Production Planning & Control
The Management of Operations

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/tppc20

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To cite this article: Ilias Krystallis, Giorgio Locatelli & Eleni Papadonikolaki (2023): Captain and conscript or companions in operational reconfiguration? The case of an infrastructure owner with projects and asset management units, Production Planning & Control, DOI: 10.1080/09537287.2023.2249438

To link to this article: https://doi.org/10.1080/09537287.2023.2249438

Published online: 25 Aug 2023.

PRODUCTION PLANNING & CONTROL
https://doi.org/10.1080/09537287.2023.2249438

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Captain and conscript or companions in operational reconfiguration? The case of an infrastructure owner with projects and asset management units

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ABSTRACT

Infrastructure owners with projects and asset management units reconfigure their operational capabilities to deal with external stressors. We distinguish between two reconfiguration approaches, the discrete and the continuous approach. The discrete approach is broadly adopted in the infrastructure sector and draws from the project capabilities literature, whereas the continuous approach draws from the general management literature and views reconfiguration as a best practice dynamic capability. This article compares and contrasts the two approaches by leveraging an ethnographic study of an infrastructure owner. We explain why the discrete approach was initially adopted but ultimately failed. Later, by adopting the continuous approach, the organisation succeeded by enabling the two units to work collaboratively by developing two dynamic capabilities: negotiating and disseminating for reconfiguring their operational capabilities. Our research contributes to the theoretical elaboration of why and how change management processes succeed or fail. We discuss the implications of our study to the capabilities literature and project organising research and the managerial implications of developing dynamic capabilities for operational reconfiguration in organisations with projects and asset management units.

ARTICLE HISTORY
Received 1 December 2022
Accepted 15 August 2023

KEYWORDS
Capability development; ethnography; project-operations transition; reconfiguration; project capabilities; organizational change

1. Introduction

Infrastructure is usually owned by organisations with projects and asset management units (Winch and Leiringer 2016). Asset management (AM) units require capabilities to operate and maintain the infrastructure (Hartmann et al. 2014; Krystallis et al. 2016; Davies et al. 2018; Al-Mazrouie et al. 2021), while projects units require capabilities to upgrade, refurbish and extend the infrastructure (Brady and Davies 2014; Davies, Dodgson, and Gann 2016; Liu et al. 2018). Like any other organisation, organisations with projects and AM units often need to reconfigure their aforementioned operational capabilities (OC) to cope with external stressors, such as new legal requirements, technologies or pandemics. In the case discussed in the article, an infrastructure owner invested significant time and resources to reconfigure their OC against external stressors, i.e. the 2011 UK government mandate for implementing new digital technologies in infrastructure (Cabinet Office 2011). This necessity to reconfigure OC for UK infrastructure owners is not unique. For instance, the UK Ministry of Justice is projecting over £1 billion of investment until 2025 to reconfigure its OC to (A) operate and maintain its infrastructure and (B) upgrade, refurbish and extend its infrastructure (Sturge et al. 2019). Also, Whyte, Stasis, and Lindkvist (2016) analysed processes of managing change in Airbus, CERN and Crossrail to deal with the ever-expanding offering of digital technologies and associated policy change. The need for infrastructure owners to reconfigure their OC to accommodate new digital technologies informs the practical motivation of our study.

Reconfiguration processes facilitate continuous evolution and are particularly relevant for dynamic environments (Girod and Karim 2017; Girod and Whittington 2017). With few exceptions (Zerjav, Edkins, and Davies 2018; Whyte and Nussbaum 2020), there is a paucity of studies regarding the reconfiguration of OC for organisations with both AM and projects units. For such organisations, there are two main approaches to reconfiguring their OC, the 'discrete' and the 'continuous' approach.

The discrete approach to reconfiguring OC consists of planning and delivering *innovative* projects that, once completed, can be transitioned into the operation of such infrastructure, as described in, e.g. (Whyte, Lindkvist, and Jaradat 2016; Whyte, Stasis, and Lindkvist 2016; Locatelli, Zerjav, and Klein 2020). The alternative of having a project's unit leading the reconfiguration of OC is a continuous approach (often described as patching) which refers to unit changes within existing organisational principles (Eisenhardt and Brown 1999; Girod and Whittington 2017). The discrete approach is the *de facto* approach employed by infrastructure owners to reconfigure their OC. However, challenges arise when organisations with AM and projects units adopt the discrete approach to reconfigure their OC. This was magnified in our empirical observations (see Section 4), where the two units

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first adopted the discrete approach, but reconfiguration failed, and then, successfully proceeded with the continuous approach. Against this backdrop, we ask: 'Why did the discrete approach fail, whereas the continuous approach succeeded?'

Our study builds on Dynamic Capabilities (DCs) as a 'best practices' view (Eisenhardt and Martin 2000) for the theoretical framework of this study. Our research contributes to the theoretical elaboration of why and how the continuous approach succeeded where the discrete approach failed. We explain how the success of the continuous approach is grounded on projects and AM units working together as equal partners to develop two DCs: negotiating and disseminating. Ultimately, we generalise our findings by comparing these two approaches, further expanding the knowledge in the capabilities and project organising research (Cantarelli and Genovese 2021; Leiringer and Zhang 2021).

The rest of the article is organised as follows: We first present the two approaches. Later we leverage an ethnography that benefits from a thick description which investigates an infrastructure owner with projects and AM units. In Section 5, we discuss the theoretical and management implications, propose research avenues and conclude by summarising relevant insights.

2. Theoretical background

In an organisational context, capabilities are clustered into operational, which involves the production, development and delivery of goods and services (Winter 2003) and dynamic (DCs), which consist of the extension, modification, change and/or creation of new capabilities (Schilke, Hu, and Helfat 2018). The dynamic capabilities perspective is often considered an extension of the firm's resource-based view (RBV) (Helfat and Peteraf 2003). DCs are critical for achieving purposeful strategic change and are a key to profitable growth. While originating in the field of strategy (Teece, Pisano, and Shuen 1997; Eisenhardt and Martin 2000), DCs have expanded into other management fields, including operations (Ketokivi and Schroeder 2004) and project management (Davies and Brady 2016). Teece, Pisano and Shuen (1997) introduced DCs as a concept that primarily addresses purposeful modifications of an organisation's operational capabilities. DCs is an evolving theory encapsulating different frameworks (Peteraf, Di Stefano, and Verona 2013; Schilke, Hu, and Helfat 2018).

DCs are high-level routines (or a collection of routines) (Winter 2003). This means that DCs requires repeated and reliable routines to be set in motion and cannot be for *ad hoc* problem-solving (Helfat and Winter 2011). Building on (Zollo and Winter 2002; Ketokivi and Schroeder 2004; Peng, Schroeder, and Shah 2008), we consider DCs as structured interrelated routines, enabling organisations to reconfigure their operational capabilities (OC) in pursuit of operational continuity. This view of DCs provides a reductionist approach (Schriber and Löwstedt 2020) to unpacking the simpler routines constituting DCs. By unpacking DCs as structured routines it is possible to understand the primary components underlying these DCs, explore how their components interact; and investigate how differences in DCs arise. The next sections present two approaches to reconfiguring OC.

2.1. The continuous approach

The continuous approach predominantly draws from the general management literature (Eisenhardt and Martin 2000). In this subsection, we start from the general concept of capability, funnelling down to more specific topics, namely, DCs and reconfiguration capabilities.

A particular type of dynamic capability is reconfiguration (patching), which can be termed as 'best practice', such as alliancing, product development and strategic decision making (Eisenhardt and Brown 1999; Eisenhardt and Martin 2000; Girod and Whittington 2017). Eisenhardt and Martin (2000, 1106) argue that DCs are 'complicated, detailed, analytic processes that rely extensively on existing knowledge and linear execution to produce predictable outcomes'. In this view, DSs are characterised as functional, differentiating between different functional domains/activities in a firm (Schilke, Hu, and Helfat 2018). Viewing DCs as best practices suggests that their functionality can be duplicated across firms and that their value lies in the resource configurations they create, not the capabilities themselves (Eisenhardt and Martin 2000).

Reconfiguration involves adding, splitting, transferring, combining or dissolving organisational resources to deal with external stressors. As a dynamic capability, reconfiguration is equifinal and exhibits commonalities across organisations, i.e. organisations can develop these capabilities from different starting points and paths (Eisenhardt and Martin 2000). Organisations can use reconfiguration capabilities to reconfigure their *strategies* (Strategic Reconfiguration) and *operations* (Operational Reconfiguration) by continuously renewing and modifying their resources and assets (Teece 2007). Reconfiguration is based on existing strategy, resources and knowledge base but focuses on reconfiguring operations to facilitate incremental changes (Eisenhardt and Brown 1999; Girod and Whittington 2017).

