney (UTS). Her research examines innovation in context of strategy and digital technologies, with a focus on open innovation, crowdsourcing, digital platforms, ecosystems and business models. Her work appears in leading journals such as the Journal of Product Innovation Management, Journal of Business Research, California Management Review, Journal of Knowledge Management and R&D Management, and as book chapters and industry reports. Krithika carries out research for corporates, SMEs, start-ups, and public sector organisations helping them implement innovation in digital, collaborative settings to deliver business and societal impact. Her work has been recognised with several awards at UTS and internationally.

Dr Natalia Nikolova is Associate Professor in Organization Studies at the University of Technology Sydney Business School. Her research focuses on organization practices, strategy, innovation, and leadership. She is passionate about bringing insights from various disciplines to explore complex issues and phenomena and translate these into practical insights for industry. Natalia has published widely in academic journals, books and industry reports.

Dr Sumati Ahuja is Senior Lecturer in Management at the Business School, University of Technology Sydney, Australia. With over 25 years of experience of working as an architect, she brings cross-functional perspectives from design and innovation to management and organization studies. Her research spans digital transformation and the increasing use of human centered design in private enterprise, from SMEs to Fortune 500 companies and government agencies, among others. Her research has been published in a range of leading international Management and Design journals, including Human Relations, Management Learning, Construction Management and Economics, Journal of Professions and Organization and The International Journal of Design in Society

Dr Jochen Schweitzer is Associate Professor of Strategy and Innovation and Director of Entrepreneurship at the University of Technology Sydney Business School. Trained as both an engineer and a social scientist, his research focuses on issues of strategy, entrepreneurship, and innovation with a special interest in design thinking, emerging technologies, and the future of work. His research is industry involved and applied, looking at how organizations and managers navigate complex business environments at the intersection of strategy, design and technology. His work has been published widely in academic journals, books and industry reports.

DESIGN THINKING IMPLEMENTATION FOR INNOVATION: AN ORGANIZATION'S JOURNEY TO AMBIDEXTERITY

ABSTRACT

Implementing design thinking for innovation (DTI) is seen as a way to balance exploration and exploitation, and thus attain an ambidextrous innovation portfolio. Yet, transitioning to ambidexterity is challenging, and is often met with inertia. So how can managers implement DTI as a path towards ambidextrous innovation? In this article, based on an in-depth longitudinal case study of a leading Australian property development firm and drawing on rich primary and secondary data collected over four years, we examine how middle managers leveraged DTI to respond to inertia generatively, and how this process helped shift the cognitive frame of the organization toward ambidexterity. In our case, the middle manager flexibly implemented three DTI practices—(1) creative problem-solving, (2) sprint execution, and (3) creative confidence—in response to inertia and transition the organization's cognitive frame from an explorative to exploitative, to ultimately an ambidextrous innovation frame. Our argument is that these DTI practices trigger three generative mechanisms—frame flexibility, co-optation, and collective sensemaking—that underpin the cognitive integration that supported this transition. Drawing on these insights, we develop a process framework of how different DT practices and related generative mechanisms can be deployed flexibly to adapt to the interim (explorative and exploitative) innovation objectives over time. We argue that freezing the innovation frame in each phase can trigger a generative response to inertia, which enables the organization to transition more radically to an ambidextrous innovation portfolio. We thus contribute to the limited design thinking research on the role of cognition in DTI implementation, and more generally to innovation management and ambidexterity research on how leveraging DTI to achieve an ambidextrous innovation portfolio is an emergent and adaptive process.

Practitioner points

Organizations seeking to leverage DT as a strategic approach to ambidextrous innovation should:

- Recognize that implementing DT to develop an ambidextrous innovation portfolio is an emergent and adaptive process
- Use DT practices flexibly to negotiate inertia in a generative way when transitioning to ambidextrous innovation
- Acknowledge the central role of middle managers for the effective implementation of DTI.
- Put in place systems and processes that encourage innovation managers to work toward integrating cognitive frames of business unit managers and frontline employees
- Embed practices that augment the cognitive abilities of frontline employees and business unit managers involved with DTI to accelerate the adjustment of an organization's collective cognitive frame toward ambidexterity.

DESIGN THINKING IMPLEMENTATION FOR INNOVATION: AN ORGANIZATION'S JOURNEY TO AMBIDEXTERITY

INTRODUCTION

Design thinking (DT) is the application of design methods and tools to innovation challenges (Micheli et al., 2019; Seidel and Fixson, 2013; Verganti, 2008, 2017). Deploying design thinking for innovation (DTI) has emerged as a way for organizations to develop a portfolio of product and service innovations (Perks, Cooper, and Jones, 2005), innovation strategies (Dell’Era and Verganti, 2010), and competitive advantage (Liedtka and Kaplan, 2019). Although implementing DTI is often difficult (Ben Mahmoud-Jouini, Fixson, and Boulet, 2019; Hölzle and Rhinow, 2019; Micheli, Perks, and Beverland, 2018), researchers have acknowledged that DT can help organizations overcome cognitive challenges when transitioning to new innovation approaches and outcomes (Kolko, 2015; Liedtka, 2015).

A critical cognitive challenge is the transition to ambidextrous innovation—that is, balancing explorative and exploitative innovation while managing competing objectives (He and Wong, 2004; O’Reilly and Tushman, 2013). Explorative innovation refers to radical advances to enter new product-market domains that meet emerging user needs, while exploitative innovation refers to incremental improvements in existing product-market efficiency that meet the needs of existing users (He and Wong, 2004; Jansen, van den Bosch, and Volberda, 2006; O’Reilly and Tushman, 2013). However, the simultaneous pursuit of both requires managers to shift their organization’s innovation frame—the shared cognitive map or mental model of innovation (Kaplan, 2008; Narayanan, Zane, and Kemmerer, 2011)—to one that copes with the competing cognitive agenda of ambidexterity (Karhu and Ritala, 2019; Karhu, Ritala, and Viola, 2016). We refer to such a cognitive frame as the ambidextrous innovation frame.

Research has shown that a shift towards an ambidextrous innovation frame is challenging (Raish et al., 2009) and often met with inertia (Benner and Tushman, 2003; Kaplan, 2008; Randhawa et al., 2021a). As a result, few organizations succeed in achieving explorative and exploitative innovation *simultaneously* (He and Wong, 2004; Tushman and O'Reilly, 1996). In particular, managers struggle with the “exploratory” side of ambidexterity (O'Connor and Rice, 2013), given it involves coping with ambiguity and unpredictability (Vedel and Kokshagina, 2020; Robbins and O'Gorman, 2014). DTI has been conceptualized as a way of balancing exploration and exploitation (Martin, 2009) in situations where ambiguity and uncertainty are high (Liedtka, 2015) and as a cognitive driver of ambidextrous innovation (Zheng, 2018). Yet, there are particular challenges with implementing DT as a path toward ambidexterity (Carlgren, Elmquist, and Rauth, 2016; Butler and Roberto, 2018). Against this backdrop, we lack clarity about *if* and *how* managers can use DTI to help organizations attain an ambidextrous innovation portfolio.

There are three specific gaps in the literature. First, the discussion of DT has mostly focused on defining how DT tools work (Liedtka and Ogilvie, 2011; Seidel and Fixson, 2013), with an emphasis on the implementation of such tools at the team or project levels (e.g., Ben Mahmoud-Jouini, Midler, and Silberzahn, 2016; Hölzle and Rhinow, 2019), leaving us with little knowledge of the organization-level processes of DTI implementation (Micheli et al., 2019; Wrigley, Nusem, and Straker, 2020). As a result, despite notions of the relevance of DT to organizational practices (Brown and Martin, 2015; Gruber, de Leon, George, and Thompson, 2015), we lack insights on how DT can be leveraged for broader organization-level innovation outcomes (Elsbach and Stigliani, 2018), particularly ambidextrous innovation (Zheng, 2018).

Second, existing DT research has focused on the structural rather than cognitive aspects of DTI. From a structural perspective, researchers have considered where a DT function should be located within an organization (D'Ippolito, 2014), how a design function should be organized

(Perks et al., 2005), and what practices could elevate the strategic positioning of design in organizations (Micheli et al., 2018). However, there is limited research using a cognitive perspective to study the *thinking* side of design; a few notable exceptions (Cross, 2011) focus on how DT tools activate *individual cognitive aspects* of designers, such as reducing their cognitive biases (Liedtka, 2015), enabling them to blend analytical and intuitive thinking (Martin, 2009) or draw on “generative sensing” (Dong, Garbuio, and Lovallo, 2016) to inform strategic decision-making (Garbuio et al., 2015). We know far less about how managers use DTI to shift the *collective cognitive frames* of organizations (e.g., Stigliani and Ravasi, 2012) and reduce inertia that may constrain organization-level approaches to ambidextrous innovation (Nagaraj et al., 2020; Danneels et al., 2018). This is a critical omission because achieving an ambidextrous innovation portfolio via DTI calls for a collective cognitive transition.

Third, the ambidexterity literature has also primarily focused on structural aspects rather than cognitive processes. The majority of studies examine structural factors of exploration and exploitation, such as how organizations can be designed for ambidexterity (Csaszar, 2013) and the extent to which explorative and exploitative activities can be produced by the same organization through, for example, distinct organizational units via so-called structural ambidexterity (Jansen et al., 2006; Tushman and O’Reilly, 1996) or by designing systems and processes for their simultaneous pursuit within the same unit via contextual ambidexterity (Gibson and Birkinshaw, 2004; Randhawa, Wilden and Gudergan, 2021b) or by organizing activities over time in sequential explore-exploit cycles via temporal ambidexterity (Siggelkow and Levinthal, 2003). While some studies have identified DT as an antecedent of ambidextrous innovation (e.g., Zheng, 2018), others have questioned the capacity of DT to stimulate ambidexterity, particularly considering the inertia that impedes organizations in shifting to an ambidextrous innovation portfolio (Butler and Roberto, 2018; Nagaraj et al., 2020).

To address these gaps, in this study, we ask, how do managers leverage DTI to support their organization in its shift to achieve an ambidextrous innovation portfolio? Specifically, we examine how middle managers (MM) use DTI to shift the cognitive frames of their organization to ultimately attain an ambidextrous innovation portfolio. Drawing on abductive research design (Dubois and Gadde, 2002; Langley, 1999) and rich primary and secondary data collected over four years, we document the findings of an in-depth longitudinal case study of a leading Australian property firm's journey to ambidexterity.

In our case, MMs progressively and flexibly implemented three practices of DTI— (1) creative problem-solving, (2) sprint execution, and (3) creative confidence (cf. Dell'Era et al., 2020)—to respond to inertia and negotiate the transition of the organization's cognitive frame from an explorative to exploitative, to ultimately an ambidextrous innovation frame. We theorize that these DTI practices trigger three generative mechanisms—frame flexibility, co-optation, and collective sensemaking—that underpin the cognitive integration required to support this transition. Drawing on our insights, we develop a process framework showing how DTI practices can be used flexibly across phases. We contend that freezing the innovation frame in each phase can trigger a generative response to inertia. Ultimately, this allows the organization to conceive and implement the more radical transition to an ambidextrous innovation portfolio.

We make four contributions to both DT and innovation management research. First, we respond to the calls for more research on DTI implementation from a cognitive process perspective (e.g., Micheli et al., 2019; Liedtka, 2015). The process framework we develop shows how different DT practices and related generative mechanisms can be deployed flexibly to respond to inertia and adapt to the interim (explorative and exploitative) innovation objectives over time. Second, our study demonstrates how DT can drive broader organizational outcomes (Elsbach and Stigliani, 2018; Micheli et al., 2019)—in our case, ambidextrous innovation. We show how DTI can be used in a phased manner for shifting organization-wide cognitive frames

toward ambidexterity (e.g., Lin and McDonough, 2014; Beverland et al., 2015). Third, we provide a nuanced understanding of the strategic role of MMs in leveraging DT as a process for innovation project portfolio management, thereby contributing to innovation management research (e.g., Spieth and Lerch, 2014). By being flexible in their use of DT practices, MMs can act as a critical conduit between top management, frontline employees, and peers, reconciling their varied interests to achieve the collective cognitive (re)framing required to deliver an ambidextrous innovation portfolio (Roth, Spieth, and Lange, 2019; Radaelli et al., 2017). Finally, we contribute to research on ambidextrous innovation by clarifying that DT can be used as an enabler of ambidextrous innovation by helping overcome inertia in transitioning to an ambidextrous innovation frame, in settings involving heterogeneous organizational levels (Birkinshaw and Gupta, 2013).

In what follows, we provide a background on implementing DT for ambidextrous innovation, and the role of MMs, with a particular focus on related cognitive aspects. We then outline our research methodology before presenting the empirical findings and a process framework. We conclude with a discussion of the key theoretical and managerial implications.

THEORETICAL BACKGROUND

Design thinking implementation for innovation

DT is seen fundamentally as an exploratory process (Brown, 2009) that helps organizational members “think like a designer” (Simon, 1969) to solve “wicked problems” (Buchanan, 1992). More recently, DT has emerged as a way to draw on “designerly tools” to drive innovation (Seidel and Fixson, 2013; Verganti and Dell’Era, 2014), organizational competitiveness (Liedtka and Kaplan, 2019; Martin, 2009), and performance (Gemser, Candi, and van den Ende, 2011) in large multinationals as well as small and medium-sized enterprises (Carlgren et al., 2014; Micheli et al., 2018). DT can be implemented in various ways: from a process in innovation

projects to a set of principles driving organization-level change (Brown and Martin, 2015; Gruber et al., 2015). However, its decontextualization from the discipline of design and a largely practical focus in deploying DT tools in innovation projects has left the concept of DT disconnected from management theories (Kimbell, 2011; Micheli et al., 2020).

Most DT studies have focused on defining design tools and methods (e.g., Ben Mahmoud-Jouini et al., 2016; Hölzle and Rhinow, 2019) to generate innovative solutions for problems (Brown, 2008; Liedtka and Ogilvie, 2011). Seidel and Fixson (2013) classified DT tools into (1) need-finding tools (i.e., ethnographic observations, in-depth contextual interviews, or customer journeys to empathize with and understand user needs), (2) idea-generation tools (i.e., brainstorming to generate possible solutions to problems), and (3) idea-testing tools (i.e., rapid prototyping and experimentation to test ideas on a small scale for desirability, technical feasibility, and business viability). These align with Liedtka's (2014) description of tools across the (1) exploration, (2) ideation, and (3) experimentation phases. More recently, Micheli et al. (2019) have consolidated ten attributes and eight tools and methods that underpin DT.

Beyond applying tools and methods, DTI calls for a shift to new mindsets or mental models that embrace user-centricity, ambiguity, and risk-taking (Liedtka and Kaplan, 2019; Elsbach and Stigliani, 2018; Schweitzer et al., 2016; Groeger and Schweitzer, 2020). This is because DT is seen as “user experience-driven” (Liedtka, 2014) in opposition to traditional “user preference-driven” approaches that focus on “identifying and aggregating knowledge from existing markets quantitatively” (Meinel et al., 2020, p. 4). DT also relies on experimenting and testing several iterations of a solution thus (re)framing failure as learning. As such, DTI tests existing ways of innovating and is often met with skepticism (Butler and Roberto, 2018; Micheli et al., 2018). As a result, in practice, integrating DT into project routines is not easy (Björklund et al., 2020; Hölzle and Rhinow, 2019).

Critical perspectives of DT have cautioned that reassembling designers' practices that adopt a user-centered approach, as opposed to a technology-centered approach to innovation, has not always "brought a happy synthesis" (Kimbell, 2011, p. 286). Indeed, researchers have argued that "any innovation implies understanding of both technologies and markets" (Verganti, 2011, p. 386) and that radical innovation may equally be driven by technology change rather than user-centeredness. Yet, questions remain about whether DT is "a means of approaching problems or is best understood as a professionally derived skillset" that can help non-designers (e.g., managers) learn a "designer's sensibilities" (Micheli et al., 2018, p. 17; Brown, 2008).

In addition, DTI is often in conflict with existing organizational structures and cultures (Csaszar, 2013; Chang et al., 2013) making its implementation resource-demanding and challenging (Ben Mahmoud-Jouini et al., 2019). Prior research has explored how DT influences innovation by examining where it should be positioned within the organizational structure (D'Ippolito, 2014) and how organizational practices can elevate it as a strategic function (Micheli et al., 2018). The argument is that the effect of design on firm performance depends on whether it is organized top-down—as functional specialism—or as part of new product development- or cross-functionally integrated multifunctional teams (Perks et al., 2005; Nagaraj et al., 2020), balancing design alongside commercial considerations (Micheli et al., 2018).

Research taking a cognitive perspective focusing on how DT influences innovation processes and outcomes, however, remains sparse. The few exceptions have focused on "design cognition" to show how DT tools guide particular ways of knowing (Cross, 2011) and problem-solving through expanding problem and solution boundaries (Dorst, 2015). Dong et al. (2016) focused on how DT tools help managers develop "generative sensing capabilities" to use abduction in strategic decision-making. Relatedly, Martin (2009) argued that, by enabling managers to blend analytical and intuitive thinking, DT enables organizations to attain strategic competitive advantage. Liedtka (2015) argued that design thinking enables synthetic, dialectical, and

abductive strategies. Liedtka and Kaplan (2019) further suggested that DT aids strategy development by allowing organizations to perceive opportunities differently. While these studies focus on strategy, Liedtka (2015) suggests that DT challenges nine individual-level cognitive biases that influence innovation outcomes, and Zheng (2018) argues that DT facilitates ambidextrous learning required for innovation, thus cultivating individual ambidexterity among managers. Researchers have argued that innovation is related to shifts in organizational cognition (Greve and Taylor, 2000; Kaplan, 2008) which is particularly pronounced when organizations must balance the contradictory rationalities of ambidextrous innovation (Karhu and Ritala, 2019) and manage the ambiguity and uncertainty related to explorative innovation (O'Connor and Rice, 2013; Robbins and O'Gorman, 2014; Vedel and Kokshagina, 2020).

Design thinking, ambidextrous innovation, and cognitive frames

Ambidexterity research offers insights into how organizations balance explorative and exploitative innovation (He and Wong, 2004; O'Reilly and Tushman, 2013) and other related competing objectives, such as incremental and radical innovation (Benner and Tushman, 2003), exploitative and explorative learning (Kang and Snell, 2009), and explorative and exploitative knowledge-sharing (Im and Rai, 2008). Empirical evidence shows that ambidexterity drives sales growth (He and Wong, 2004), performance (Lubatkin et al., 2006), and survival (Hill and Birkinshaw, 2014) in organizations and business units.

The ambidexterity literature highlights different perspectives on how ambidextrous innovation can be achieved. Researchers have largely focused on the structural separation of exploitative and explorative innovation tasks into different organizational units, i.e., structural ambidexterity (Tushman and O'Reilly, 1996; Simsek et al., 2009). However, while structural ambidexterity is achieved through a separate unit focused on exploration to shield it from the mainstream business that remains focused on exploitation (Smith and Tushman, 2005), and by separating

radical and incremental innovation teams (Martini et al., 2015), effective coordination and integration between the two remains a challenge (Zimmerman and Birkinshaw, 2016).

Another approach referred to as temporal ambidexterity suggests oscillating between the conflicting activities of exploration and exploitation over time in response to environmental needs (Siggelkow and Levinthal, 2003; Boumgarden et al., 2012). This allows individuals to focus on one activity at a time, and yet, integrate knowledge and experience from explorative and exploitative phases, thus overcoming a shortcoming of structural ambidexterity. However, this temporal separation and vacillation also demand constant changes in systems and processes to organize activities in back-and-forth cycles between explorative and exploitative innovation.

To address these challenges, researchers have begun to focus on the notion of contextual ambidexterity, arguing that exploration and exploitation should be integrated within and across business units (BUs), and rely on supportive organizational context and processes that “encourage individuals and teams to make their own judgments about how to divide their time between conflicting demands for alignment and adaptability” (Gibson and Birkinshaw, 2004, p. 210). While this approach aids the development of the behavioral capacity to simultaneously explore and exploit (He and Wong, 2004), it places great strain on employees who must cope with conflicting tasks and tends to be more suited to exploitative innovation (Zimmerman and Birkinshaw, 2016). More recently, researchers have also highlighted the importance of cognitive ambidexterity; that is, contextual ambidexterity at the individual level (Good and Michel, 2013; Karhu et al., 2016), acknowledging the role that individual cognitive capacities play in coping with the conflicting tasks of exploration and exploitative innovation.

Research in strategy cognition also suggests that cognitive frames, defined as the shared assumptions and understandings or collective mental models that organizations possess (Kaplan, 2011), play a crucial role in innovation processes and outcomes (Foss and Saebi, 2017; Narayanan et al., 2011; Kaplan, 2011). Cognitive frames help manage the uncertainty,

ambiguity, and unpredictability that besets explorative innovation (Raisch et al., 2009; O'Connor and Rice, 2013), and the innovation paradoxes associated with balancing exploration and exploitation (Andriopoulos and Lewis, 2010; Smith and Tushman, 2005). Importantly, even when a firm has appropriate project portfolio management capabilities, it may not be able to deliver anticipated outcomes if cognitive frames are not aligned with innovation opportunities (Kaplan, 2008; Randhawa et al., 2021a). Going further, Lin and McDonough (2014) have argued that cognition is an antecedent to ambidextrous innovation: cognitive ambidexterity aids firms in embracing tensions rather than denying them. Therefore, ambidextrous cognitive frames are essential for generating ambidextrous innovation. Yet, while stable cognitive frames develop common understandings and coordinated action at the organizational level, the very stability of cognitive frames may also lead to inertia that hinders innovation (Danneels et al., 2018; Nagaraj et al., 2020).

Prior research has shown that DT enables ambidextrous innovation by changing individual thinking among managers (Zheng, 2018) and reducing team-level cognitive inertia (Nagaraj et al., 2020). Yet, we know little about if and how managers can use DTI to shift the collective cognitive frames of organizations to achieve an ambidextrous innovation portfolio. While some researchers have highlighted the importance of cognition at the individual level (Carlgren, Rauth, and Elmquist, 2016; Schweitzer et al., 2016; Liedtka, 2015), we focus on how DT can help overcome inertia and shift cognitive frames at an organizational level to ultimately enable an ambidextrous innovation portfolio. We thus respond to Lin and McDonough's (2014) call for more empirical studies on the role of cognitive frames in fostering ambidexterity.

The role of middle managers in ambidextrous innovation

The literature on ambidexterity draws heavily on the assumption that the top management team (TMT) are the key decision-makers who address the exploration-exploitation tensions (Zimmermann, Raisch, and Birkinshaw, 2015), and are hence pivotal in “the processing of

disparate demands essential to attaining ambidexterity” (Lubatkin et al., 2006, p. 646). This line of thinking stems from a traditional view that the senior managers’ role is to define (innovation) strategy, while MMs focus on strategy implementation and, only occasionally, get involved with strategy formulation (Floyd and Wooldridge 1992, Raes et al. 2011). The structural ambidexterity perspective (Tushman and O’Reilly, 1996), for instance, suggests that creating the conditions to engage in both exploitative and explorative activities and behaviors is a senior management task, whereas BU managers should focus on executing either exploration or exploitation. Yet, strategy and innovation research has highlighted that MMs’ decision-making helps shape innovation strategies (Fulop 1991, Burgelman 1994, Reitzig and Sorenson 2013, Heyden, Sidhu and Volberda, 2018) and, consequently, whether and how firms explore and exploit innovation opportunities (Randhawa, Wilden and Gudergan, 2018). More recently, the top-down view of innovation has been challenged, highlighting the importance of MMs for selecting and implementing entrepreneurial opportunities (Ren and Guo, 2011; Schubert and Tavassoli, 2020) and initiating and implementing strategic change (Tarakci et al. 2018).

MMs, as the first instance of organizational decision-making, are well placed to initiate and create a strategic innovation portfolio (Roth, Spieth and Lange, 2019; Radaelli et al., 2017). MMs play a crucial role in innovation portfolio management, defined as the decision-making process to evaluate, select and prioritize innovation projects in line with the firm’s long-term strategic objectives (Kester et al., 2011; Spieth and Lerch, 2014). MMs who manage innovation portfolios are responsible for not only efficiently and effectively allocating scarce resources but also for establishing cross-functional collaboration across different managerial levels and adapting the innovation portfolio to emergent changes (Kester et al., 2011; Roth, Spieth and Lange, 2019). More generally, MMs act as “interpreters and sellers of strategic change at the micro-level” (Rouleau, 2005, p. 1413). From an ambidexterity perspective, Mom, van den Bosch, and Volberda (2007) showed that a combination of top-down, bottom-up, and horizontal

knowledge flows could help synthesize explorative and exploitative innovation. More recent studies suggest that MMs play a vital role in bridging between front line employees and the TMT to develop innovations (Heyden, Sidhu and Volberda, 2018), leading to calls for more in-depth analyses of how MMs contribute to innovation (Radaelli et al., 2017) and shape an ambidextrous innovation portfolio in organizations (Mom, Fourné, and Jansen, 2015). In this article, we address how MMs leverage DT to serve this end.

RESEARCH DESIGN AND METHODOLOGY

We adopt an in-depth longitudinal case study approach to investigate the process of implementing DT for ambidextrous innovation. This approach is well-suited where the boundaries between the phenomenon and its context are blurred (Hartley, 2004; Yin, 2003) and to analyze “a number of interdependent variables in complex structures” (Dubois and Gadde 2002, p. 558). Our case features the execution of DTI by the innovation unit, Nest, set up to pursue an ambidextrous innovation portfolio at Urban (pseudonyms), a leading Australian property development company. The case covers four years (2016–2019) and is complemented by an analysis of the firm’s recent history (2008–2019) to understand the context and events leading up to the DT implementation process. We follow the journey of the organization from a current to a future state in line with the targeted strategic ideal (Hoyte and Greenwood, 2007), taking account time and the nature of the process(es) of change, to derive theoretical insights (Langley et al., 2013). Specifically, we focus on the dynamics by which ambidextrous innovation was pursued through DTI implementation and how the organization responded to inertia in the process.

Research setting

Urban is a leading, publicly listed Australian property group that owns and manages commercial offices, retail centers, and residential and industrial properties both in Australia and

internationally. The group has a strong property development capability and one of the largest property portfolios in the country.

The group is led by a CEO, Chief Financial Officer (CFO), Head of Strategy, Chief Information Officer (CIO), and Head of Culture. Each of its three BUs – office and industrial, retail, and residential – has its own Head. Together, these form the TMT of Urban. Reporting to the BU Heads are the BU general managers who form Urban's middle management.

During the 2008 global financial crisis, Urban's diversified property portfolio, funded mostly via bank loans, created significant issues. It represented a volatile time for Urban's TMT, MMs, employees, and shareholders alike. Indeed, at one point, the company's share price dropped 80% in only six months. Slowly recovering, the firm found itself in a more stable position by 2012, which also marked the change in Urban's leadership and strategic direction, culminating in the appointment of a new chief executive officer (CEO) in 2012.

This study covers a period commencing when Urban began to make deliberate changes to improve its strategic innovation portfolio through a time in which the construction industry experienced growth but also competitive struggles and culminates when Urban began reaping benefits as a result of its growing ambidextrous innovation portfolio.