In the continuous approach, the literature provides insights into how organisations reconfigure their OC by employing, e.g. lean and sigma principles (Vaculik et al. 2019; Sunder, Ganesh, and Marathe 2023), or by deploying continuous improvement initiatives (Anand et al. 2009; Galeazzo, Furlan, and Vinelli 2017). However, the context of these studies is manufacturing; the infrastructure sector is lacking behind in adopting such practices (Tezel, Koskela, and Aziz 2018). Overall, under the continuous approach, we know very little about how organisations with projects and AM units undergo reconfiguration of their OC. Adam and Lindahl (2017) looked at an infrastructure owner organisation's reconfiguration and applied the Teece, Pisano and Shuen (1997) DCs framework. They unpacked the reconfiguration process and documented how sensing, seising and transformation capabilities were performed. Hartmann et al. (2014) found that infrastructure owners initiated and formed the transition from procuring single products and services to procuring complex performance but highlighted that this transition involves a strong interplay of clients and suppliers in value creation. Davies et al. (2018) identified four organisational processes (envision, experiment, entrench, enact) for developing and reproducing new service routines in an infrastructure owner setting.

2.2. The discrete approach

The discrete approach predominantly draws on the project management literature. In this subsection, we describe the following concepts: innovative projects, project capabilities and 'Transition to operations'. We also discuss the environmental context surrounding the discrete approach and explain the moderating conditions operating at our analysis inter and intra levels.

Davies and Brady (2016) identified two types of projects: (i) routine projects and (ii) innovative projects. Routine projects exploit the existing base, utilise proven technologies and mature products and address current demands. Innovative projects are necessary to keep pace with external stressors and to reconfigure OC (Cantarelli and Genovese 2021). To deliver innovative projects, senior managers rely on DCs to exploit routine project capabilities and explore new project capabilities to keep pace with a changing environment. Davies and Brady (2016, 319) highlight the role of innovative projects in creating new project capabilities and downplay the role of DCs: 'Rather than relying on the intervention of dynamic capabilities … such [innovative] projects often provide strategic focus, emerging insights and valuable signposts for the future direction of a firm'.

The concept of project capabilities was pioneered by Davies and Brady (2000) as a set of capabilities project-based and project-supported organisations employ to establish, coordinate and execute one-off projects. Since, then, project capabilities have been researched extensively in the capabilities and project organising literature (Lobo and Whyte 2017; Eltigani et al. 2020; Steen, Ford, and Verreynne 2021; Ashill et al. 2022; Sabri, Micheli, and Cagno 2022). Studies showed how organisations have project capabilities in terms of project delivery, e.g. how infrastructure owners develop governance capabilities that relate to assurance, project coordination and asset integration (Winch and Leiringer 2016; Adam, Lindahl, and Leiringer 2019); and how the project's units of such organisations create new project capabilities to transition one-off projects into day-to-day operations (Krystallis, Demian, and Price 2015; Whyte, Lindkvist, and Jaradat 2016; Zerjav, Edkins, and Davies 2018).

The 'transition to operations' (Whyte, Stasis, and Lindkvist 2016; Liu et al. 2018; Al-Mazrouie et al. 2021) is the *de facto* approach in the infrastructure sector despite mixed results. For example, Davies et al., (2016, 39) highlight the vulnerability of DCs under this 'waterfall' approach: 'The poorly executed handover from the project to operating airport terminal underlines the vulnerability of dynamic capabilities … insufficient effort was made to enforce the operational processes for testing the systems and handover trials that were carefully developed in advance to prepare for the opening'. Taking digitalisation as an external stressor, the projects units are tasked with reconfiguring their OC for digital delivery and digital handover. However, the AM units often fail to reconfigure their operations despite the efforts (Whyte, Lindkvist, and Jaradat 2016; Love, Matthews, and Zhou 2020; Whyte and Nussbaum 2020).

Few studies (Brady and Davies 2010; Davies, Dodgson, and Gann 2016; Whyte, Lindkvist, and Jaradat 2016; Al-Mazrouie et al. 2021) describe the discrete approach. The authors report on the context and how the approach failed, whereas the 'why' is downplayed. To answer our research question, we operationalised, in conjunction with the DCs literature, the theoretical lenses of institutional change and supply chain literature and extracted the moderating conditions that enable us to make sense of our data. Next, we introduce these moderating conditions (later used in Subsection 4.2) clustered in the *Intra-organisation* and *Inter-organisation* levels.

At the intra-organisational level, we looked for insights from institutional change literature (Dacin, Goodstein, and Scott 2002; Coccia 2019) to understand the surrounding context of the discrete approach. The *design process* informs the development of routines and capabilities (Felin et al. 2012). Design processes, such as time-dependent processes, are sequences of interdependent events that provide insights into how routines and capabilities emerge (Felin et al. 2012). *Technology adoption* explains how technological changes may disrupt operational routines and alter dependencies among exchange partners (Lakemond, Holmberg, and Pettersson 2022). Another moderating condition is *Organising logic*, e.g. bureaucratic, engineering and autocratic, and their influence on routine development and modification (Baron, Hannan, and Burton 1999; Bobbink, Hartmann, and Dewulf 2021). Although logic has extensively been researched in general management, we know little about logic in reconfiguring OC.

At the inter-organisational level of analysis, we operationalised insights from supply chain management. This helped us understand the context of the discrete approach, focusing on organisations being linked in a network supply chain (Chen and Paulraj 2004; Wieland 2021). The infrastructure industry organises business activities around projects which require strong supplier–client relationships. Thus, the *supplier–client relationship* is an important moderating condition for understanding the relationship between clients and suppliers and how these affect the discrete approach (Cox 2004; Obayi et al. 2017). *Special boundary condition* refers to the development and diffusion of innovations over various boundaries, including organisational, project and supply networks (Tushman 1977; Lo and Theodoraki 2021). This moderator helped us understand the communication approach across various organisational boundaries. Lastly, *value creation and capture* are relevant for understanding how value is realised (Chesbrough, Lettl, and Ritter 2018). This moderator helped us understand how the realisation of exchange value is determined.

2.3. Theoretical framework of discrete and continuous approaches

In this section, we critically discuss the two approaches and identify the theoretical framework of both approaches that we observed in our empirical study (Table 1). The discrete approach needs specific capabilities for project-operations transition (Winch and Leiringer 2016; Zerjav, Edkins, and Davies 2018). For example, Winch and Leiringer (2016) developed the 'owner project capabilities' concept: the DCs

required by owner organisations to acquire infrastructure assets to extend or improve their operational capabilities. Under 'owner project capabilities', Winch and Leiringer (2016, 276) identified asset integration as the dynamic capability that 'addresses the final phases of the project where the asset being created by the project is integrated into the existing operations of the operator for beneficial use'. However, recent studies discussed the AM units' difficulties in reconfiguring their OC under this approach (Brady and Davies 2010; Davies, Dodgson, and Gann 2016; Krystallis et al. 2016; Love, Matthews, and Zhou 2020; Whyte and Nussbaum 2020). Because the discrete approach follows a typical infrastructure lifecycle, it focuses more on planning and development than operation, maintenance and preservation. As a result, this approach leaves AM units in a stalemate.

In contrast, the continuous approach leverages views DCs as specific and identifiable processes such as patching, alliancing and product development (Eisenhardt and Brown 1999; Girod and Whittington 2017) and can be studied through the lens of DCs *as best practices* (Eisenhardt and Martin 2000). Terming DCs as best practices makes them empirically relevant and has strong management applicability for infrastructure owners who must reconfigure their OC simultaneously in *projects and AM units* against external stressors. In addition, the continuous approach focuses on the entire infrastructure lifecycle, including challenges from planning to disposal, making it appealing for infrastructure owners.

Under the discrete approach, the projects unit first reconfigures its OC and then integrates these OC into the asset management unit, e.g. (Winch and Leiringer 2016; Zerjav, Edkins, and Davies 2018). In the continuous approach, the two units simultaneously develop the reconfiguration of their OC. Remarkably, the project management literature has traditionally focused on the capabilities of infrastructure development (Leiringer and Zhang 2021) and, more or less implicitly, promoted the discrete approach. Nevertheless, as confirmed in our case, the discrete approach might not be ideal. In contrast, the continuous approach, a less researched subject, might be a better option, at least for infrastructure owners. This background, summarised in Table 1, informs the theoretical motivation of our study.

3. Methodology

3.1. Research design

In our case, we studied the reconfiguration process of OC of an infrastructure owner, Smart Infrastructure (SI) (pseudonym). At the time of the data collection, SI had to deal with an external stressor from the UK government, i.e. to implement a new digital technology and associated processes (Building Information Modelling—BIM Level 2) in its projects and AM units. Our study employed ethnography as its research strategy to describe, interpret and explain shared patterns of behaviour, beliefs and language regarding the projects and AM units' approach to reconfiguring their OC (Van Marrewijk and Veenswijk 2006; Creswell and Poth 2016). Ethnography has a built-in propensity towards theory elaboration research (Fisher and Aguinis 2017). An ethnographic study examines the shared patterns of individuals with shared values, behaviours, beliefs and language. Therefore, the projects and AM units can be understood as two distinct culture-sharing groups (Creswell and Poth 2016). Furthermore, ethnography provided an intimate understanding through direct observation and participation via attendance in informal meetings, boardrooms, gatherings and generally 'being on the shop floor' (Van Marrewijk and Veenswijk 2006). The physical presence of the researcher through direct observation of daily practices of SI is one of the strengths of ethnography. It is ideal for comparing different group perspectives (Moore 2011), e.g. how our case's two SI units behaved.

This study was built on abductive reasoning (Dubois and Gadde 2002), i.e. 'the clustering and explanation of themes [was] guided, but not determined by existing theoretical understanding' (Thompson 2022, 1415). Rather than themes

Table 1. Capabilities perspective of discrete and continuous approaches.

	Discrete approach	Continuous approach
Ontology	Capabilities as processes to initiate and deliver innovative projects (e.g. project capabilities); projects unit develop 'owner capabilities' to reach project success; project-operations transition; the temporary nature of innovative projects may impede reconfiguration.	Capabilities as processes to simultaneously reconfigure the operations of projects and AM units; projects and AM units jointly develop capabilities for reconfiguration; moderating role of structures may impede reconfiguration.
Epistemology	Knowledge of DCs via learning from and between projects. Project context is the epistemological device.	Knowledge of DCs in the form of continuous improvements, e.g. lean, six sigma. Business-as-usual operations are the epistemological device.
Transition	How to transition new project capabilities of one-off innovative projects into business-as-usual operations.	How to transition the new capabilities of business-as-usual operations into one-off projects.
Theoretical Framework	Project capabilities (Davies and Brady 2000; Brady and Davies 2004; Zerjav, Edkins, and Davies 2018)	Best practices (Eisenhardt and Martin 2000)
Exemplar capabilities	Strategic, commercial and governance capabilities (Winch and Leiringer 2016); Reconfiguring, adapting and maintaining capabilities (Zerjav, Edkins, and Davies 2018)	Patching (Eisenhardt and Brown 1999), alliancing (Schilke 2014), new product development capabilities (Danneels 2008)
Empirical infrastructure studies	Many, e.g. (Whyte, Lindkvist, and Jaradat 2016; Whyte, Stasis, and Lindkvist 2016)	Few, e.g. (Hartmann et al. 2014; Adam and Lindahl 2017; Davies et al. 2018)

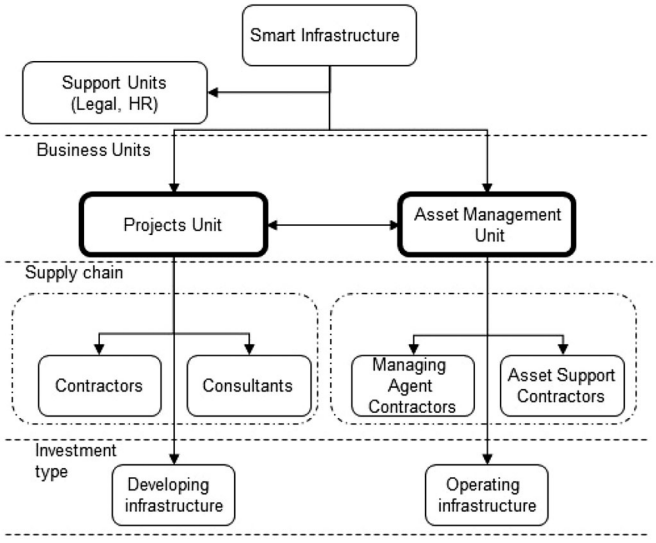

Figure 1. SI organisational structure.

emerging passively from the data, we went back and forth in our study, reviewing the literature to help us provide the theoretical basis for the two reconfiguration approaches we investigated. Subsection 3.3 explains how we conducted parallel and equal engagement with the empirical data and extant theories and how existing theories guided coding and thematic development. The research combined both aspects of (A) deduction, i.e. a theoretical framework that is first built, in this case, our theoretical framework is routed in the DCs view and the continuous and the discrete approaches that we were able to distinguish; and (B) induction, i.e. referring to insight creation through emergence to understand the important question of 'what's going here?' (Gioia, Corley, and Hamilton 2013). Thus, the conclusions were drawn from the emerging situations and data (Gioia, Corley, and Hamilton 2013), and explanations were constructed to confirm or challenge the chosen theoretical foundations (Eisenhardt 1989).

3.2. Setting

SI is a publicly funded organisation that is risk-averse in adopting new processes, mainly because of its vast size (circa 5000 staff) and its critical infrastructure, spanning 5000 miles, including more than 15,000 infrastructure assets. SI assets are worth more than £140 bn, while for 2020–2025, more than £20 bn will be invested in capital projects, operations and maintenance.

SI develops and operates its infrastructure through two business units (Figure 1). One of the units is AM managing existing infrastructure, i.e. maintaining both the physical infrastructure and the infrastructure information. The other is a projects unit developing large investment projects focused on delivering major upgrades or expansions of existing assets, e.g. new carriageway sections. These projects are typically implemented from phases briefing to handover in a rapidly changing environment. The AM units undertake the 'core business' of the infrastructure owner, i.e. operating and maintaining a safe motorway network (Winch 2014). The AM unit operates in more stable environments than the projects unit and sees a broader organisational context than an individual project.

In June 2011, the UK government appointed the UK BIM Task Group to drive digital processes and technologies adoption across government departments (Cabinet Office 2011). In addition, the UK Government announced its intention to mandate collaborative, integrated software and processes with all project and asset information, documentation and data being electronic on its assets by 2016 (Cabinet Office 2011).

In 2014, in response to this mandate (i.e. the specific stressor of our case), the SI committed to a six-year programme to enable the SI to fully deploy digital processes and technologies to reconfigure its operational capabilities. SI envisaged to: 'Deliver efficiency, standardisation and coordinated information throughout the lifecycle of an asset allowing informed, intelligent decisions to be made'. This intervention was deemed necessary for the SI to understand how their assets deliver long-term operational and service outcomes to the organisation. To support this, a staged approach was deployed, with the first stage being a 12-month plan for achieving a minimum of 'Level 2 compliance'. Our investigation focuses on this first stage. In the following sections, we show how the SI in reconfiguring the OC of both units first tried the discrete approach and failed, but it later succeeded with the continuous approach.

3.3. Data collection

The first author was based part-time at SI from March 2015 to March 2016 and conducted ethnographic fieldwork to observe the actors' daily operations within SI. The author collected a vast array of longitudinal field data capture, including interviews, observations and secondary data during that period (Table 2). Interviews (item #2 in Table 2) with 35 participants (Appendix A) were conducted. Regarding the sampling strategy, the project sponsors identified and arranged meetings with SI staff and suppliers, which provided essential data (Table 2) for the research. Considering that the external stressor is related to digital technologies (Papadonikolaki, Krystallis, and Morgan 2022), we also collected data regarding the various digital technologies used by both units. Thus, our dataset ranges from technologies used as a repository for a single subsystem of a larger infrastructure to systems that grant access over the project lifecycle across multistakeholder design authoring tools in both native and software agnostic format (Papadonikolaki, Krystallis, and Morgan 2022). In addition, there were extensive interactions with experts providing insights on reconfiguration. Initially, weekly meetings were held with the two business units to understand scope delivery regarding asset data, processes and stakeholders involved. The sponsors helped identify relevant stakeholders within the supply chain network and the organisation. Often participants would identify further individuals.

Before each interview, the interviewees were briefed about the research project and its aim. The interview

Table 2. Data sources.