Urban was identified as an exemplary case for the investigation of the development of an ambidextrous innovation portfolio by two of the authors when they conducted a preliminary qualitative study with 21 CEOs and chairs of Boards of leading Australian companies (Leung et al., 2016), which included Urban. The study's aim was to investigate the strategies and practices of Boards and executive teams that fostered and hindered innovation. It became clear during these preliminary interviews that it was Urban's ambition to develop an ambidextrous innovation portfolio. At the time, Urban had just launched their innovation unit, Nest. In 2017, the CEO introduced the researchers to the director of Nest (a MM), who then provided access to other members of the organization and a range of secondary data sources.

Data collection

The interviews with the CEO and the Board chair as part of the earlier study were the first phase of our data gathering. We then developed a collection of publicly accessible information on Urban, such as company reports and the property development industry. Other archival data included documents not publicly available—for example, internal reports; company documents such as memos, meeting minutes, presentations, and emails; project proposals; training and workshop materials—which were made available to us by the Nest director. These documents outlined critical steps in the setup and development of Nest and its practices.

Subsequently, two of the authors conducted 31 interviews with key decision-makers at all levels, including the TMT (e.g., CEO, CFO, Head of Strategy, Head of Culture), MMs (e.g., the director of Nest, BU managers), and frontline employees taking a lead role in the innovation unit (called “innovation leads” and “innovation champions” respectively) over a period from 2016 until early 2020 (see Table 1). We identified these interviewees in collaboration with executives, the Nest team and by asking interviewees to introduce us to other relevant members. Pseudonyms are assigned to key informants. Interviews were conducted face-to-face, lasted between 45 minutes and 2 hours, and were recorded and transcribed.

After the first three interviews with the Nest director and other members of the team, it became clear that DT was to be used as a framework for the setup of Urban’s ambidextrous innovation portfolio. We then consulted the DT literature to generate additional questions that focused on the circumstances, strategies, and activities, as well as reasons for events, as they related to the implementation of DTI by Nest to attain ambidextrous innovation. These questions revealed each interviewee’s role and contribution to DTI implementation, examples of innovation projects they worked on, how the DT methodology and toolset were applied, reflections on key success factors and challenges, and how they responded to the challenges. Table 1 shows the primary and secondary data that we collected as part of the study.

INSERT TABLE 1 HERE

As interviews were retrospective by no more than four years, we did not assume extensive retrospective rationalization, misinterpretation, or idealization. However, in this relatively short time, respondents may have developed less openness, as their statements could have affected their career or ongoing project work. Insights from interviews were hence triangulated with information from other meetings as well as concurrent secondary data. Several informants were interviewed repeatedly over the course of 4 years to trace how managerial decisions were made and how they impacted the DTI implementation activities and outcomes. Interviewing informants from different levels and who were involved in different ways and at different times with the innovation unit, along with the use of secondary and archival data, helped include diverse perspectives and complementary information on the same events (Glaser and Strauss, 1967), thereby increasing the validity of our findings (Yin, 2003).

Data analysis

We adopted an abductive approach to analyze the longitudinal data. The iterative cycles of confronting data and theory allowed us to “expand [our] understanding of both theory and empirical phenomena” (Dubois and Gadde, 2002, p. 555). The goal was to allow new theoretical insights to emerge from data collected from multiple sources, analyzed through constant comparison, and validated by both extant theories and ongoing data analysis.

We started with a focus on the ambidexterity literature as our data indicated that Urban saw an ambidextrous innovation portfolio as a key goal. We engaged concepts such as structural ambidexterity in the data analysis. For example, we coded statements about “separation from hierarchy”, “autonomy”, “core team” and divided focus between exploration and exploitation as examples of structural separation. As we progressed data collection, we were led to the DT literature, especially the three different interpretations of DT practices as identified by Dell’Era et al (2020): creative problem-solving, sprint execution, and creative confidence, which helped

explain our data on how DT was adopted. For example, originally the Nest team focused on using DT tools to understand the needs of the customer and to develop ideas for potential new products/services. We coded statements referring to the importance of “customer scan stage” and “ideation stage” as creative problem-solving practice, as there is a strong focus on understanding the customer needs and ideation in this DT practice (Dell’Era et al 2020). See Figure 1 for a detailed coding structure.

INSERT FIGURE 1 HERE

As we continued our analysis, we noted that interviewees reflected upon the cognitive shifts they felt and/or observed as a result of engagement with the DT practices, revealing the important role of cognitive reframing underpinning the firm’s journey toward ambidextrous innovation. We then expanded our conceptual framework by drawing on strategy cognition and innovation management research, which has noted the centrality of collective cognitive frames in driving innovation portfolios. While this served as a theoretical reference, it allowed us to code the data and abstract themes such as frame flexibility, co-optation, and collective sensemaking. For example, we coded references such as “thinking outside the box”, “something no-one has done before” to the theme of frame flexibility as they demonstrate a cognitive frame that accommodated explorative innovations (Raffaelli, Glynn, and Tushman, 2019) (see Figure 1). This literature also helped us make sense of the difficulty to shift towards explorative innovation, which the data also revealed, by sensitizing us to the concept of inertia (Danneels et al, 2018). Based on our abductive analysis and our efforts to match theory and reality (Dubois and Gadde, 2002), we organized first-level themes into theoretical constructs which we further abstracted into aggregate dimensions (see Figure 1).

Next, in alignment with other process studies (e.g., Langley, 1999), we consolidated the narrative history of Urban and Nest. We used key transition periods, when the Nest team changed elements of their practice, to delineate three phases of DTI, the drivers and outcomes of

these transitions, how the phases related to a progressive shift in cognitive frames, and how these, in turn, led to ambidextrous innovation. The phases included feedback loops between old and new practices, yet, for analytical reasons, we present the phases in a more linear fashion.

Finally, we conducted an in-depth analysis of the process and outcomes and looked for relationships between key constructs across phases. For each phase, we asked the following questions: (1) How did Nest evolve their DT practice during this phase? (2) What triggered the transition to the next phase? (3) How did the Nest director, team and other organizational members respond during this phase? (4) What were the outcomes and impact of these responses on the innovation portfolio? (5) What mechanisms could explain these actions and outcomes? We generated memos when analyzing the data and literature in terms of the above questions, and continuously matched and contrasted memos to refine our theoretical understanding.

We validated our interpretations throughout the analysis: on several occasions, we shared insights with the Nest team. Progress reports were shared in late-2017 and mid-2018, and two informal progress presentations took place in November 2019 and January 2020. These feedback sessions allowed us to check our understanding of the key issues and provided additional insights that were incorporated into the ongoing rounds of data analysis. The member checks served to revise and clarify the findings discussed below (Hirschman, 1986; Lincoln and Guba, 1985).

By iteratively enfolded our findings with constructs in existing research to inform the ongoing data collection, analysis, and interpretation and validating recurrent patterns in the data, we developed our final process framework of how DT enabled ambidextrous innovation (Figure 2). Tables 2, 3, and 4 outline the core theoretical concepts and how they were empirically manifested for each phase of DTI implementation.

RESULTS

We theorize how Urban's innovation director (a MM) used DT practices to support the organization toward ambidexterity across three phases (Dell'Era et al., 2020). Importantly, this process triggered a progressive shift in the organization's cognitive frame toward one that embraced ambidextrous innovation. Figure 2 presents our process framework to using DT as a strategic lever for attaining an ambidextrous innovation portfolio and the way this was enabled by the innovation director. Tables 2, 3, and 4 provide illustrative evidence for each phase.

INSERT FIGURE 2 HERE

INSERT TABLES 2, 3, AND 4 HERE

Developing Urban's innovation strategy: Incorporating design thinking

Embedding and formalizing innovation as a core capability in Urban was a key strategy launched by Karen when she was appointed as CEO in 2012. This was because “[innovation] was sporadic and patchy, and there was no holistic thought to why are we doing this, how are we doing it” (CEO, 2017). Karen defined innovation as “change that adds value,” keeping the definition broad intentionally “so, that [innovation] can be as far-reaching as process innovation, a product innovation, a service innovation. It can be disruptive; it can be incremental” (CEO, 2016). Accordingly, the focus was on improving existing offerings and also developing radically new offerings such as using drone technologies to improve health and safety construction practices; using prefabricated construction methods, and developing new business models for residential building (build-to-rent) or new services in retail (artificial intelligence-enabled customization of products and services). The goal was an ambidextrous innovation portfolio, as Karen explained, acknowledging the cognitive shift that this would entail:

We need to squeeze that [existing] business as hard as we can ... and then do something completely different ... so we're trying to do two things at once ... owning the now and owning the future at the same time. They're *quite different ways of thinking*. So, as an organization, we have to be somewhat ambidextrous

... in ‘squeeze the lemon mode’ [and] ‘think of the future mode (emphasis added, CEO, 2017).

In 2013, Rachel was appointed to lead the development of Urban’s innovation portfolio, becoming Urban’s first General Manager, Innovation. Rachel was a well-regarded and experienced MM in the strategy department, who had worked at Urban for several years. She had identified innovation as a critical capability gap across the organization and had raised the need to address this gap in conversations with Karen and other senior executives. Rachel also knew that the lack of strategic direction was a key barrier to innovation at Urban:

People knew that we needed to be more innovative; we’d had internal studies that said we weren’t doing [innovation] well.... So, everyone was very well-intentioned but was quite directionless.

Rachel led the setup of Nest and was appointed its director. She chose DT as the key methodology to underpin Nest’s innovation initiatives because she saw “the rigor, the structure, the thinking around customer problems” that DT offered as important to formalizing an ambidextrous innovation portfolio. Her goal was to balance Urban’s current portfolio of exploitative innovation projects, which incrementally extended existing offerings to meet existing customer needs to achieve better product-market efficiency, with explorative innovation projects to develop new offerings designed for new product-market domains and emerging customer needs (Jansen et al., 2006; O’Reilly and Tushman, 2013; He and Wong, 2004).

We found that the innovation director used three different DT practices in phases to respond generatively to inertia towards explorative innovation and shift the cognitive frame of the organization toward ambidexterity. We present our findings according to our three-phase periodization: (1) creative problem-solving, (2) sprint execution and, (3) creative confidence. For each phase, we show the firms’ organizational context and the structural separation that marked the beginning of each phase, enabling the organization to progressively build resources and legitimacy for DTI. We then demonstrate how the implementation of a specific DT practice, from *creative problem-solving* to *design sprint execution* to *creative confidence*, triggered a

generative response to inertia in each phase through the mechanisms of *frame flexibility*, *co-optation*, and *collective sensemaking*. We argue that these mechanisms enabled a shift in collective cognitive frame towards an ambidextrous frame. Finally, we summarize our findings by taking stock of Urbans' ambidextrous innovation portfolio.

Phase 1: 2015–2017—Creative problem-solving

The context: Prior to 2015, Urban had no formal structuring for innovation portfolio management. Rachel addressed this issue by setting up systems, processes, funding and governance to support innovation, and developing specific innovation roles (Faems et al., 2008), to help build resources for DTI.

Structural separation: Nest became the unit dedicated to driving DTI implementation and building an explorative and exploitative innovation portfolio. We see this as an important step towards structural separation - a proven approach to achieving ambidextrous innovation (O'Reilly and Tushman, 2013; Tushman et al., 2010) as it signaled the firm's commitment to innovation, while "protecting" innovation from the pressures of business operations.

Rachel facilitated a series of workshops with the TMT, including BU Heads, to develop and agree on some "broad areas of focus" that set priorities for the company's innovation efforts. A decision was made to define eight missions with a balance between explorative and exploitative innovation. Four exploitative missions focused on Urban's existing customers and product-market efficiency and four explorative missions were defined around the potential needs of future customers and new product-market domains (He and Wong, 2004). This was a deliberate strategy to attain ambidexterity by creating a portfolio of projects with different risk profiles and time frames and was seen as a way of balancing the long- and short-term (Baghai, Coley, and White, 1999). It is well known that such a portfolio management strategy is recommended for its aggregate-level focus—bringing focus on the performance of the overall portfolio rather than the

success or failure of individual high-risk projects (Sykes and Block, 1989). It was Rachel's role as the MM to implement this strategy (Floyd and Wooldridge, 1992).

Rachel recruited 22 volunteers called innovation champions (frontline employees) from across the firm, who were trained in DT by a team of external consultants, building resources for DT. The champions' brief was to spend about 2–3 days per month working exclusively on either an exploitative or explorative innovation mission and come up with creative ideas to support the idea generation phase of the innovation value chain (Hansen and Birkenshaw, 2007). Promising ideas were passed onto the respective BUs to be further tested, implemented and commercialized.

We refer to this as the start of structural separation as innovation champions were removed from their operational activities and put into dedicated teams working on either an explorative or exploitative mission (Martini et al., 2015; Simsek et al., 2009). The teams were organizationally interdependent with respect to pursuing ambidexterity and their activities were coordinated through a shared vision and the leadership of the Nest director and the senior management team (O' Reilly and Tushman, 2007). Kelley (2009, p. 497) argues that structural options that “preserve organizational connectedness [] will more likely be associated with sustainable radical innovation activity in an established organization”. Although Nest was as a separate unit, the innovation champions provided an ongoing connection to the BUs.

Creative problem solving: To translate the missions into innovation ideas, Rachel and the innovation champions used a creative problem-solving approach (Dell'Era et al., 2020) to “go and talk to customers around these [missions] to actually identify specific challenges that [they] want to solve...in line with our strategy” Here, DT tools were deployed intensively to seek creative solutions to meet both current and emerging user needs: that is, pursue exploitative and explorative innovation as part of the innovation portfolio management. An Innovation Council,

consisting of the TMT, was responsible for overseeing progress and approving a small yet dedicated budget for customer scans, ideation, and experimentation sessions.