Source	Details
Item #1 Documentation	*Published documents:* Reviewed 35 corporate documents, including strategic business plans, annual assessments, delivery plans, annual reports, governance arrangements, annual performance reports, advice notes and technical standards. *Internal documents:* Reviewed 149 documents, including internal reports, interim documents, board meeting minutes, communication material regarding the change programme, PowerPoint presentations, roadmaps, working documents such as asset information standards, asset data management manuals, asset support contracts and templates capturing various asset information aspects.
Item #2 Interviews	*Recruitment*: Engaged with 35 stakeholders within the organisation and its supply chain to identify areas for digital development at the corporate level. Sessions averaged 60 min. *Conduct:* Interviews covered process innovation, organisational routinisation and reconfiguring operational capabilities relevant to the participant's expertise and role in the business.
Item #3 Meetings	*Ongoing informal meetings:* Ongoing weekly meetings were held (March 2015–March 2016) either at SI headquarters (see Visits below) or over the phone. Initial meetings covered the formulation of the case objectives and project set-up, stakeholder identification and introductions, and access to documentation. Weekly meetings were held with the Project Sponsor. Frequent meetings were held with the projects unit digital lead, the projects unit digital Sponsor, the Digital training lead and the Project Sponsor for asset data delivery. *Monthly update meetings:* Monthly meetings (12 in total) were held with the Project Sponsor and two senior technologists in the organisation offices. The first author observed the meetings. The objectives of the meetings were to update on progress and ensure alignment with wider coordinated activities around digital delivery across the organisation.
Item #4 Visits	*Head office:* The first author initially spent 2 days/week for the first 3 months on-site, followed by 1-day monthly visits totalling 39 days, having access to the intranet, observing and meeting members of the organisation, and learning about their roles and responsibilities, which were relevant to this study. *Area visit:* The first author visited the maintenance contract areas (April 2015) and discussed implications for digital delivery with the service providers team (five members).
Item #5 Artefacts	*Intranet access:* Access to archival information of ongoing change programmes and stakeholder details. *Artefacts*: Access to 30 software and demonstration by lead users regarding the use of each tool.
Item #6 Validation	*Validation workshop:* A validation workshop was organised to present the study's findings and seek validation of findings. The participants were the Project Sponsor and three consultants with experience in digital delivery and AM. The meeting lasted 8 h. *Final presentation:* A presentation (March 2016) was organised with a team of senior technologists in AM and digitalisation, including a Sponsor representative. The presentation lasted 1 h.

protocol captured their job title, roles and responsibilities, unit and organisation, interfaces with other subunits and interfaces regarding asset data delivery. Once data saturation was reached, a validation workshop and a separate final presentation with the project sponsor were organised to validate and consolidate the findings (Table 2, Item #6).

3.4. Data analysis

The analysis combined five iterative steps.

Step 1—Familiarisation: Items #1—Items #5 from Table 2 were used to develop the rich case narrative. Data were analysed to identify key or common emergent themes (Appendix B) using text mining techniques implemented in NVivo to find patterns (Gioia, Corley, and Hamilton 2013; Locke, Feldman, and Golden-Biddle 2022). We used a bottom-up approach from lived experiences to develop our theoretical narrative (Gioia, Corley, and Hamilton 2013). The lead author worked inductively and familiarised themselves with the data. Then, the interview notes, primary and secondary data were read numerous times.

Step 2—Coding: Notes and annotations were initially taken as the data were read and re-read to highlight items of potential interest. Following Gioia, Corley, and Hamilton (2013), this first coding round relied on 'open coding' and trying to extrapolate as much semantic meaning as possible from the 'raw data'. For the second coding round, we attempted to consolidate codes that could be included under a single heading and removed codes deemed insignificant or not repeated.

Step 3—Development of Themes: In abductive thematic analysis, themes are distinct from codes. Whereas codes are specific and concise, themes are more complex and can consolidate several codes to theoretically explain phenomena (Thompson 2022). In this step, we compared our codes with the literature on DCs and the theoretical framework we outlined in Section 2. Thus, at this stage, we could broadly distinguish two reconfiguration approaches, which we provisionally labelled *traditional* (referring to the discrete approach) and *innovative* (referring to the continuous approach). We proceeded with substantive coding of our data into aggregated dimensions to generate the latent themes that eventually became the two reconfiguration approaches, using concepts from the DCs literature as reference points. As mentioned in Section 2, we know much more about the infrastructure sector's discrete approach than the continuous approach. Thus, even though we could apply the general theory of DCs as best practices to identify the continuous approach, the context of our study was not known well enough to obtain sufficiently detailed premises to test the theory. Therefore, we aimed to work more abstractly, asking whether the emergent codings suggest concepts that might help us describe and explain the phenomena we were observing. The second-order concepts represent what we identified as *structured routines* (Zollo and Winter 2002), which were used by the two units to develop the DCs necessary for the continuous approach. Once we had a workable set of concepts, we sought to distil the emergent second-order concepts into aggregate dimensions (see Appendix Figure B1 and representative quotes in Tables 3 and 4). These aggregate themes specify the two units' DCs in the continuous approach. We organised a validation workshop (Table 2, Item #6). Minor modifications were made during the workshop, and the industry experts approved the coding structure. As a result, a technical report (Table 2, Item #6) was produced outlining a lay summary of the first- and second-order concepts and aggregate themes. Finally, the coding structure was

Table 3. Structure[a] of negotiating capability.

Dynamic capabilities (Structured routines)	Routines	Details
DC1: Negotiating adoption of digital technologies across internal and external partners and stakeholders		
SR1a: Developing a strategy for aligning organisational and project information routines and systems 'As well as the asset, the asset data itself can also be managed within a lifecycle. Good asset data management can be achieved when there is a clear strategy for controlling the stages of the life cycle stages'.	-Reviewing established in-house routines for data manipulation across the organisation's ecology. 'Asset data is at the core of meeting SI's objectives as it is fundamental to making good decisions on its network and provides evidence to its stakeholder on the outcomes of these decisions. The [referring to an internal document] is SI's tool for communicating its asset data requirements to its providers to achieve its asset data management outcomes. A strategic review of the document has been undertaken as part of the roadmap'. -Evaluating the existing routines regarding data collection, storage and retrieval for both units. '… review all the data/attribute requirements for the SI Databases against each component. We then get a Level of Information Matrix produced for each SI component, seamlessly upload to 'The future System'. -Evaluating the new routines regarding the interrelationship between new digital technologies and legacy AM systems. 'The correctness of the information … will be determined by the data structure upon which these records will be held. But, as not even the system to hold the data has been chosen, I am certain the data structure will not be known, and hence, I feel this is a big risk'. -Developing a strategy, so existing routines regarding data manipulation and new routines emerging from OR are intertwined. 'The information that I understood regarding additions to the [internal asset data management document] … was that asset data that was connected to the AM plan. Considering the cyclic and routine maintenance plan, there are performance measures there'.	• Development of a long-term plan (5 years) with allocated funding. • Formal weekly progress meetings held at SI headquarters • Participants: Heads of each business unit co-leading and representatives of projects and AM teams. • Programme of works to monitor progress • Accountability of delivery split between the two units • Review and feedback from a diverse team to negotiate the development of outputs being produced
SR1b: Changing behaviours of internal and external partners and stakeholders 'Encouraging the correct culture and behaviours through an aligned communication process. We have done this by giving presentations, raising awareness, and supporting the culture shift in the [Infrastructure] industry'.	-Adopting industry-wide approaches to secure the buy-in of internal and external stakeholders. '[we] considered what could be achieved using best practice in a range of significant infrastructure providers in the UK. This research was not limited to infrastructure providers, and so other Owner Operators were contacted such as [anonymized], utility companies were contacted as well as the [anonymized] which maintains main river assets'. -Developing a communication strategy to facilitate behavioural change across both units. 'One of the challenges … was identifying the right individuals to consult in each organisation. Our existing network of contacts was the preferred source for identifying appropriate contacts for this task. This strategy proved successful in reaching most of the target organisations'.	• Searching for best practices globally, adopting routines from other sectors • Utilising worldwide best practices to promote change internally/externally. Less resistance to change if best practice is proven • Regular communications with staff to ensure they understand new processes and tools, inform them of progress, and inspire them to get involved. • Working in collaboration with stakeholders and partners to ensure buy-in. • Presentations to a wider user community and tailor-made presentations to focus groups.

[a]Label: DC: Dynamic Capability; SR: Structured routines.

reviewed and further verified by the author team. This was done through a series of workshops whereby the team would revisit the raw data. During this quality assurance procedure, the team also considered the definition of DCs and having an (i) singular focus, (ii) are related but not overlap and (iii) directly address the research question.

Step 4—Theorising: At this stage, we engaged cognitively with theory and data in parallel to produce the theoretical conclusions of our case (Ketokivi and Choi 2014). We adopted the principles of abductive reasoning to address our research question and explain the moderating conditions under the discrete approach between the two business units. We consulted the literature as a source of definitions and concepts to help us delimit the data field notes and explain the moderating conditions under which the two units performed the discrete approach (Thompson 2022). In this sequence, we adopted a top-down approach (Eisenhardt 1989) which helped us sensitise and identify what observations to investigate further and scrutinise in our coding (Locke, Feldman, and Golden-Biddle 2022). This analysis involved scanning field notes using text mining techniques in NVivo, focusing on words and sentences to

Table 4. Structure[a] of disseminating capability.