DT's focus on the holistic needs of customers (current customers for exploit-type projects and future customers for explore-type projects) through need-finding (Seidel and Fixson, 2013) was seen as the critical starting point:

Importantly, we're looking to uncover the gaps in the customer experiences when trying to get these jobs done— ... if we find the gap between what the customer wants and the available solutions—that is where the opportunity is. These are the innovations that are highly successful ... the gap when someone comes up with something new!!! (Nest training materials)

Frame flexibility: Through intense DTI tool deployment, Rachel emphasized “quality and rigor over speed,” which gradually led to a change in cognitive frame towards exploration:

It took almost a year for us to get out of our own assumption and headspace around what we currently do. It's so hard when you're in a business to have the freedom to do that next thinking, and [the innovation champions] did; they did a fantastic scan ... came up with this really cool idea, running experiments So, it was really the first disruptive idea. (Rachel, 2018)

Frontline project members felt increasingly comfortable deploying DT tools such as ethnographic research, user interviews, and observations to explore unmet customer needs and identify innovation opportunities. They felt that explorative thinking was encouraged, accepted, and supported, and radical ideas were no longer perceived as risky: “Now you can have conversations with people and explore things without people fearing that their idea is a bad one or that they're too junior and so it won't be heard” (Innovation Champion 2, 2017). As innovation champion 4 explained, “another reason I'm really passionate about innovation is I find it transformed the way I think even in my day job.”

Phase 1 (see Figure 2) instilled confidence and commitment among frontline members in applying DT for exploration in their daily pursuit of innovation (Elsbach and Stigliani, 2018; Kelley and Kelley, 2013), which expanded their cognitive frame as evident from this quote:

“[The process] really got me thinking about a *different way of thinking* about my contribution to the workplace, to the culture and certainly, there were some really significant ... *mind shifts, paradigm shift thinking* that was required which I embraced and I continue to use that, even outside of [Nest]. (Innovation Champion 2, 2018)

As a result of such an explorative innovation frame, frontline employees had an outlook that “if you understand the customer, the dollars come rather than just [thinking], I can’t see the immediate dollar increase. That’s been a big change” (Rachel, 2018). We find that this was enabled by frame flexibility (Raffaelli, Glynn, and Tushman, 2019), defined as the ability to shift a contracted cognitive frame to accommodate explorative innovations.

A big part of Rachel’s role at the time was keeping the innovation champions “enthused and supporting them in any way”. This is because, without these champions, Nest would not have had the same impact and penetration into the business:

Now they talk about customer-centricity, and they know what a scan means ... you really see differences in the way people talk and the language, which has happened from this champion model....And we really needed that in the early days, that influence. (Rachel, 2019)

This helped to build critical legitimacy for DTI as an enabler of explorative innovation at the frontline level. There was also strong support from the TMT, who recognized how Nest’s deployment of DT was fostering an explorative innovation frame among frontline members:

More people have been learning the process that we have adopted for innovation. I think people are now seeing the value of creating an environment of ideas and not trying to quickly dive into a solution. People are much more aware of that now and far more appreciative. So, we have become far more sophisticated in terms of our *thinking* around innovation. (CFO, 2017)

However, after two years of operation, the BUs remained skeptical about the focus on explorative innovation and unconvinced that DTI was producing sufficiently quick and tangible innovation outcomes. As this BU manager remarked:

You can deliver those great ideas, but then it’s the people that are operating the assets [] so it’s got to flow through to all of those different roles and aspects of the

operational business. So, I'm not sure if that's really happened yet. It's still in the sort glory and big ideas []. (BU MM 2)

Inertia: While the creative problem-solving approach helped legitimize DTI as a driver of explorative innovation among frontline employees, skepticism remained at the BU level. BU managers questioned why the Nest team was spending time and resources to pursue ideas that were “very far out there” (BU MM 3, 2018) and did not add value or direct benefits to the BUs. We see this as a kind of inertia to change (Danneels et al., 2018), in this case, toward explorative innovation at the BU level. As missions were set by the TMT with the Nest team, who then worked directly with customers, BU managers felt that the innovation portfolio was not well-aligned with BUs' needs. As such, BUs' substantial investment in the Nest initiative, including the time spent by innovation champions, were questioned:

We were actually funding [one innovation role 50/50]. And talking to some of the innovation champions that are in [our BU], I just got this overwhelming sense we weren't actually achieving anything. We were going in circles [and] the business was heading in one direction, and [Nest] seemed to be heading in a completely different direction. This makes absolutely no sense to me. (BU MM 1, 2017)

Both the TMT and Nest reflected on the inertia towards explorative innovation at the BU level. The Head of Culture noted in 2018: “because [Nest] is working on some of those big long-term missions [and Urban has] a very transactional culture, so [for] things that are taking more than a few months; [the BU managers ask] what's happening—is there progress?”. Rachel added: “They're working every day in how to exploit their business, [so when] they're presented with something [visionary], they're just like, ‘Whoa, how does that fit?’”

The BUs hesitated to release their employees to work on innovation projects. Without their cooperation, Nest lacked the workforce capacity to deploy the resource-intensive DT tools and to simultaneously pursue explorative and exploitative innovation. Soon, most innovation champions could only commit time in addition to their usual workloads. Rachel acknowledged:

So even though we had the innovation champions, and they were meant to work 2 to 3 days a month, they never actually did It's just very hard when you have

your reporting manager and deadlines. [People are] always at capacity, and people are working on [Nest] outside business hours.

By the end of 2017, five out of eight missions had stalled. Out of four explorative innovation projects, only two progressed to a pilot stage, and both were eventually aborted. Only one exploitative innovation project was successfully implemented (see Table 5). Yet, Rachel remained confident that “swings and roundabouts” are part of the transition towards an ambidextrous innovation portfolio and that experimenting with DT practices was necessary:

It’s not something you rush, and we’re fine with that because we’d rather spend a lot of time and experiment and get it right than launch something that’s wrong (Rachel, 2017).

Indeed, the inertia towards exploration triggered the next DTI phase. We see this as an adjustment of DTI implementation.

INSERT TABLE 5 HERE

Phase 2: 2017–2019—Design sprint execution

The context: Rachel realized that it was crucial to demonstrate quick solutions to the BUs, “[and] make what we offer the business better and add more and more value to the business” (Rachel, 2018). Rachel thus shifted Nest’s portfolio management to pursue exploitative innovation projects via design sprints (Dell’Era et al., 2020). The emphasis was on accelerating the development process and reducing market uncertainty by quickly and effectively launching new solutions to meet current customer needs (Knapp et al., 2016; Ries, 2011) and, importantly, to demonstrate the value of DTI for exploitative innovation to the BUs. To do so, dedicated resources were needed: “...we lacked the horsepower to get things going” (Head of Culture, 2018), as was a clearer structural separation between exploration and exploitation across different units (Martini et al., 2015).

Structural separation: The role of innovation lead was created and four innovation leads were appointed full-time to Nest to enable the widespread implementation of design sprints. Structural

separation was thus strengthened by setting up a core Nest team to build resources for DTI. Each innovation lead was allocated to one BU to support prototyping, reduce risk and deliver innovative outcomes for the BUs: “running lots of experiments and having the business be as comfortable around experiments” (Rachel, 2018). Innovation leads were paired with a sponsor (BU manager) to focus on exploitative innovation. A delegation team comprising three members of the TMT (the CEO, CFO, and chief strategy officer) and a rotating group of BU sponsors was created whose role was to support innovation project portfolio management. The aim of the redesign of the portfolio management model was to involve BU managers in making decisions on Nest’s innovation project portfolio and to make them accountable for their progress.

Design Sprint execution: To execute the design sprints, a limited set of tools that focused on brainstorming and prototyping solutions, rather than need-finding (Seidel and Fixson, 2013), was deployed in accordance with project-specific requirements. The intent was to learn just enough from users to test viable products and deliver improved solutions (Dell’Era et al., 2020). This variation followed feedback from BU managers that using the full range of DT tools was overly time-consuming and resource-intensive and not supportive of the quick execution they were looking to achieve. As one explained, “I need a [Nest]-lite expedited version that picks up the key steps, and then I need the full robust [process] completely There’s nothing where one size fits all” (BU MM 3). In response, depending on the stage of the projects and the needs of the BU team they were supporting, the innovation leads applied DT tools in a more selective way:

I guide [the BU team] by giving them the training they need for each part of the project. They come to us with an idea, and we start the experiment phase, and we use Lean Startup to go back to scan and uncover the jobs to be done. So, it’s much more flexible. (Innovation Lead 1, 2019)

Using select DT tools reduced the burden on workforce resources. Crucially, the speedy design sprint execution meant that implementing DT became more manageable, and outcomes were achieved quicker. Consequently, there was a large increase in the number of exploitative projects completed (see Table 5) in comparison to the previous phase.

Co-optation: From a cognitive perspective, the visible success of design sprints both fed and reinforced the previously established exploitative innovation frame among BU managers, enhancing their confidence and buy-in to use DT as a legitimate approach for innovation (Wrigley, Nusem, and Straker, 2020). Some of those most skeptical at the start began to embrace DTI:

[DTI] is starting to permeate into middle management as well. So that [middle management] level, which we've always struggled with. We've got some really great supporters within that group now that we have worked really hard to build up. (Innovation Lead 1, 2019)

Based on strategy cognition literature, we refer to this mechanism of putting the new DTI approach at the service of the already legitimized cognitive frame as co-optation (e.g., Danneels et al., 2018; Starr and MacMillan, 1990). Indeed, co-optation helped in building legitimacy for DTI at the MM level. Importantly, with DTI being applied increasingly at the BU level, Rachel was able to leverage the legitimacy of the exploitative frame to obtain the required buy-in to continue DT deployment to pursue an ambidextrous innovation portfolio:

The thing about [Nest] is, you're always learning, I've done lots of [training] sessions ...and I still go into a workshop, and they come up with some new technique that I've never seen before...the techniques they teach you and how to think about things and not to close your eyes to certain ideas and biases and unconscious bias and all that stuff, it's just good business to know it. (BU MM 1, 2018)

Inertia: With flexible DT tool deployment and speedy execution, as the demand for the innovation leads to support BU exploitation projects continued to increase, questions were raised as to Nest's own focus on longer-term initiatives and the value these were adding to the BUs. BU managers wanted Nest to focus on their immediate, incremental needs:

The [BU] knows the business better than anyone, so why are we not going in the same direction? Because there's plenty to be done in the right direction [] This just is not working – [] because we're heading in a new direction [] you are kind of over here going, no, you need to be doing this. (BU MM4, 2018)

This feedback indicated that inertia towards exploration was still an issue at the BU level. This posed a risk “because [BUs] are the ones that control where the dollars are spent [...]” (BU MM 4, 2018). BUs preferred to absorb the Nest team and draw on these resources to drive BU-specific, exploitative innovations. However, this further jeopardized Nest’s workforce capacity to pursue explorative innovation, and developing a balanced ambidextrous innovation portfolio remained a challenge. As Rachel explained, “we’re turning business projects around so quickly now, but the [explorative] missions have kind of this slow trajectory, and it’s almost become the group norm to have it at that slower pace” (Rachel, 2018). Consequently, no new explorative innovations were pursued during this phase (see Table 5). The residual inertia towards explorative innovation at the BU level and the continued focus on exploitative innovation triggered another shift, leading to the third phase of DTI implementation. An emergent portfolio strategy evolved as more experience was gained with the flexible deployment of DTI.

Phase 3: 2019—Creative confidence

The context: In response to the inertia that was slowing down explorative projects, DT was deployed differently to make the organization more confident with the creative processes underpinning both explorative and exploitative innovation (Kelley and Kelley, 2013). However, it became clear that the two needed to be separated even more to achieve this (Martini et al., 2015). For Rachel, this created an opportunity for further structural separation. DT implementation for exploitative innovation became “business-led and very aligned” with the BUs: “So, we’re working, in a very tailored manner with the heads of each of the businesses” (Rachel, 2019). The DT for exploration continued to be championed by Nest.

Structural separation: In this phase, structural separation became more pronounced than in the previous two phases through distinct task and role divisions across units; with the BUs owning and implementing exploitative innovation, while Nest would spearhead explorative innovation, building further resources for DTI. Exploitative innovation was implemented through

incremental design sprints by “the businesses [that] set the mission, the challenges, [and] resource ... and [the Nest team are] the facilitators ... what we do is provide the training and guidance [on] the [Nest DT] process” (Innovation Lead 2, 2019). For explorative innovation, a radical design sprint approach that brought the entire Nest team together for intensive periods to work on new (or revisited) explorative missions was introduced.

Creative confidence: A creative confidence approach was adopted (Dell’Era et al., 2020) with DTI tools deployed flexibly—that is, DT tools for need-finding, brainstorming, and prototyping were used entirely for explorative projects and selectively for exploitative projects. With increased confidence among all levels in using the DT tools, and by using radical and incremental design sprints, the time needed to make progress was reduced: “the sprints were just revolutionary in terms of our ability to just make stuff happen ... where we are now is just a different level” (Rachel, 2019).

The way explorative projects were defined and executed was changed with Nest engaging all key stakeholders—from the TMT to a larger group of BU managers. During April–May 2019, the innovation leads worked every day on “bulldozing” explorative innovation:

It was progression at any cost because ... people in the business were saying, “you’ve got great value here, and great culture here, but, what have you delivered, what ideas have come out?” ... it’s all about delivery. So, it was head down and get stuff done. (Rachel, 2019)

Importantly, critical synergy required for ambidexterity was achieved by having innovation leads coordinate activities across the separate exploitative and explorative project teams, and through the shared vision and leadership of the Nest director and the senior management team (O’ Reilly and Tushman, 2007). Eventually, two significant explorative innovations were realized (see Table 5), leading to Urban-backed spin-offs, including a venture that developed an artificial intelligence-based system for monitoring progress on construction sites, improving safety and reducing time and cost for Urban and others in the industry.

Collective sensemaking: Throughout the sprints, the Nest team engaged with over 50 managers and employees across Urban, which was in “contrast ... to the early days where we would ... only occasionally give the business an update” (Rachel, 2019). They also invited all BU managers responsible for Nest innovation champions to present the current and planned innovation portfolio: “we went through everything, I went through the strategy and the sprints” (Rachel, 2019). This ensured that “[the BU managers and TMT] have visibility; they [would] have the right to decide which thing we are going to focus on” (Innovation Lead 1, 2019). Notably, having innovation leads coordinate across both exploitative and explorative project teams led to a synergistic effect between the two. This hybrid model ensured that insights and ideas generated during explorative projects were shared with the BUs and helped inform exploitative projects. On the other hand, building relationships in the BUs during exploitative projects helped the team secure buy-in and support from the BU managers when they were working on explorative projects.

These helped further establish “organizational connectedness” (Kelley, 2009) between the innovation unit and the BUs. From a cognitive perspective, it enabled collective sensemaking of DTI. Collective sensemaking is seen to occur as “individuals exchange provisional understandings and try to agree on consensual interpretations and a course of action” and is underpinned by the understanding that “individual interpretive actions feed collective ones” (Stigliani and Ravasi, 2012, p. 1232). In our case, the Nest team worked with the BU managers (and the TMT) for collective sensemaking of exploitative and explorative innovation (Beverland et al., 2015; Stigliani and Ravasi, 2012; Weick, 1995). This led to joint interpretations of the innovation portfolio (Dougherty, 1992) and the development of a shared cognitive schema (Moussavi and Evans, 1993; Narayanan et al., 2011) around ambidexterity, underpinning the cognitive integration required to shift to an ambidextrous innovation frame. This proved critical to attain synergy between exploration and exploitation. The resulting ambidextrous innovation

frame also helped build further legitimacy for DTI at the BU level with one putting “half a million dollars aside to fund innovation projects” (Innovation Lead 1, 2019). The CEO added:

[It was] a five-year transformation program []. It was a series of decisions along the way to get from where we were then to where we are now. And I would say that [Nest] ...has been a key driver of cultural change in the organization (CEO, 2018)

Overcoming inertia: Progressively, as people from across the organization were exposed to and recognized the value of DTI, they started applying it in their day-to-day practice: “I’ve found the DT training to be an amazing tool not just for the missions, but for everything I do. I look at things from a totally different perspective” (BU MM 5, 2018). We argue that the creative confidence approach (Dell’Era et al., 2020) ensured support and ways to gain organizational connectedness and collective buy-in for DTI across the TMT, MM, and frontline employee levels for both explorative and exploitative innovation. Importantly, this approach inspired collective sensemaking across the organization (Buehring and Liedtka, 2018; Narayanan et al., 2011) through the development of a shared ambidextrous innovation frame:

I think that [Nest] has had very positive cultural impacts within our broader business on a number of different fronts but certainly [Urban] as a business is looking to be industry leaders, and I think [Nest] has really provided that mindset within the business. (BU MM 4, 2018)

Subsequently, Urban was recognized as one of the most innovative companies nationally and had established a portfolio of both explorative and exploitative innovation, as we describe below (see also Table 5). The CEO acknowledged that Nest had embedded ambidextrous innovation mindset into the organizational culture (company press release 2019, paraphrased), indicating a shift in the company’s cognitive frame. Importantly, deploying DT practices flexibly and responding generatively to inertia was the key to an evolutionary approach to managing the tension between explorative and exploitative innovation (He and Wong, 2004). This was critical in achieving synergy between the two to build an ambidextrous innovation portfolio:

As we mature, we look at how to pivot the program. I think that's one of the best things about what we do, is that we actually apply our own methodology ... And we've done that throughout the five years; [Nest] has changed a lot. It changes all the time. (Rachel, 2019)

Taking stock of Urban's ambidextrous innovation portfolio

By the end of 2019, Nest had built an ambidextrous innovation portfolio: completed over sixty business projects (exploitative innovation) and proposed six explorative innovations, two of which led to the creation of radical, innovative spin-offs. Importantly, through the flexible and continuous use of DT practices, the company attained synergistic effects between explorative and exploitative innovation. Additionally, Nest had engaged in over 2500 direct customer interactions and raised AU\$7.9 million to seed fund Nest projects. The team had trained close to 25% of Urban's workforce, including 165 now skilled and experienced innovation champions.

In 2020, Urban received global recognition for its innovation achievements, ranking in the top 10 of the world's most innovative companies in its category. This ranking was based on three explorative innovation projects that delivered innovative solutions for commercial, residential, and retail customers. Urban's CEO summarized the emergent, adaptive implementation of DTI driven by a generative response when faced with inertia that shifted the cognitive frame across the organization:

Over the last few years, we have been working towards a culture of innovation where everybody believes it is part of their job to challenge the status quo and reimagine what we do. This transition has been championed by our innovation team [Nest] [] We are changing the way we problem solve as a business (CEO, 2020, company website).

DISCUSSION

DT practices for ambidextrous innovation: a framework

We have presented findings of a longitudinal case study showing how the innovation director (MM) of a large organization used DT practices flexibly over three phases and how this process helped shift the cognitive frame of the organization toward ambidexterity. This led us to develop

a process framework (Figure 2). While the deliberate strategy from the outset was to achieve an ambidextrous innovation portfolio, getting there only emerged as a result of a phased and adaptive process, ranging from creative problem-solving to design sprints and finally to creative confidence. When faced with inertia to explorative innovation, the innovation director (MM) responded with strategic flexibility: she adapted the DT approach and structures along the way, allowing an emergent portfolio strategy to be shaped over time (Burgelman, 1983; Mintzberg, 1978). The MM's generative response to inertia in each phase guided the choice of the type of DT that was adopted. The mechanisms of this emergent process were similar across all phases, and eventually overcame the inertia and achieved an ambidextrous cognitive frame.

Each phase began with *structural separation* (Faems et al., 2008; O'Reilly and Tushman, 2013; Tushman et al., 2010), that increased progressively in terms of formal structuring of a separate organizational unit, team recruitment and training, and role distinction for exploration and exploitation. The structural separation helped in *building resources for DTI*—in turn enabling the implementation of a specific DT practice in phases, starting from *creative problem-solving* to *design sprint execution*, and finally *creative confidence* (Dell'Era et al., 2020). The decision to adopt these practices in each phase was triggered by what we term “generative inertia”. We argue that the MMs generative response to inertia in each phase triggered the cognitive mechanisms—*frame flexibility*, *co-optation*, and *collective sensemaking*—that underpinned the transition from an explorative to exploitative to ambidextrous frame. Such a continuous and evolutionary development of a shared ambidextrous innovation frame across diverse units and organizational levels (Narayanan et al., 2011; Kaplan, 2011) drove the *cognitive integration* necessary to achieve an ambidextrous innovation portfolio.

During the creative problem-solving phase, need-finding (Seidel and Fixson, 2013) with a focus on user-centeredness (Brown, 2008) enabled *frame flexibility* (Raffaelli et al., 2019), which in turn, expanded the exploitative frame to accommodate an explorative innovation frame among

frontline employees. This created legitimacy for DTI as a driver of explorative innovation at the frontline level. However, inertia at the BU level in relation to explorative innovation generated a pivot to design sprint execution in Phase 2. Here, the focus shifted back to exploitative innovation via the flexible deployment of brainstorming and prototyping (Seidel and Fixson, 2013) to accelerate the innovation development process (Knapp et al., 2016; Ries, 2011), which enabled *co-optation* (Starr and MacMillan, 1990; Danneels, Verona and Provera, 2018), enhancing legitimacy for DTI as an enabler of exploitative innovation at the BU level. However, the residual inertia in relation to exploration triggered a generative response that led the change to a creative confidence approach in Phase 3. All DT tools (need-finding, brainstorming, and prototyping) were leveraged flexibly for both explorative and exploitative innovation. Critically, *collective sensemaking* (Stigliani and Ravasi, 2012; Beverland et al., 2015) was instrumental in cognitive integration across the top, middle, and frontline levels to foster an ambidextrous innovation frame (Buehring and Liedtka, 2018), and create synergies between explorative and exploitative innovation (He and Wong, 2004).

This process was shaped as the innovation director (MM) and her team pivoted along the way, adjusting responsibilities for exploitation and exploration and how DTI is deployed based on feedback. Importantly, while Nest started with a deliberate innovation portfolio strategy, they changed it along the way as needed. Moreover, rather than attempting to follow a single best DTI approach, they adapted their DT practice and related structure as interim objectives evolved, highlighting the significance of strategic flexibility (Burgelman, 1983; Mintzberg, 1978). In light of these findings, we suggest that the flexible and phased implementation of DTI ultimately promoted a way to achieve the cognitive (re)framing necessary for attaining an ambidextrous innovation portfolio. Despite starting with an overly optimistic deliberate strategy and having setbacks to DTI adoption along the way, freezing of the cognitive frame in each phase triggered a generative response to inertia, enabling the organization to progressively build the resources

and legitimacy for DTI. Ultimately, this allowed them to go beyond a local maximum and implement the higher-potential cognitive shift to ambidextrous innovation.

Theoretical implications

This study makes four key contributions. First, we contribute to the DT literature by developing a process model of how MMs can respond to inertia towards exploration and, in doing so, shift the organization's cognitive frame to an ambidextrous innovation orientation. We demonstrate how DT can be used flexibly and iteratively, thus enabling a transition to an ambidextrous innovation frame. We conceptualize generative inertia as a transition mechanism and as a way of coping with the ambiguities and uncertainty of explorative innovation (O'Connor and Rice, 2013) and competing innovation priorities (e.g., He and Wong, 2004), that ultimately enables the cognitive integration required to achieve synergistic effects between explorative and exploitative innovation.

In contrast to Liedtka (2015), our focus is not on how DT enables individual cognitive bias reduction but on how a phased DTI implementation can expand the collective cognitive frames from explorative to exploitative to ambidextrous innovation at the organizational level. In doing so, we respond to Micheli et al.'s (2019) call to examine how new cognitive frames can be introduced in contexts where previously established logics or "cognition-based inertia" may stifle innovation (Nagaraj et al., 2020). We also address the need to link DT with innovation from a cognitive process perspective (e.g., Beverland et al., 2015; Dong et al., 2016).

We argue that for organizations to attain an ambidextrous innovation portfolio, it is important to have a stepwise approach to DT implementation that can adapt to the interim (explorative and exploitative) innovation objectives over time. Notably, in our case, shifting from creative problem-solving to design sprint execution, and ultimately to creative confidence, enabled the cognitive integration required to achieve an ambidextrous frame. This demonstrates how different DT practices can be deployed flexibly and sequentially within the same organization,

thus extending the work of Dell’Era et al. (2020). At the same time, our analysis also implies that all four DT practices identified by Dell’Era et al. (2020) do not necessarily have to be present for successful DTI implementation. Indeed, we did not find evidence for the adoption of the fourth DT practice – “innovation of meaning” that enables the identification of “a novel purpose that redefines the problems worth addressing” (Dell’Era et al., 2020, p. 10). Instead, we suggest that different combinations of practices might work in different contexts and that there is no one best DTI implementation approach. Notably, leveraging DTI to achieve an ambidextrous innovation portfolio requires a robust feedback mechanism to maintain strategic flexibility rather than attempting to get it right at the outset (Burgelman, 1983; Mintzberg, 1978). This is because emergent portfolio strategy evolves as more experience is gained along the way, and DT implementation needs adjusting as organizational conditions change.

Furthermore, we suggest the type of DT used in each phase depends on the exploration-exploitation maturity level of the organization, and an intentional choice to adopt different DT practices is required to achieve an ambidextrous innovation frame. Similar to prior research on strategy cognition (e.g., Kaplan, 2011) and ambidexterity (e.g., Zimmermann et al., 2015), our insights highlight that implementing DTI to develop an ambidextrous innovation portfolio is an emergent, adaptive process. Notably, we show how this process can be managed flexibly to respond to inertia in a generative way across different organizational levels and BUs (e.g., Ben Mahmoud-Jouini et al., 2019). Our findings lend support to the notion that DT is not a linear process that can be deployed “through a series of structured steps” (Butler and Roberto, 2018, p. 49). We demonstrate how DTI is “actually used in multidisciplinary teams that newly adopt a design thinking approach” (Seidel and Fixson, 2013, p. 19).

Our second contribution to the DT literature is to show how DT links to broader organizational outcomes. In our case, the phased implementation of DTI helped shift organization-wide cognitive frames toward ambidexterity. The majority of the DT literature has

focused on specific DT tools and methods to solve problems at the project level (e.g., Ben Mahmoud-Jouini et al., 2016; Seidel and Fixson, 2013). Only recent studies have started to address how DT implementation relates to organization-level constructs such as organizational culture (e.g., Elsbach and Stigliani, 2018), organizational design (Csaszar, 2013), organizational strategy (e.g., Knight et al., 2020; Liedtka and Kaplan, 2019), innovation (Verganti, 2006), product development (Meinel et al., 2020), and brand ambidexterity (Beverland, Wilner, and Micheli, 2015). In line with Beverland et al. (2015), we focus on the generative mechanisms through which DT can enable cognitive integration at the organizational level. We show how such a process enabled the organization to manage its explorative side and discover a more radical transition to ambidexterity (O'Connor and Rice, 2013). More broadly, we argue that a firm's innovation frame can be created and changed through DT if the organization is flexible about how it uses DT practices and generative in how it responds to inertia.