Dynamic capabilities (Structured routines)	Routines	Details
DC2: Disseminating adoption of digital technologies across contracts and business units.		
SR2a: Formalising how data will be communicated between the organisation and supply chain '[Supply chain provider to the AM unit] has struggled to receive management information, particularly condition information. There is the feeling that the providers are, in many cases collecting the data but not supplying it to SI'.	-Developing routines for pre-qualification assessment criteria to assess the digital competency of their suppliers 'Generally, … qualifications of the Suppliers Key Staff (sic) are to be highlighted in Pre-contract [documentation] for consideration. All suppliers shall identify their key … staff in their [contract documents] highlighting their competence'. -Developing a series of value and complexity-related amendments that can be used for works delivered by their suppliers 'The records produced and held for each structure should be appropriate to its complexity and size. Normally, the detail and quantity of records increase as complexity and size increase'. -Communicating the integrated process upwards and downwards. 'The asset data hierarchy used SI groups asset types within asset classes. These classes, through grouping similar types of assets together, enable the company's asset data requirements to be more clearly communicated'.	• Amending best practices to fit organisational needs. • Issuing new procurement documentation that considers data as an asset for project delivery and AM. • Updating documentation that meets the infrastructure's complexity and information to be produced.
SR2b: Deploying digital platforms to streamline (or integrate) the production process 'The company is currently rolling out [name of new AM software], and five contracts are currently using the system for reactive maintenance. Over the next two years, the system will be developed to cover many asset types and become the prime location for most of the company's asset data. As the system develops, new requirements for asset data management will emerge which must be incorporated into the company's asset data requirements]; this will certainly extend the range of assets currently captured by the company'.	-Not mandating what document management software the suppliers will use for ongoing projects. 'Provided that this extension is done generically, i.e. contract agnostic, the work could facilitate the use of [digital technologies] more widely than simply for major schemes'. -Investing in new software and committing the whole organisation towards a long-term AM approach. '… with the vision of [new AM software] as the company's core asset data repository and the planned development of the system, the roadmap which includes specific tasks to develop the manual as the national stages of the deployment are achieved, and it must continue to reflect this (sic)'. -Defining new methods for managing information production, distribution and quality using digital technologies. 'The investment strategy requires the company to produce new, enhanced condition metrics that adequately reflect the technical condition of the main asset classes, the quality and completeness of supporting asset information, the residual asset life and asset performance. Therefore, an implementation plan to improve the [information] quality is required'.	• Providing the supply chain with the freedom to specify 'work-in-progress conditions. • Gradually migrating all information from legacy systems into the central system (Part of the 5-year plan). • All teams manage asset information in 'one source of truth' by migrating all asset information into a central system. • The two units produced SI standards that outline new digital project delivery and AM processes.

[a]Label: DC: dynamic capability; SR: structured routines.

find similarities and differences with themes previously identified in the literature (see Subsections 4.2.1 and 4.2.2). We engaged with different bodies of literature to understand the surrounding context that affects the effectiveness of the discrete approach, i.e. institutional change literature helped us at the intra-level of analysis, and supply chain literature helped us at the inter-level of analysis. As a result, in Table 5, we explain the moderating conditions under the discrete approach between the two business units. This step enabled us to modify and elaborate the general theory of the discrete approach to reconciling it with contextual idiosyncrasies at the intra- and inter-levels of our study.

Step 5—Reporting: After completing the previous steps, we have written our findings with headings denoting each reconfiguration approach. Chronologically, the organisation initiated the discrete approach first; therefore, we report this approach in Section 4. To answer the first part of our research question, i.e. why the discrete approach failed to deliver, we operationalised the moderating conditions we identified in the literature and described in Subsection 2.2. Then, we describe the continuous approach and present the two DCs that emerged from our data.

4. Findings

4.1. The failure to implement the discrete approach

Following the discrete approach, reconfiguration was initially led only by the projects unit. In this approach, the projects

Table 5. Moderating conditions under the discrete approach between the two business units.

Moderating conditions		Projects unit	AM unit
Organisational context		Dynamic environment; Project capabilities	Stable environment; Operational capabilities
Intra-organisational level	Design process	Flexible	Rigid
	Technology	'copy-exactly'-approach	Adapted to organisation needs
	Organising logic	Engineering logic	Bureaucratic logic
Inter-organisational level	Special boundary approach	Gatekeeper + laboratory liaisons	Gatekeeper + organisational liaisons
	Client–Supplier Relationship	Reciprocal collaborative	Client dominant
	Value creation and capture	Economies of scope Economies of repetition	Economies of scope Economies of scale

unit is 'Captain', considering reconfiguration mainly in terms of infrastructure development. The AM unit is the 'conscript' that needs to follow the orders of its 'captain'.

The projects unit initially launched a series of innovative projects to create new project capabilities. An example of new project capabilities was the development of new technologies (e.g. acquisition of a Common Data Environment) and new design guidelines and BIM artefacts (e.g. Employer's Information Requirements) related to the delivery stages of infrastructure development. The new project capabilities were created/tested in a series of innovative infrastructure development projects. Out of the 44 innovative projects that had been identified, 30 were major/construction projects, 14 were related to maintenance/management of infrastructure, but only five out of 14 participated in the testing.

This is a classic example of the discrete approach. This plan created enormous issues because considerations regarding how existing infrastructure should be operated and maintained under the new regime were left out. The projects unit was optimising its processes, assuming that the AM units would have optimised their processes as ordered. People in the AM units were quite upset about this approach and resisted the changes imposed by the projects unit. Soon, conflict ensued between the heads of the projects and AM units leading to the reconfiguration process. During the first six months, the two units dealt independently with issues arising at either end. As a result, they searched for solutions to solve problems unilaterally, often creating more problems in the other unit's routines. After six months of conflict and little progress, reconfiguration failed and the SI senior management team realised that a different approach was needed to fit the organisational needs. In the following sections, with insights from institutional change and supply chain management literature, we examine the causes of such failure. Next, we leverage the moderating conditions of Subsection 2.2 to present our data regarding the effectiveness of the discrete approach.

4.1.1. Intra-organisational level moderating conditions

4.1.1.1. Design process (design processes that directly contribute to the development of routines). The projects units's design process was more flexible than the AM unit's during the discrete approach. The projects unit's design process was loosely connected to the existing routines and processes within the organisation's OC. In contrast, the AM unit's design process was more rigid and aimed to minimise the impact of reconfiguration in its existing routines. For instance, the projects unit did not want to mandate what digital technologies the suppliers should use to collect, manage and disseminate documentation. This approach created confusion for the AM unit, who commented during the interview:

> How many suppliers [project repository software] are needed within a project? Who is going to provide the licenses? Will [SI] specify the requirements of a Supplier's [project repository software]? What about ownership of data living in that software? (Principal GIS technologist – AM unit).

In contrast, the AM unit adopted a rigid design process and focused on resolving operational issues, specifically delivering the information to SI to unlock efficiencies throughout the long (30 > years) operational cycle of assets. In consultation with its supply chain, the AM unit employed this process to maximise the use of data postdevelopment. Being cautious and rebelling over the discrete approach, the unit issued a set of principles and clarified that '[these principles] are our *'rules for asset information'* to safeguard its routines and processes.

4.1.1.2. Technology adoption (regarding how organisations operate and routines are shaped). The projects unit was more enthusiastic adopting new technologies and adopted a 'copy-exactly' approach. Under the discrete approach, the projects unit focused on how the digital technologies were used across the organisation's *project ecology*, as summarised in the below excerpt:

> [The projects unit] has been working with … the supply chain to explore performance improvements by adopting [digitalization] techniques **across all SI projects**. There is now a blueprint in place, and the next step is to empower everyone to adopt [digital technologies **across SI projects**]. (Principal BIM technologist– Projects unit).

In contrast, the AM unit was more sceptical and wanted the technology adapted to the wider organisational needs. The AM unit wanted to focus on 'where data is going to be held within the organisation's routines and systems' when the innovations offered by digital technologies are in place. Adopting digital technologies could be a quick-start solution for organisations with (A) routines for manipulating little or no existing asset data or (B) one-off projects. However, the AM unit had routines for manipulating an enormous database spread throughout its legacy systems in various forms and ontologies. One of the AM unit suppliers summarised this during a presentation: 'Legacy systems are not friendly [towards adoption of new digital technologies]!' Frustrated

by these developments, the AM unit rebelled and commissioned an independent consulting firm to conduct a review of the discrete approach:

> The objectives … are to carry out a wide-ranging, state of the art review of the technology currently in [infrastructure] industry [sic] … internationally which could be of benefit for effective AM for the [IS]. The aim is to identify potential technology that could be **adapted** [following reconfiguration] for the infrastructure over the next 5- and 10-year horizons [sic]. (Internal report).

4.1.1.3. Organising logic (the unit's logic informs the practices and symbolic constructions which constitute organising principles of a specific sphere).

The differences are also evident in the organising logic. The projects unit's engineering logic focused more on skills and specialised task abilities (e.g. 3D parametric modelling). This logic is justified since the projects unit is more engineering-focused than AM. For example, the projects unit prioritised how its suppliers communicated their digital competency in project delivery and disregarded the needs of the AM unit.