Specifically, we demonstrate how DT can be used to change mindsets in favor of producing behaviors that lead to ambidextrous innovation (Lin and McDonough, 2014) by enabling managers and employees to feel confident in facing innovation challenges and organizational change (Dell'Era et al., 2020). This highlights the relevance of DT for changing organizational culture (Elsbach and Stigliani, 2018; Kolko, 2015). More generally, we add to the limited research on the process of DTI implementation (e.g., Chang et al., 2013; Carlgren, Elmquist, and Rauth, 2016) showing how developing legitimacy is critical (Micheli et al., 2018; Rauth et al., 2014) to overcome barriers to innovation (Hölzle and Rhinow, 2019; Ben Mahmoud-Jouini et al., 2019).

Third, research focusing on the role of MMs in leveraging DT for strategic innovation portfolio management is still in its infancy (Knight et al., 2020; Radaelli et al., 2017). Despite the strategic importance of MMs in the innovation process (Floyd and Wooldridge 1994, Currie and Procter 2005, Heyden et al. 2018), we know little about how a manager's position within the

organization shapes the way DT is used for innovation portfolio management (Taracki et al., 2018; Behrens, Ernst, and Shepherd, 2014). In this study, we do not focus on senior managers (Micheli et al., 2018; Rauth et al., 2014) or frontline project teams (e.g., Hölzle and Rhinow, 2019). Rather, we studied the role of MMs: that is, managers who do not simply carry out top-level orders but also have the freedom to make decisions on DTI portfolio management (Behrens, Ernst, and Shepherd, 2014). While organizations start with a deliberate innovation portfolio strategy, this must be adjusted when faced with inertia (Randhawa et al., 2021a). Here, our findings highlight that MMs can respond to inertia with strategic flexibility – adapting the DT approach and structures and by allowing strategy to emerge over time (Burgelman, 1983; Mintzberg, 1978). This highlights the strategic role and agency of MM in leveraging DT for innovation portfolio management.

In particular, we investigated MMs' bottom-up engagement with senior executives, their top-down engagement with frontline employees, and their horizontal engagement with peers in leveraging DTI to facilitate innovation portfolio management (Roth, Spieth, and Lange, 2019; Kester et al., 2011). In this context, our study demonstrates that MMs act as a conduit between TMT, frontline employees, and peers, reconciling their varied interests, increasing legitimacy for DT, to ultimately shape the organization's collective cognitive frames over time, underpinning its shift towards ambidextrous innovation. This finding accords with prior management research on how MMs contribute to strategy and innovation by championing initiatives such as DTI (Glaser, Stam, and Takeuchi, 2016; Heyden, Sidhu, and Volberda, 2018; Huy, 2002). The implications of our findings are that focusing only on the upper echelons creates the risk of misattributing the consequences of innovation processes, some of which are at least partly attributable to MMs (Schubert and Tavassoli 2020).

Prior research has suggested that MMs manage innovation portfolios by applying formalized innovation portfolio management systems, seeking to align their employees' different abilities,

actions, and outcomes with firm goals and strategy (Kester et al., 2011; Spieth and Lerch, 2014; Randhawa, Wilden and West, 2019). By contrast, we contribute to the limited research taking a behavioral perspective to innovation portfolio management (Radaelli et al., 2017; Roth, Spieth and Lange, 2019), showing how MMs can use DTI to respond generatively to inertia and facilitate collective sensemaking among various organizational members to align their decisions and actions with firm strategies (Randhawa et al, 2021a). We thus complement Roth et al.'s (2019) work on the role of sensegiving and sensebreaking in innovation portfolio management. We show how using DTI flexibly can help MMs adapt innovation portfolios to changes and opportunities, reconcile conflicting interests and understandings among groups (Andriopoulos and Lewis, 2010; Smith and Tushman, 2005), and account for the complexity and uncertainty in exploratory innovation (Vedel and Kokshagina, 2020; O'Connor and Rice, 2013). In so doing, our study challenges the effectiveness of formal and rational but potentially inflexible innovation portfolio management processes.

Our final contribution is to ambidextrous innovation research. By showing how DT practices can be deployed in a phased manner to attain an ambidextrous innovation portfolio, we add to the limited research that clarifies the relationship between DT implementation and ambidexterity. Previous conceptual work has suggested that DT can enable ambidextrous innovation through the mediating effect of ambidextrous learning at the project level (Zheng, 2018). We extend this work showing how DT can enable ambidextrous innovation through a suite of generative mechanisms deployed at the organizational level. We identify how these mechanisms allow for a generative response to inertia towards exploration, leading to an ambidextrous innovation frame. We highlight the need for starting with the near-term exploitative innovation and build resources and legitimacy progressively before attempting to pursue explorative innovation. In doing so, we address the more general question of how managers can use DT in a stepwise manner when transitioning to ambidextrous innovation. We contend that DT can provide a new organizational

design principle to manage the tension between explorative and exploitative innovation simultaneously (He and Wong, 2004).

Research on ambidexterity has stressed the differentiation between structural, temporal and contextual ambidexterity (Zimmerman and Birkinshaw, 2016) – and more recently cognitive ambidexterity, which refers to contextual ambidexterity at the individual level (e.g., Good and Michel, 2013; Karhu et al., 2016). In our study, DT provided a set of practices that enabled individuals to address different dualities—exploitation and exploration (Raisch and Birkinshaw, 2008; see also “harmonic ambidexterity”, Simsek et al., 2009). We suggest that flexible use of DT practices can serve as a basis for cooperative exchange to help attain “organizational connectedness” (Kelley, 2009), that is critical for the cognitive integration underpinning ambidextrous innovation (Simsek et al., 2009; Zimmerman and Birkinshaw, 2016). This is in line with He and Wong (2004), who find that ambidexterity can be achieved if the dualities between exploration and exploitation can be reconciled by managers at the group level.

Furthermore, while structural and contextual ambidexterity has often been considered as being mutually exclusive, we found that DT can enable a dual approach to ambidexterity (Randhawa, Wilden and Gudergan, 2021b). This is because DT tools can be adapted to the needs and objectives of the evolving innovation project portfolio and help attain greater connections between the innovation unit and the broader organization on which it depends. These ultimately develop collective cognitive frames that provide synergistic effects between explorative and exploitative innovation, thus supporting the shift to ambidextrous innovation (He and Wong, 2004).

In so doing, we also add to the sparse literature on cognitive ambidexterity by showing how DT can be used as a lever to help teams develop the cognitive capacity to accommodate the contradictions between explorative and exploitative innovation (Good and Michel, 2013) and expand their cognitive agenda to recognize a broader range of innovation opportunities (Smith

and Tushman, 2005). Eventually, these lead to a collective cognitive reframing toward ambidexterity at the organizational level (Birkinshaw and Gupta, 2013).

Managerial implications

Our findings are relevant for executives and managers who leverage DT as a strategic approach to innovation. Too often the focus of implementing DT is merely on training people in new tools and methods leading to naive expectations of achieving outcomes quickly. Our findings suggest that executives must tap into the potential of DT to achieve strategic outcomes such as ambidextrous innovation. At the same time, we show that implementing DT in transitioning to long-term explorative innovation outcomes and pursuing ambidextrous innovation is not straightforward – it is an emergent and adaptive process. We highlight the significant role that MMs can play in the flexible implementation of DTI and proactively addressing inertia.

Indeed, our case highlights that for an organization with a high-velocity, operational culture, to attempt to secure support for high-risk, long-term explorative innovation, there needs to be a step-wise approach. We suggest that organizations will benefit most from DTI when managers deploy DTI in a phased manner rather than striving for ambidextrous innovation outcomes from the outset. It is best to start with the near-term exploitative innovation and build resources and legitimacy progressively before attempting to pursue explorative innovation. In navigating the shift to ambidexterity, managers can use our framework to choose DT practices that can be used flexibly based on the exploration-exploitation maturity and objectives of their organizations. Rather than follow a single best approach, it is best to be pragmatic, and test, adapt and pivot to different DT practices as interim objectives evolve. We suggest that such an iterative approach, that lies at the heart of DT, applies to the very implementation of DT too.

Because managers charged with the responsibility to implement innovation, often MMs, are often directly exposed to the pressures of delivering on short-term business objectives and long-

term innovation strategies, they have a challenging but crucial role in achieving ambidextrous innovation outcomes. In other words, if organizations want to develop an ambidextrous innovation portfolio, they need to appreciate the strategic role and agency of MMs in this process. It is hence important to train and coach MMs to use DT practices flexibly to this end. MMs responsible for DTI implementation also require autonomy and resources to adjust the DTI approach—for example, shifting between the practices of creative problem-solving, sprint execution, and creative confidence—to meet changing demands. Giving MMs autonomy means giving them the freedom to experiment (and possibly fail) and pivot as they discover new ways of working with new approaches in the prevailing work culture.

Our findings suggest that MMs can leverage DTI practices to trigger generative mechanisms—frame flexibility, co-optation, and collective sensemaking – to adapt to the interim (explorative and exploitative) innovation objectives over time. First, we find that implementing creative problem-solving triggers frame flexibility by expanding cognitive frames to accommodate explorative innovation. Here, dedicated training of managers and employees in creative problem-solving techniques could also play a crucial role. Second, sprint execution can be used to achieve cognitive cooptation as it can draw on the already legitimized exploitative frame to produce quick wins and obtain further buy-in for the change effort. By work collaboratively with peers and demonstrating early achievements, MMs can gain their support. Finally, the creative confidence approach cultivates collective sense-making by involving multiple stakeholders, seeking their feedback and input, and getting their commitment early in the process. Overall, this helps MMs drive the higher-potential cognitive shift to ambidextrous innovation.

To this end, firms should put in place systems and practices that encourage MMs to use DTI flexibly to work toward greater connections between the innovation unit and the broader organization on which it depends, and changing the cognitive frames or outlooks of BU

managers and frontline employees across units. This is necessary to create synergies between explorative and exploitative innovation across units and levels, and to produce behaviors that lead to ambidextrous innovation. Employees and managers need support to augment such cognitive abilities involved with DTI, which may also involve developing a mentorship and coaching framework.

FUTURE RESEARCH

Inevitably, our study has limitations, which also provide avenues for future research. First, we have focused on a single organization in the property development sector that has a volatile history of entrepreneurial activity (Bailey, 2020). While recognizing the limitations of a single case study for statistical generalizability (Yin, 2003), we suggest that our findings may be transferable across organizations facing challenges in transitioning to ambidexterity and/or DTI implementation. Researchers can explore how the DTI implementation process varies across organizations in different industries (e.g., manufacturing, services) and sectors (including public and non-profit contexts) that are known to face innovation barriers in pursuing different organizational outcomes (e.g., open innovation, digital transformation) (e.g., Randhawa, Wilden and Gudergan, 2018; Randhawa, Wilden and West, 2019).

Additionally, our research draws from a larger corporate organization. Consequently, DTI implementation in different-sized organizations (e.g., small and medium-sized enterprises or start-ups) warrants further attention. Future research may also fruitfully explore the conditions under which organizations use the DT practice that Dell’Era et al. (2020) term, “innovation of meaning,” and see if perhaps firms need to be more mature in their ambidexterity journey to use this type of DT. While our focus has been on the role of cognition in DTI implementation, future research can explore the impact of organizational culture (and other environmental factors) on how DTI is implemented. Finally, future studies can explore a multilevel conceptualization to

enable a deeper understanding of the link between cognitive frames and DTI implementation and outcomes at different levels (e.g., Lin and McDonough, 2014). Despite these limitations, our study provides valuable insights for both scholars and practitioners on how DT can be used as an enabler of ambidextrous innovation.

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Table 1: Data inventory table (interviews and secondary data)

<i>Secondary data source</i>	<i>Type</i>	<i># of items</i>	<i># of pages</i>	<i>Primary data source (Interviewees)</i>	<i># of interviews / interviewee</i>	<i>Interview period</i>	<i># of pages per transcript</i>
Company Annual Reports 2009 to 2019	Report	10	~772	Top Management Team (TMT)			
Press releases, media coverage, blog posts and media mentions	Text	5	18	CEO (Pseudonym: Karen)	2	2017, 2018	20, 13
Client/partner briefing and industry conference presentations	Presentation	29*	266	Chair of Board	1	2017	21
Strategy documents (acceleration, partnerships, spin off, governance review)	Presentation	5	199	CFO	1	2017	12
Consulting firm reports and strategic recommendations	Report	2	207	Head of Strategy	2	2017, 2018	19, 22
Board papers and presentations	Presentation	2	10	Head of Culture	1	2018	23
Leadership status updates	Presentation	8	185	Middle Managers (MM)			
Innovation Council status updates	Presentation	15	294	Innovation Director (Pseudonym: Rachel)	8	3/2017, 6/2017, 5/2018, 7/2018, 4/2019, 11/2019, 12/2019; 2/2021	34, 18, 25, 42, 27, 16, 38, 17
BU briefing, HR dept, Tax dept and other functional areas or locations	Presentation	17*	299	Company secretary/Head of Urban internal investment fund	1	2018	15
Mission overview documents for Innovation champions	Report	8	8	Business Unit manager 1	1	2017	16
Electronic pasteboards, posters, digital screens, intranet posts	Text	37*	84	Business Unit manager 2	1	2018	23
Innovation champion recruitment, role descriptions and briefing documents	Text	12	15	Business Unit manager 3	1	2018	11
Nest training materials	Presentation	10	377	Business Unit manager 4	1	2018	30
Nest process guide and toolkit	Report	2	305	Business Unit manager 5	1	2018	19
Personal email exchanges with researchers	Text	22	29	Frontline employees			
Photographs of events, workshops, trainings	Images	12	57	Innovation lead 1	2	2017, 2019	20, 18
				Innovation lead 2	1	2017	20
				Innovation lead 3	2	2017, 2019	13, 27
				Innovation lead 4	1	2017	20
				Innovation champion 2	1	2017	9
				Innovation champion 4	1	2017	15
				Innovation champion 1	1	2017	17
				Innovation champion 3	1	2017	20
Total # pages			3133		31		640

* These documents contain information that was used for multiple purposes and is at times repetitive and/or an amended copy of an earlier version.