Instead, the AM unit was more bureaucratic. Traditionally, its people preferred working in ways that had many steps to complete a task and very strict rules and procedures. In addition, some AM unit managers were not welcoming some of the changes brought about by the discrete approach. Being concerned with how things have been historically done (a distinctiveness of bureaucratic logic), they expressed discontent with reconfiguring their existing capabilities. In one of the presentation sessions, a senior manager used euphemisms such as 'emperor's new clothes', referring to how existing OC needed to be reconfigured.

4.1.2. Inter-organisational level moderating conditions

4.1.2.1. Client–supplier relationship (the type of working relationship between client and supplier).

Under the discrete approach, both units were collaborative, seeking long-term relationships and establishing extensive and close working relationships between client and suppliers (Cox 2004; Obayi et al. 2017), but with some differences. The projects unit was reciprocal collaborative, e.g. both unit and suppliers shared the commercial value created and agreed on price and quality trade-offs equally, and both operated non-adversarially commercially. A consultant working for the projects unit described:

> The aim of the digital library [we built for SI] is to reduce the extensive effort spent recreating content amongst project teams. The value of SI is in generating project information models more rapidly and at an earlier stage in a project lifecycle. The library will act as one version of the truth through the availability of digital contents from the [projects unit] supply chain.

Conversely, the relationship between the AM unit and its suppliers was client-dominant. Here, the unit adversarially appropriated most commercial value and established price and quality trade-offs. As a result, the supply chain is non-adversarial commercially and accepts continuous business rather than high margins from the relationship.

4.1.2.2. Special boundary approach (communication approach across organisational boundaries).

Our data showed that both units were highly engaged with their suppliers under the discrete approach. Both units acted as gatekeepers because both units consulted frequently and were well-connected to their suppliers. However, the projects unit was significantly more focused on the task interdependencies between its projects and how reconfiguration may affect project delivery. In addition, the unit acted as a laboratory liaison; that is, the unit was focused on intra-project interfaces, certainly in the early stages. The following excerpt shows evidence of this:

> The contract Execution Plan shall look at data deliverables (at specific data drops and during **development** phases) and workflow management in the Execution Plan. Details of the proposed collaboration with the client, stakeholders and client's agent should be highlighted. (Interim document).

Contrary, the AM unit was more focused on the performance outcomes of reconfiguration between the two business units and the units and the larger organisation. The unit assumed the role of Organisational liaison because it emphasised the importance of the boundary between the two units and the larger organisation.

4.1.2.3. Value creation and capture (how the realisation of exchange value is determined).

Both units are aimed at 'economies of scope', i.e. savings incurred from the joint production of different services (Carvalho and Marques 2014). However, the projects unit also aimed at achieving 'economies of repetition' by standardising routines to perform increasingly repetitive processes efficiently (Davies and Brady 2000). A projects unit representative explained:

> New governing standards are developed, superseding the interim documents. The new standards define structured methods for managing data production, distribution, and quality using digital technologies. By doing this … [we create] a disciplined process for collaboration, naming and modelling practice.

Instead, the AM unit saw reconfiguration as an opportunity to achieve 'economies of scale'. Accordingly, it identified, classified and standardised its massive asset portfolio, which comprises more than 15,000 infrastructure assets clustered into just 11 asset categories. A report commented on this approach:

> The enterprise portfolio perspective allowed [SI and its suppliers] to introduce even greater savings by adopting standardized components; lower procurement cost of components arising from economies of scale; and reduction in procurement and design costs. (Published document).

4.2. The success of implementing the continuous approach

Since the discrete approach failed to provide results, SI's strategic leadership proposed that the AM unit join the reconfiguration as an equal partner. This meant the two units needed to communicate and their supply chains to work in partnership for reconfiguration to be successful. By locating

reconfiguration within both units, SI could simultaneously consider development and operation issues related to its infrastructure. Under the discrete approach, SI's strategic leadership empowered the projects unit to lead the reconfiguration efforts and the AM unit to comply. However, as explained in the previous section, this approach failed. Realising this, the top management at SI urged the AM unit to 'join the table' and contribute to the reconfiguration process. After assessing the situation, the strategic leadership of SI made the sensible choice to invite the AM to help determine the specific processes both units needed to develop to reconfigure their OC effectively. In hindsight, this move made sense because SI leadership was interested in efficiencies across its entire infrastructure ecology; thus, deciding the AM unit to be involved would balance the focus of reconfiguration of OC towards both the development and management of infrastructure.

Two DCs proved to be the key mechanisms to facilitate reconfiguration: negotiating and disseminating. Under the continuous approach, SI developed the two DCs to allow the organisation to simultaneously reconfigure its operational capabilities to build new infrastructure and operate its existing infrastructure digitally. Next, we present how the reconfiguration was successful thanks to the two DCs and the respective routines.

Table 3 provides an aggregated view and includes representative quotes from our dataset. Our approach aligns with the theoretical juxtaposition: 'reconfiguration capabilities are higher-order DCs which can be leveraged to develop and analyse lower-order DCs, to understand what do or do not work and keep them from stagnating' (Ovuakporie et al. 2021, 6). Thus, reconfiguration is a higher-order DC that can be leveraged to analyse lower-order DCs, such as negotiating and disseminating.

4.2.1. Dynamic capability #1: negotiating adoption of digital technologies across internal and external partners and stakeholders

By developing the two DCs, the two units pursued negotiating the adoption of digital technologies across internal and external partners and stakeholders (Table 3). They did so through two structured routines: developing a strategy for aligning organisational and project information routines and systems (SR1a), and changing the behaviours of internal and external partners and stakeholders (SR1b).

4.2.2. Dynamic capability #2: disseminating the adoption of digital technologies across its supply chain contracts and internal business units

Next, both units pursued disseminating the adoption of digital technologies across their supply chain contracts and internal business units (Table 4). This dynamic capability was operationalised via two structured routines, namely, by formalising how data will be communicated between the organisation (SR2a) and supply chain; and by deploying digital platforms to streamline (or integrate) the production process (SR2b). Table 4 includes representative quotes that further confirm these findings.

5. Discussion

5.1. Why did the discrete approach fail, whereas the continuous approach succeeded?

In this section, we critically discuss the findings of our study. Under the discrete approach, SI aimed to reconfigure its operational capabilities by empowering the projects unit to lead the process and the AM unit to comply. Despite the efforts, the discrete approach failed due to the contextual conditions detailed in Subsection 4.2, while Table 5 highlights the key differences in the moderating conditions between the two units. The discrete approach disregarded the AM unit's needs whilst empowering the projects unit to shape the reconfiguration process and outcome. The changes during the reconfiguration expected the AM unit to comply with the new regime. Under the discrete approach, the AM unit was not treated as an equal partner and was expected to abide by the changes the reconfiguration process brought. Consequently, the AM unit 'rebelled', and the discrete approach failed to yield positive results.

As noted in the discrete approach, the projects unit had a different reconfiguration approach than the AM unit. However, by moving forward with the continuous approach, we found that negotiating and disseminating were crucial for the two units to overcome their differences. Subsection 4.3 and our model (Figure 2) explain how under the continuous approach, both units sought to negotiate technology adoption through the first dynamic capability.

Under *negotiating*, the two units worked together to align AM and project-related routines and systems. The two units focused on detecting counterproductive behaviours and searched for solutions acceptable to all the parties involved. Under *disseminating*, both units formalised how data will be communicated between the organisation and its supply chain; the two units searched to disseminate the adoption of digital technologies across their supply chain contracts and SI. The two units also deployed digital platforms to streamline and integrate the production process of both units.

Although the relationship between the two DCs is intertwined, negotiating must be implemented first (precondition) so disseminating can follow. After the negotiating DC has been implemented, it can run in parallel with the following disseminating DC, allowing the potential overall of the two. This finding differs from past studies (Winch and Leiringer 2016; Lobo and Whyte 2017). The overall effectiveness of reconfiguring OC requires developing, negotiating *and* disseminating DCs. Postpone one of the two DCs; the organisation risks by taking a half-measures approach.

5.2. Research implications

Our study has two main research implications. First, our study contributes to the capabilities of literature and project-organising research (Cantarelli and Genovese 2021; Leiringer

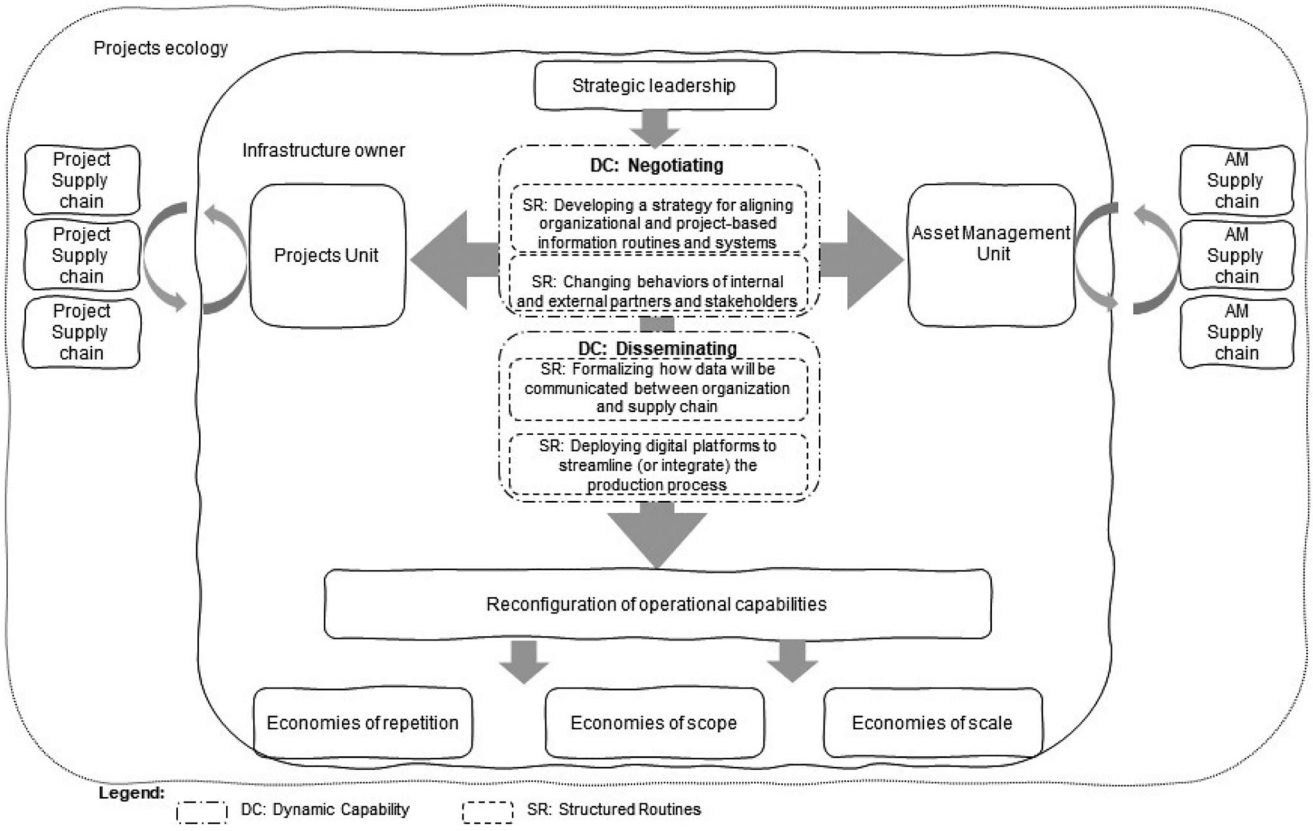

Figure 2. Negotiating and disseminating for the continuous approach.

and Zhang 2021). The project capabilities view (Davies and Brady 2000; Brady and Davies 2004) or the classic view of DCs (Teece, Pisano, and Shuen 1997; Teece 2007) dominate this research field. Whereas the project capabilities stream has significantly contributed to project delivery, their strength drops when one-off projects transition into operations and the discrete approach, as our study showed. Conversely, the classical view of DCs has drawn much criticism, with critics arguing that DCs are tautological and vague (Peteraf, Di Stefano, and Verona 2013). For instance, Teece et al. (Teece, Pisano, and Shuen 1997; Teece 2007) argue that organisations achieve superior performance from VRIN DCs. Instead, by adopting the view of DCs as best practices (Eisenhardt and Martin 2000), DCs become tractable, identifiable and detailed routines. Therefore, by adopting the view of DCs as best practices, our study contributes to theory elaboration and presents a detailed reconfiguration process that organisations with projects and AM units in the infrastructure sector can replicate to successfully reconfigure their OC simultaneously across projects and AM units.

Specifically on the contemporary discussion of reconfiguring OC in organisations with projects and AM units (Whyte, Lindkvist, and Jaradat 2016; Zerjav, Edkins, and Davies 2018; Locatelli, Zerjav, and Klein 2020; Whyte and Nussbaum 2020; Al-Mazrouie et al. 2021), we can distinguish two approaches (Table 6) for reconfiguring OC. In the discrete approach, benefiting from insights from the project capabilities literature, innovative infrastructure development projects are launched to create new project capabilities to cope with external stressors (Davies and Brady 2016; Winch and Leiringer 2016; Ashill et al. 2022). In this approach, the projects units and their suppliers seek to transition one-off projects into day-to-day business operations (Whyte, Lindkvist, and Jaradat 2016; Zerjav, Edkins, and Davies 2018; Locatelli, Zerjav, and Klein 2020). As a result, projects units may successfully create new project capabilities and reconfigure their OC, but as our study's findings explicated, AM units end up in a stalemate.

Instead, our study explains how organisations with projects and AM units may *simultaneously* reconfigure their OC in the continuous approach. Here, negotiating and disseminating reconfigure the two units' operational resources, processes and routines. Organisations with projects and AM units *concur* with the reconfiguration process and develop DCs in the confinements of a business environment (Anand et al. 2009; Galeazzo, Furlan, and Vinelli 2017). Importantly, our findings showed that the organisation's strategic leadership guided the two DCs to enable the organisation to keep reconfiguring its OC. In addition, our study showed that power dynamics work in their favour if owners reconfigure their OC within the organisation's boundaries rather than within an innovative infrastructure development project. Finally, our findings indicate that favouring the continuous over the discrete approach may help owner organisations avoid the latter's shortcomings, which brings AM units into a stalemate.

Our second contribution is methodological. There is a paucity of ethnographic studies in the capabilities and project organising research, with the majority of research being case studies (56) and surveys (11) (Leiringer and Zhang 2021). To

Table 6. Comparison between key concepts of the discrete and continuous approaches.

	Discrete approach	Continuous approach
Where dynamic capabilities live	Within a project ecology and diffuse innovation to the organisation.	Within the organisation's boundaries and diffuse innovation to the project ecology.
Exemplar dynamic capabilities	Aligning and reconciling (Lobo and Whyte 2017); Strategic, commercial and governance capabilities (Winch and Leiringer 2016)	Negotiating and Disseminating
Relationship between the dynamic capabilities	Various frameworks offered, all DCs assumed equal	Strategic leadership (antecedent), Negotiating is a precondition to Disseminating
Market dynamism	Rapidly changing environments	Moderately changing environments
Power dynamics	Weak position	Strong position
Value creation and capture	Economies of repetition: By reducing the need for training in new software and processes, enabling the organisation to mobilise existing resources Economies of recombination: By requiring additional work to interface with the software and processes of other organisations in the project ecology.	Economies of scope: By developing digital solutions that contribute to extending the use of its resources to incur savings from the joint production of different kinds of services Economies of repetition: Standardising routines to perform increasingly repetitive and efficient digital delivery and AM management processes. Economies of scale: by delivering and managing a large volume of assets is possible to realise cost savings by optimising resources and spreading fix and semi-fix costs on a larger volume

Table 7. Do's and Dont's for reconfiguring OC in infrastructure owner organisations.

Do	Don't
Reconfigure operational capabilities within organisational boundaries	Reconfigure operational capabilities via (isolated) innovative business projects
Engage both Projects and AM units as co-developers of reconfiguration to negotiate and disseminate the reconfiguration process. Ensure strategic leadership buy-in.	The discrete approach might not be the optimal solution operational reconfiguration. Do not anticipate a seamless transition from one-off projects to regular business operations.
Embrace the diversity of Projects and AM units—Process variation exists in how the OC of each unit are reconfigured.	Do not authorise one unit to lead reconfiguration—what works for one unit does not work for the other.
Be cautious of aggressive organisational changes and supply chain conditions surrounding the reconfiguration.	Negotiating and Disseminating may yield no results if the conditions surrounding them are not acknowledged.

our knowledge, this is the first ethnographic study in the field. Ethnography is a very intimate data collection method that allows the researcher to collect longitudinal real-time data. Therefore, the researcher can observe how the reconfiguration process untangles in the business environment and plunge themselves deeply into it, collecting fine-grained qualitative data from multiple sources in real-time (Langley 1999). The benefit is that the researcher can extract theory from the ground up (Pettigrew 1985). Importantly, ethnography can be complemented by interviews often employed in other methods (e.g. case study), but it avoids retrospective biases because the researcher is also collecting data by participating in boardrooms and keeping notes on organisation politics, informal meetings and gatherings (Van Marrewijk and Veenswijk 2006).