Table 2: Evidence for key constructs Phase 1

Key constructs	Example quotes
Structural separation (Formal DTI structuring)	<p>“[Nest] deliberately sits outside the normal hierarchy of management. Because innovative ideas are all well and good but when a project gets under pressure, the [BU] manager is going to stop it [] and the idea [] won't get any airtime because it costs. So, we set up a budget and a very small team.” (CEO, 2016)</p> <p>“And one of the key tenants of [Nest] is that it’s separate to the hierarchy; its governance is set up entirely separately because we learnt that that was best practice, that the hierarchy can block innovation.” (Nest director, 2017)</p> <p>“[Need to] [m]aintain a separation between the [Nest] innovation program and the conventional business hierarchy, ensuring autonomy and independence” (Nest TMT presentation, 2017)</p> <p>“we give [innovation champions] space and training and time to go ahead and think of innovative ideas around these very specific missions” (CEO, 2016)</p> <p>“When we were champions [] we could put our preferences, which one [mission] we wanted to go on” (Nest director, 2017)</p>
Building resources for DTI	<p>“Then we trained what we call [Nest] champions; so I actually think of them as little revolutionaries in the business in how to think about this methodology” (CEO, 2016)</p> <p>“[Nest team has] been training people and spreading the story and allowing people to be involved [] freeing up their time” (CFO 2017)</p> <p>“Innovation champions: Building capability in our business; [] Working 2-3 days a month on innovation; In a space that was completely different to the normal business environment” (Nest presentation to TMT, 2017)</p> <p>“We have ‘innovation champions’ because we really want to embed change at the front line. There’s no innovation team sitting off to the side, it’s something that’s very, very embedded.” (Nest director interview for a magazine, 2017)</p>
Creative problem solving (Focus on need finding)	<p>“There is so much value in just stepping back and listening to what your customers want and observing how they actually use our physical spaces []; there are so many challenges in terms of how technology has changed the way consumers operate.” (BU manager 1, 2017)</p> <p>“We've also learned that actually going out and talking to people is absolutely essential. You can't sit in a room and you can't ask people what they would do. You have to go and ask people what they do do.” (CEO, 2016)</p> <p>“[Nest] was [b]ased on leading Design thinking methodologies; [and] a customer-centric approach.” (Nest progress presentation to TMT, 2017)</p> <p>“The customer is everything – customers are at the heart of innovation and our innovation process. Our innovation champion training is called ‘customer-centric innovation’. We’re building the capability in-house so we can be out there, on the front line: interacting, observing, talking to our customers, understanding what it is they’re trying to get done, and understanding their frustrations, their workarounds, their experiences. So it all begins and ends with the customer and customer experience” (Nest director interview for a magazine, 2017).</p>
Creative problem solving (Intense DTI tool deployment)	<p>“[In] a lot of [innovation] programs, people go from ideation to implementation but there are a lot more stages that you need to go through in that. So, we've got this quite rigorous process.” (CEO, 2017)</p> <p>“We proposed that [rigorous DT] approach. So, by comparison, other innovation managers that I used to work with, communicate with, [] they would skip the entire design thinking process and quickly get something out []; and so because the leadership let us do what was being proposed without standing in the way, that’s kind of what set us apart” (Nest director, 2017)</p>

<i>Key constructs</i>	<i>Example quotes</i>
	<p>“What I really appreciate about working through the [Nest] program is no one’s making knee jerk reactions at anything, it’s all very methodical and very thought through. [] So, the one thing I can say about the [Nest] methodology is it’s incredibly robust” (Innovation champion 1, 2017)</p> <p>“A process that can be applied to any problem; A process that we are slightly obsessed with; [] it changes the way you look at things; and ensure you don’t skip steps.” (Nest training notes, 2017)</p>
Cognitive frame flexibility	<p>“We had never been customer centric in our innovation before, we’d always been tech lead or saw someone else doing something cool.” (Nest director, 2017)</p> <p>“I refer to it as a way of thinking and I think it’s an innovative way of thinking [] I see something there and think, ‘I’m going to ask the question’. Sometimes you can change it, sometimes you can’t, that’s fine, but let’s at least explore that” (Innovation champion 2, 2017).</p> <p>“[DT] really gets you to reach for the stars and think outside the box and reimagine, and for me has been a key driver for how I think and the decisions I make on our projects. So [] it gives you a really broad scope – something that’s a first – something no-one has done before and I see that as part of innovation [] that’s been the biggest game changer for me in how we think about it.” (BU manager 1, 2017).</p> <p>“[DT is] so relevant for [Urban], the methodology is so robust [] just this whole process of starting to question assumptions and to test assumptions and not just be led blindly by assumptions that we all make [] is so powerful” (Innovation champion 1, 2017).</p>
Explorative innovation frame	<p>“We really love the quote of, ‘if you’re not changing at the same pace as the world outside you, the question is not if you will die, but when’. \ then how are we doing something completely different out here?” (CEO, 2016)</p> <p>“We’re not looking to just tinker around the edges. That’s not what we’re here to do. The business does that. We’re here to radically revolutionize [] [the mission] is absolutely meant to be disruptive so it’s an exploratory focused mission [] A big emotive language about creating a new offering, focused, fairly and squarely on our future customer in this space.” (Nest director, 2017)</p> <p>“My understanding of Urban’s Innovation Strategy is to [pursue] those sorts of bigger blue-sky innovations as well, which might provide some value whether commercially or making our jobs more efficient in other areas of the business.” (Innovation champion 2, 2017)</p> <p>“We’re not focusing on just what’s in front of us here. We’ve obviously got to do that as part of our day to day, but we’ve got to be thinking about what’s beyond that and I think our innovation program helps us do that.” (Head of Strategy, 2017)</p> <p>“We need to be EXPLORING the future, at the same time that we EXPLOIT what we do now” (Nest presentation to innovation champions, 2016)</p>
Building legitimacy for DTI at frontline level	<p>“I think people are now seeing the value of creating an environment of ideas and not trying to quickly dive to a solution. People are much more aware of that now and far more appreciative [] we have become far more sophisticated in terms of our thinking around innovation.” (CFO, 2017)</p> <p>“[Nest has] given people on the ground some ownership over the process and you see them applying it, you hear people talking about innovation not just as a buzz word but as a practice and as a way of thinking and the cultural impact of being in a [Nest] program is starting to spread its way through. So [] when I hear people saying, “what do my customers say about this product and service” rather than, “I think this”, that’s when I know that the ethos of the program has leaked it’s way in.” (Innovation lead 1, 2017).</p> <p>“[The DT language] started to be added to the lexicon, like you’d hear jobs being done, and that’s not just from [innovation] champions, but it’s also people that have gone out and had some training on interviews and had gone out to do that” (Innovation lead 3, 2017).</p>

Table 3: Evidence for key constructs Phase 2

Key constructs	Example quotes
Structural separation (DTI role development, recruitment and training)	<p>“There started to be a bit of tension between the [Nest] champion role and the business as usual activities [] So [the Nest director] restructured [Nest] to include a core team of people 100% dedicated to doing innovation whatever that may be []. Our role is to do the two things: [] run the missions and guide the champions []. But also to give the business units ownership; [] a lead innovator is different to a champion because it’s a full time role, focussed 100% on delivering disruptive ends and incremental innovation” (Innovation lead 1, 2018)</p> <p>“We have done a pivot with setting up a [Nest] core team [] because we lacked horse power to get things going []. The [Nest] team is on a journey around how they play the role of what I call incredible activists – they have credibility in the system – they know the system but they have a point of view and [] drive the innovation agenda.” (Head of Culture, 2017)</p> <p>“I [] see benefit in having a fulltime team of people who can start to build-up that [DT] experience and that knowledge and share those learnings. It was [] hard for the champions to switch from their day-to-day [work] back into [Nest] and back out again” (Nest director, 2017)</p> <p>“The success of the [Nest] program, has resulted in a dedicated full-time innovation team to support progress on [explorative projects], and help the business apply the [Nest] process to various business projects. [] The team has expert knowledge in best-practice innovation and works closely with the entire [Urban] business.” (Urban website)</p>
Building resources for DTI	<p>“Since the core team has been formed, we’ve made leaps and bounds. [] I think it remains to be seen, on that front, whether or not [Nest] is a success. But certainly, in terms of shaping culture and changing the conversation and the tone, definitely.” (Nest director, 2018)</p> <p>“[The innovation] lead role has [] in a very short space of time [] increased the internal capability when it comes to innovation.” (Innovation lead 1, 2017)</p> <p>“[The innovation lead role] allows the progression; So, what this [role] has done now has enabled me to just get things progressing.” (Innovation lead 2, 2017)</p> <p>“[Nest] CORE TEAM: 4 Lead Innovators; ‘A dedicated innovation resource for Mirvac’. [They bring]: Innovation Training, Team Coaching, Diversity of thought.” (Nest presentation to TMT, 2017)</p>
Sprint execution (Focus on prototyping and brainstorming)	<p>“Before we invest the money into developing that [idea], let’s do the scans, let’s do some experiments, let’s just [] use that methodology, that innovation, real innovation [DT] theory. [] that’s where we might save thousands and thousands of dollars [].” (BU manager 5, 2018)</p> <p>“The centre manager [] developed a little co-working space on a casual leasing site in the shopping centre. [] ... that was just having a go, just trying something. [] It was pretty raw in its development, but that was encouraged. Why not? To see what we can learn from it.” (BU manager 4, 2018)</p> <p>“We learnt so much getting to that point in how to do innovation properly – how to ask those questions and experiment and rapid prototyping and all those things that we theorised about the team was live doing it [].” (Head of Culture, 2017)</p> <p>“What happens in lean start up? Traditional approach thrown out window; Customer research informs a problem; Ideas are suggested to solve problem; If assumption is validated another experiment is run.” (Nest presentation to TMT, 2017)</p>
Sprint execution (Flexible DTI tool deployment and	<p>“When we experiment, [] we think about how we can do [DT] differently – does it need to be all encompassing? Are there quicker ways to test? [] and there’s – almost subservience to the model – like it was some kind of religious experience. Now [] we will borrow from different approaches and [Nest] are building their own approach.” (Head of Culture, 2017)</p>

<i>Key constructs</i>	<i>Example quotes</i>
Speedy DTI execution)	<p>“[The DT] process is great, [but] it does not apply to everything; there was a period [when] everything we wanted to do [was] to go through this process. And I was like, ‘you guys, this applies in certain cases, it can’t apply [to] everything’ [] ‘You’ve got to come up [with] a [Nest] lite version [] to achieve outcomes faster.” (BU manager 4, 2018)</p> <p>“[W]ith a business project, we might be like, okay, we’ll just do an ideation for you or we’ll just run an experiment for you. [] we pick parts of the process that are suitable to that business project.” (Nest director, 2018)</p> <p>“We are changing the game. Setting a new pace for Mission progress. We will drive speed and cycle through the learning loop. Rapid learning. Imagine we are a start up! Time is of the essence. ‘Whatever it takes!’” (Nest presentation, 2018)</p>
Cognitive co-optation	<p>“But now we want to add value in more ad hoc way, someone can come to us with a problem here and maybe we can help a little bit there or, have you done customer scan here, have you done this? So, it’s trying to find that balance between not completely compromising what you do and your process and the rigour but also adding value to that business in a way that, they see as adding value as well.” (Nest director, 2017)</p> <p>“[Nest] is good to have as a consulting role; so say we had a proposal on a project to implement something new that would be an industry first, it would be good to be able to go to [Nest] and consult them on that idea and see what their thoughts were [] because it does add cost and often these projects – they are done on a very lean basis.” (Innovation lead 3, 2018)</p> <p>“The sprints were designed to get that outcome for the business, which they did and so we had at least one idea from every mission that entered the market or was delivered to the business. [] we have got [four successful projects] out.” (Innovation lead 1, 2019)</p>
Exploitative innovation frame	<p>“[BU managers] don’t necessarily want to come to [Nest] and give [us] something because [they] won’t get anything out of it for two years []; [they were] feeling like the innovation process was too intense or too long.” (Innovation lead 2, 2017).</p> <p>“I was having monthly catch-ups with whoever the innovation lead was, and making sure that we were progressing things, that I was asking questions. What are we putting in front of people? What are we focusing on? Just putting that business lens over it. So, I think, you need to have the innovation mindset and the thinking and pushing that, but it’s got to be connected to the business.” (BU manager 4, 2018)</p> <p>“It might not be things that develop into the next amazing thing that changes the world, but if it’s that incremental change at project level and if you have lots and lots of people across the business doing that, then that in aggregate creates a lot of value.” (Head of Strategy, 2017)</p>
Building legitimacy for DTI at MM level	<p>“[We have] really spent those nine months focused on the ripple effect, as in, business projects – deliver value to the business, show how design thinking can be rolled out and help with someone in any way, shape, or form [] – and I think we’ve built a lot of political capital back with the businesses and demonstrated [the] value [of DT] and so we’re in a much better place now than we were [before].” (Nest director, 2019)</p> <p>“The ability to articulate the alignment of how [Nest projects] were actually tied to the strategy [] started to happen.” (BU manager 4, 2018)</p> <p>“Some of the senior people from the [BU] were also training in [DT] research, and my [] manager was at that training, and she was quite excited about the opportunity to [] bring some of that into projects.” (Innovation champion 1, 2017)</p> <p>“Sprints [] delivered things that we could put in the market as tangible outcomes for the business. They were hugely valuable to the business in terms of the PR and the brand recognition they were getting.” (Innovation lead 1, 2019)</p> <p>“[Nest projects are] focused on extending the reach of the [Nest] ideology from [Nest] Missions to BAU [business as usual]; Become more embedded []; move from compartmentalised program to a group wide customer-centric ideology; 1. Where [Nest] ideology applied to BAU by both champions and non-champions; 2. Commercialisation and implementation of ideas” (Nest progress presentation to TMT, 2017)</p>