5.3. Managerial implications

The key contribution of our article to practice lies in unearthing the continuous approach in organisations with projects and AM units such as infrastructure owners. Unlike manufacturing, the infrastructure industry traditionally reconfigures OC by investing in innovative business projects (Cantarelli and Genovese 2021). As a result, reconfigurations often fall short when transitioning one-off projects into operations (Brady and Davies 2010; Davies, Dodgson, and Gann 2016; Whyte and Nussbaum 2020). The problem with the discrete approach lies in the cultural differences between the projects and AM units. As our findings demonstrated, the two units' organisational context and moderating conditions at the intra- and inter-organisational levels are vastly different. Furthermore, the moderating conditions shown in Table 5 provide the much-needed 'context' regarding how organisations with projects and AM units perceive the discrete approach. Ultimately, we argue that the discrete approach is problematic because it treats one unit as the 'Captain' and the other unit as the 'conscript'. Without parity between the projects and AM units, the discrete approach to reconfiguration is doomed to fail.

Instead, we illustrated how projects and AM units could jointly develop structured routines by adopting the continuous approach to reconfiguration. The continuous approach requires both units to work together as equal partners to implement reconfiguration internally within their units and externally across their suppliers. The continuous approach also requires the strong support of the organisation's strategic leadership to ensure that both units are aligned in their goals to reconfigure their OC effectively. The continuous approach draws its power from executing two detailed and structured processes: negotiating and disseminating. Negotiating and disseminating processes enable infrastructure owners to reconfigure their OC and are structured processes. Their structure is presented in Tables 3 and 4 and describes in detail the routines involved. Finally, organisations with projects and AM units can benefit from the study's following the guidelines in Table 7.

5.4. Future research

Our study focused on investigating the two reconfiguration approaches of an infrastructure owner. Our research identified two DCs and the role of strategic leadership as important elements of the continuous reconfiguration approach and for getting the AM unit a 'seat at the table'. Further research is needed to investigate the antecedents (Schilke, Hu, and Helfat 2018) that contribute to creating and using DCs for OC in organisations with projects and AM units.

Whereas our research focused on an infrastructure organisation responsible for reconfiguring its OC, further research is needed to explore how suppliers can cope with the changes due to reconfiguration (client–supplier dynamics). In our study, suppliers were on the periphery of our research. Lobo and Whyte (2017) argued that suppliers align and reconcile their project capabilities concerning collaborating firms across their projects (supplier–supplier dynamics). Future research is needed to research the client–supplier dynamics where the client negotiates and disseminates under reconfiguration.

In our study, we researched the reconfiguration process; future research could investigate what happens after reconfiguration is concluded and how the outcomes of reconfiguration can be sustained. Finally, the external stressor of our study—because the UK government mandated it – guaranteed the reconfiguration of OC. Future research might explore how organisations deal with critical but not mandatory stressors. For example, further work could focus on how organisations decide whether they should go ahead with reconfiguring OC against such stressors and what processes are in place to help them decide.

6. Conclusion

Our research contributes to the theoretical elaboration of why and how the continuous approach succeeded where the discrete approach failed. In the face of external stressors, the project management literature stresses the importance of the discrete approach for infrastructure owners with projects and AM units when reconfiguring their OC (Winch and Leiringer 2016; Whyte, Lindkvist, and Jaradat 2016; Zerjav, Edkins, and Davies 2018; Locatelli, Zerjav, and Klein 2020). To this end, the literature on project capabilities traditionally views the projects unit as leading the reconfiguration process and assumes the AM unit will follow. However, successful cases are few and far between (Zerjav, Edkins, and Davies 2018). An ethnographic study of a project's and an AM's unit viewpoints was selected to understand why this approach is inadequate.

Our study unearthed the moderating conditions under which the two units reconfigured their operational capabilities under the discrete approach using insights from institutional change and supply chain management. We found variation (Table 5) in how projects and AM units reconfigure their OC under the discrete approach. We have shown that the 'Captain and conscript' model, which conforms to the discrete approach, where one unit leads and the other follows, fails because of the process variation these two units demonstrate during reconfiguration.

Instead, we found that infrastructure owners resonate with a continuous approach to overcoming process variation. Here, reconfiguration involves two lower-level DCs - negotiating and disseminating. We also found that the organisation's strategic leadership is an important antecedent to the creation and use of negotiating and disseminating. We provided a detailed account of the underlying structured routines that constitute negotiating and disseminating. Our model (Figure 2) helps explain how the two units approached the continuous approach. We showed that under the continuous approach, the two units worked as equal partners and negotiating and disseminating facilitated this process. Eventually, reconfiguration started through a careful negotiation process between the two units and their suppliers, followed by disseminating the suggested reconfiguration to internal and external stakeholders.

Acknowledgements

The authors thank the Editor-in-Chief Professor Bjørn Andersen and three anonymous reviewers for their insightful and constructive comments, which have enabled us to improve the quality of our manuscript. We also thank Professors Andrew Davies, Peter Love, Vedran Zerjav and Drs. Carlos Zarco Galera and Stefano Miraglia, for their generous time reviewing earlier versions of this study. We are thankful to the infrastructure owner, the two units and their suppliers for providing us data access.

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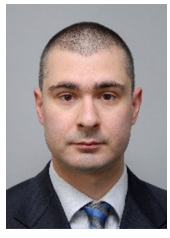

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Appendix A

Table A1. Case participants.

Participant	Organisation	Role	Number of meetings held
SI			
Project sponsors × 4	SI	Identifying the vision for the Projects Unit and AM Unit	Throughout the project
Enterprise Senior User	SI	The link between existing technologies and new technologies	Throughout the project
Project manager × 4	SI	Client-side PM for new developments; Asset Data Strategy Group Chair	Throughout the project
Area lead	SI	Managing servicing and operation of the contracted area	Throughout the project
Commercial Manager × 4	SI	Understand barriers to implementing digitalisation from a commercial perspective.	1
IS lead	SI	PM and Leading the IS team	1
Procurement manager × 2	SI	Procurement on behalf of AM Unit; Procurement on behalf of Projects Unit	1
Geotechnics manager	SI	Managing the Geotechnics team	1
Projects unit suppliers			
Information requirements lead	Consultant	Leading on information requirements capture for Projects Unit	Throughout the project
Design manager	Consultant	Leading design management services on capital engineering projects	Throughout the project
Team Lead	Consultant	Benefits realisation of new technologies	1
Digital delivery leads × 3	Consultant	Championing the use of digital technologies; Training and Education front	Throughout the project
AM unit suppliers			
Information requirements lead	Consultant	Leading on information requirements capture for Operations Unit	Throughout the project
Area service provider × 2	Management provider	Providing day-to-day monitoring and care of an area of the strategic road network	3
IT system experts × 3	Consultant	IT support to users	1
Service providers × 5	Management provider	SW #15 expert × 2, SW #26 expert × 1, AM operations × 1, Systems trainer × 1	1
Total: 35			

Appendix B

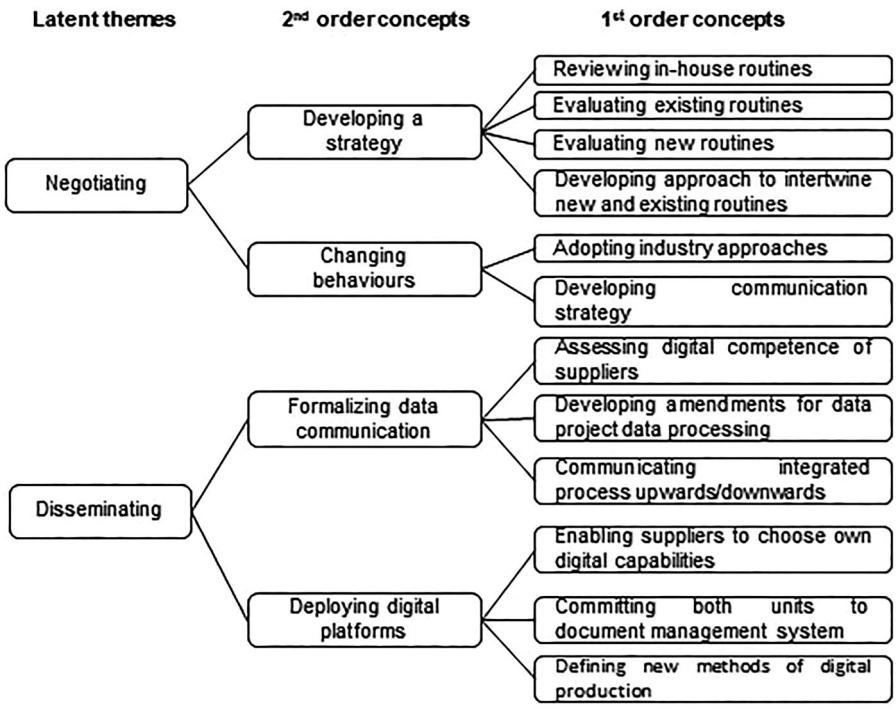

Figure B1. Data structure.