Table 4: Evidence for key constructs Phase 3

Key constructs	Example quotes
Structural separation (DTI task division across units)	<p>“The businesses tend to focus on incremental [innovation]. At [Nest] we are very conscious of [pursuing explore ideas].” (Innovation lead 3, 2019)</p> <p>“So, we’ve got the [Nest] mission. And then there’s [the BUs projects] which we see as more incremental [] And we run [our mission] like a sprint, but we bring our fulltime team. [] The switch [between exploration and exploitation] comes from our role in the business []. So, when we’re helping with the business projects, we approach it as a consultant would [].” (Nest director, 2019)</p>
Building resources for DTI	<p>“We’ve still got the champions, but we’re bigger than that now. So, we just trained 65 champions again. [] But we don’t get just champions on business projects. It’s anyone.” (Nest director, 2019)</p> <p>“I train and I provide the skills to the people within the team, and then I mentor them through that process as well.” (Innovation lead 1, 2019).</p> <p>“We’ll train them [people in the BUs who don’t know the DT methodology]. [] with business projects, [training] tends to be staged. They don’t normally go straight from scan to experiment in six weeks like we might do on a mission; [] so you can train them on just scan or just lean experiment so that you can chunk it up.” (Innovation lead 3, 2019)</p> <p>“What is a Champion? Literally champion innovation in the organisation. Keep innovation top of mind. Share the methodology with your colleagues. Agile champion model. Unlimited number of champions. [Nest] accredited.” (Nest innovation champion training notes, 2019)</p>
Creative confidence (Shared focus on need-finding, prototyping and brainstorming)	<p>“I worked on a project where they [the BU] already had an idea and in that particular instance, normally I would say, ‘look, why don’t we go and experiment with some of this’; but in that particular instance I said, ‘oh, look, we –it would be worthwhile to go back and do a bit of a scan’, because [] having gone straight to solution probably wasn’t the best thing to do, and they recognised that themselves.” (Innovation lead 3, 2019)</p> <p>“Once we set the mission, we knew it was about [this customer group], we then went and completed a scan [] and out of that came a lot of themes, so common themes and challenges []. So out of that research we then took challenges into [] an ideation. [] we had 200 people go through and we invited externals as well to go through and come up with ideas to solve the challenges, then we went through our decide phase []. [A]nd then we started to experiment with that [].” (Innovation lead 3, 2019)</p> <p>“The SHIFT to a [Nest] way of thinking is to change the way you think about your customer. [] When we understand the job the customer is trying to get done – we understand the opportunity for innovation.” (Nest innovation champion training notes, 2019)</p>
Creative confidence (Flexible DTI tool deployment)	<p>“[The sprints] sort of gave us a sandbox to play in. So, during the sprints we just forged ahead and we took the decision that whatever it took to get the outcome is what we would do []; that would mean taking a lighter [DT] approach.” (Innovation lead 1, 2019)</p> <p>“with the business projects, because you are working with business and you are delivering something for them and a lot of it is incremental, we are a little bit more flexible around the process; [] when it’s our mission and it’s explore, we will follow the process from start to finish, but with the business projects, [] what part of the process we start applying design thinking to is different.” (Innovation lead 3, 2019).</p> <p>“You can also use [Nest] in your business roles at [Urban]: This type of thinking can be applied to lots of different customer problems where you need a creative solution; And on business projects you can either use the entire [Nest] process or just use parts of it; So, be flexible and open to those opportunities where you can add value to business projects.” (Nest innovation champion training notes, 2019)</p>
Collective sensemaking	<p>“[W]hat we totally changed in the last sprint – we spent so much time workshopping [] with every range of stakeholders – [TMT], board, everyone, we crossed off things, we added things on, we honed again, we honed again, none of that work was done with our prior ideas.” (Nest director, 2019)</p>

<i>Key constructs</i>	<i>Example quotes</i>
	<p>“We are going to be more regularly touching base with the delegation [TMT representatives] in a much more ad hoc way and bringing them on our journey of how we work []. So that the support is there right from the beginning and they come all the way through that process with us.” (Innovation lead 1, 2019).</p> <p>“So, we will set that mission, that explore mission with the entire executive leadership team, so the head of [all BUs] will all be involved. They will know what the mission is. They will have view, visibility into that mission.” (Innovation lead 1, 2019).</p> <p>“Key learning was in the past we hadn’t involved the senior people in [Urban] in helping make that decision [on innovations]; so we [] spent a solid week every day, one person at a time or two people at a time [] – bringing everyone on this journey. [] The senior exec, we invited the Board and then just other key people [], so a lot of that [middle management] level and then some of [them] brought some of their teams as well, so there was probably a good 50 or 60 people that we kind of got through that information.” (Nest director, 2019)</p> <p>“We set up a room downstairs for ideation; opened it up to the [BUs] - sent out an email saying, ‘we’re doing ideation from this whole day, in this room’. And we had so many people come and get involved. I think in total we had about 120 ideas that were developed.” (Nest director, 2019)</p>
Ambidextrous innovation frame	<p>“it’s hard [to work on explorative and exploitative projects at the same time]. [] we’ve got to balance the two; we have to do business projects, that’s how we build relationships, that’s how we learn about the business. [] the hardest thing to do is radical innovation.” (Innovation lead 3, 2019)</p> <p>“the project I worked on just recently, there was a fairly radical idea that came [from a BU] and it’s on the radar but they want to focus on some of the things that they can do within the next year, but they’re aware that they need to look at more radical things as well.” (Innovation lead 3, 2019)</p> <p>“We are going to try to push them [the BUs] towards more radical [projects when working with Nest] because there are so many people trained on the [Nest] process now that we are starting to feel like, ‘you could probably do incremental [projects] yourself, but if we’re going to devote resources to this from our team and you’re going to put resources on it, pick something meaty.’ (Innovation lead 1, 2019)</p> <p>“[Nest] vision – To build ambidexterity, embed innovation capability and create value for [Urban].” (Nest innovation champion training notes, 2019)</p>
Building legitimacy for DTI at TMT and MM levels	<p>“So, [we are] talking to all of TMT and all of their direct reports, to understand, what success looks like? What are their biggest problems at the moment? [] what’s top of mind for them. How can [Nest] help. What do they need from us? [] where should innovation go next and to try to understand their jobs to be done to formulate the strategy for next year.” (Nest director, 2019)</p> <p>“[N]ow everyone uses the innovation techniques, terminology []. They know the process we go through; they know how important it is to go and do the scans, to use the methodology.” (BU manager 2, 2018).</p> <p>“It’s not unusual for me to go into a meeting and the people in there may not even know exactly what my function is, that I’m from [Nest] and they’ll be talking about jobs to be done or customer pain points and that’s just become the norm.” (Innovation lead 3, 2019)</p> <p>“the methodology part of the culture– [] I was in the leadership team meeting and they were talking about understanding our customers and this is always how people now think; that you have to actually go out and do the research and scan [] everyone speaks a common language in relation to it. And so, I think it’s changed how the business operates in terms of actually thinking about the customer first.” (Company secretary, 2018)</p>

Table 5: Innovation project examples and indicators in each phase

Innovation project type and indicators	Phase 1 up until 2017	Phase 2 2017- 2019	Phase 3 2019-2020 (end of data collection)
Explorative innovation projects* e.g., introducing new generation of products; enter new technology fields; developing innovative building methods; focusing on the needs of future customers	<ul style="list-style-type: none"> • Creating a digital platform that uses AI algorithms to match employees and employers based on skills, experience, behaviors and ways of working. (-) • Converting under-utilized spaces (car parks, basements and vacant retail or office spaces) into urban farms to address the potential obsolescence of car parks due to the rise of autonomous vehicles (-) 	<ul style="list-style-type: none"> • <i>no new explore ideas were pursued during this phase</i> 	<ul style="list-style-type: none"> • Utilizing AI to innovate building construction methods and to increase security on building sites; Urban launched a spin-off company (+) • Developing more affordable and flexible home products for younger first home buyers. Launched a spin-off company (+)
Exploitative innovation projects e.g., reducing costs through process efficiency; improving existing products and services; focusing on existing customers	<ul style="list-style-type: none"> • Developing a service that adds value to families with children in shopping centers (+) 	<ul style="list-style-type: none"> • Developing prefabricated modules for housing construction (+) • Creating a work model for co-locating employees from different units to work on joint projects (+) • Developing a Click & Collect service for customers of shopping centers (+) • Developing a Care & Support service for pet owners who live in apartment blocks (-) • Developing a transport service to attract more visitors to retail centers (-) 	<ul style="list-style-type: none"> • Creating an opt-in Smart Energy System for apartment buyers to access solar energy (+) • Developing new service features in office buildings to improve the tenant experience (+) • Improving spaces for collaboration, wayfinding and traffic flow in office buildings (+)
Number of explorative innovation projects	4 (initiated but aborted)	0	2 (completed)
Number of exploitative innovation projects	1 (completed)	44 (completed)	18 (completed)
Number of Innovation champions trained	22	60	83
Number of full time Nest team members (Director and innovation leads)	5	4	4

* The example explore innovations were initiated in the stated phase but implemented during the following phase given their longer incubation times. (+) innovation project was successfully completed/launch of spin-off or start-up; (-) innovation project was discontinued after pilot

Figure 1: Coding structure

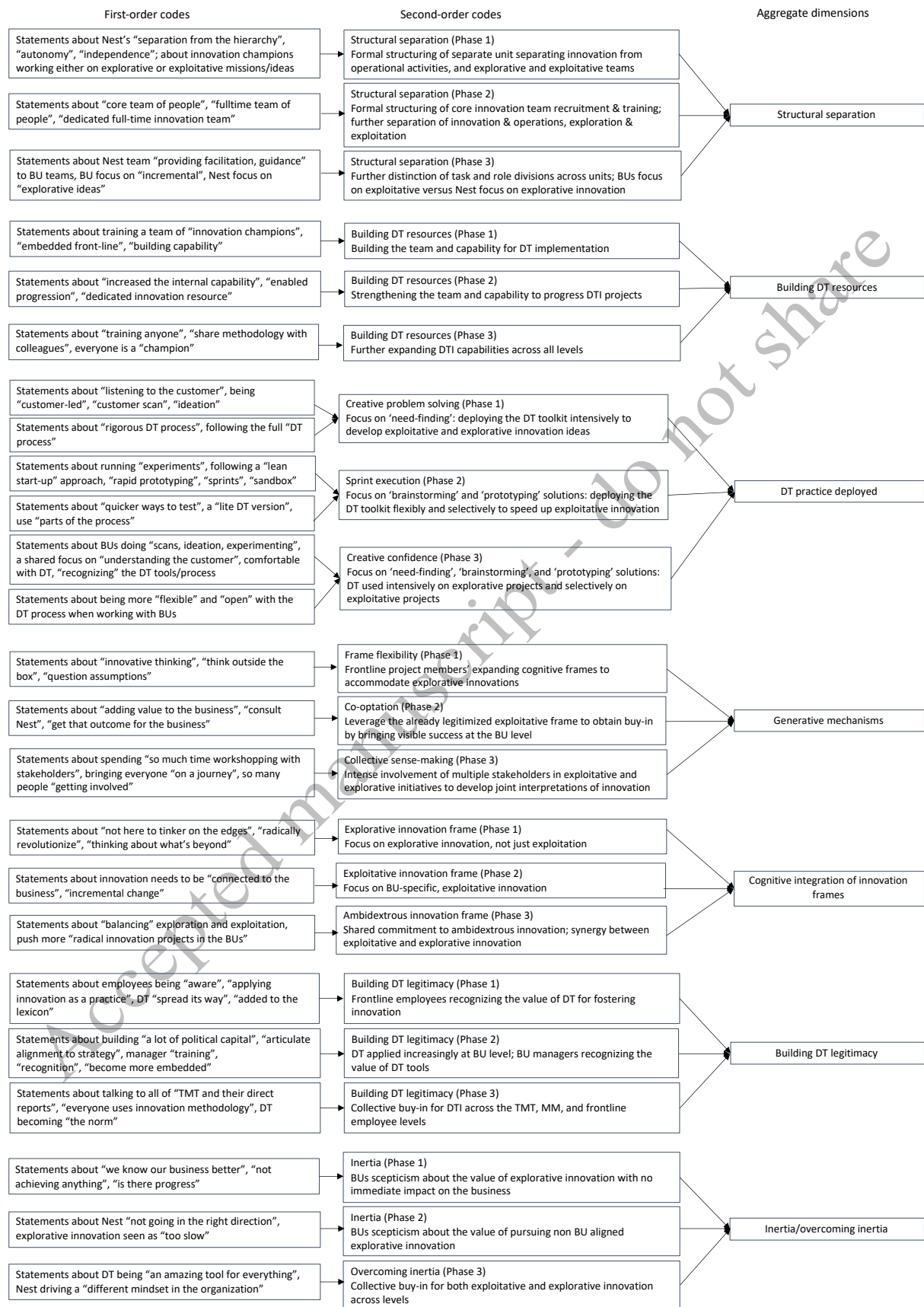


Figure 2: Framework: DT practices for ambidextrous innovation

