Smart City Digital Transformation Across Organisational Boundaries: A Resource Orchestration perspective

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Completed Research Paper

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Abstract

Smart City initiatives are gaining popularity, but their Digital Transformation (DT) process remains unclear. This paper investigates the DT process in Smart Cities through an empirical case study involving multiple government councils. We examine how stakeholders coordinate resources across organizational boundaries throughout the process. The paper presents a resource rationalization process model that promotes resourcefulness by enabling organizations to problematize, solve, and activate their resources. We provide insights into how councils shape resources, deploy common IoT systems, and transition from problem-solving to activation, despite differing short-term objectives. Resourcefulness is achieved theoretically by reshaping and reorganizing shared resources. Practically, this study offers practitioners guidance on restructuring, bundling, and leveraging resources to attain positive outcomes from DT, even with diverse objectives.

Keywords: Digital Transformation, Resource Orchestration, Smart City, Case Study, Stakeholders.

Introduction

In recent years, digital transformation (DT) has emerged as a key strategic imperative for organisations seeking to remain competitive in an increasingly digital business landscape (Bharadwaj et al., 2013). Vial (2019) defines DT as the process of integrating digital technologies into business activities with the potential to enhance operational efficiency, improve customer experience, and enable better decision-making. DT can be broadly understood as integrating digital technologies into business processes to improve performance and create value (Westerman et al., 2014). However, while DT is often seen as a strategic goal, it is also frequently implemented as a tactical response to external pressures, such as changing customer expectations, disruptive technologies, and market shifts (Lee et al., 2021; Maroufkhani et al., 2022). The concept of DT as a tactical response refers to the use of digital technologies to address specific business challenges and achieve short-term objectives. DT as a tactical response is closely related to an organisation's ability to respond quickly and effectively to changing external pressures through the use of digital technologies (Salmela et al., 2022). Tactical responses are often reactive in their nature, with organisations implementing DT in response to immediate external pressures, rather than as part of a broader strategic vision. This approach to DT can be seen in organisations across industries, from healthcare providers using telemedicine to address the challenges of the COVID-19 pandemic to retailers implementing contactless

payment systems in response to changing consumer behaviour (Lee et al., 2021). Despite the tactical nature of these initiatives, they can still contribute to the broader goal of DT. Tactical responses can provide organisations with valuable insights into the potential benefits of digital technologies and help build momentum for broader DT efforts. Furthermore, tactical responses can help organisations stay competitive in the short term, while they work to develop a more comprehensive digital strategy. The tactical response is characterised by a resource constrained environment which promotes a organisational collaboration across boundaries to share resources.

As DT process is more complex and has larger impact than an IT-enabled transformation (Wessel et al., 2021), there is a growing dependence on utilising both internal and external organisational resources with the emergence of the multitude digital platforms and their ecosystems (Baskerville et al., 2020; Vial, 2019). Hence DT initiatives shift the dependency on resources beyond the organisational boundaries (Yoo, 2010). This directs our research to investigate how individual organisations can leverage resources from within and outside of the organisation looking at their immediate ecosystems to initiate and deliver DT projects.

So, we ask the following research question (RQ): How do stakeholders orchestrate resources across organisational boundaries in DT?

The DT tactical response that is constrained by resources, both tangible and intangible, such as time frame, technology, human resources is highly dependent on building and leveraging resources capabilities. The tactical response is more immediate and specific, dealing with daily operational challenges and opportunities in "firefighting" mode, they require the organisations to become more resourceful and ready to collaborate across organisational boundaries to leverage resources capabilities for creating and capturing value. Hence, the resource orchestration theory (Sirmon et al., 2011) is adopted as a theoretical lens for conceptualisation of the DT tactical response process across organisational boundaries.

To achieve the objective of this paper within the context of DT as a tactical response we examine a case study of a group of adjacent organisations working on a DT initiative. The group of councils, we call them the "Parkland" in this paper, deployed a common platform using an open data portal and a sensor network of IOT devices across their geographical areas to collect large data. They work individually and collectively to leverage their specialised resources as well as common resources using digital technologies to address specific business challenges and achieve their respective disparate short-term objectives. Our study found that individual organisations engage in problematising their resources by structuring and restructuring their resources to build capabilities for potential value creation. This is achieved through defining specific problems and gaps in their resources. As a result, the Parkland group of organisations reshape their resources to leverage existing and newly acquired resources across to group allowing them to create resource solving capabilities. The resources converted into capabilities are reorganised to be activated through deployment into specific projects intended for piloting and testing. This final transition into action generates the DT as tactical response for each council individually. Resources are then rationalised across the group to become more resourceful in as resource constrained environment. As an example, The Parkland engages into exploration of resource sharing through the sharing of knowledge and unifying of data sources. This step is intended to upscale each project to be applied at group level with effective and efficient use of resources, we call this resourcefulness. Finally, the paper presents and discusses a processual model depicting the different steps and aspects of resourcefulness in such a constrained DT process as a tactical response.

Digital Transformation

DT is the process of integrating digital technology into all aspects of business and society, which triggers significant changes and transforms the structure, strategy and operations of an entity (Vial, 2019). Fundamentally, DT changes how organisation interact internally and with their customers recognising the need to adapt to the digital age in order to stay competitive (Kraus et al., 2021). However, the realisation of the organisational objectives from deploying new technologies imposes on organisation to initiate a DT process that involves stakeholders' collaborative engagement across the entire organisation (White, 2012).

DT is far more complex for an organisation than an IT-enabled transformation used to enhance their value proposition and improve their competitive advantage (Prügl & Spitzley, 2021; Wessel et al., 2021). Organisations initiate DT process to respond to the changing competitive environment and explore opportunities for renewal by creating digital business strategies that guide the selection of projects to

implement those strategies (Vial, 2019). On a strategic level, the integration of digital technologies into business processes has the potential to enhance operational efficiency, improve customer experience, and enable better decision-making. However, while DT is often seen as a strategic goal, it is also frequently implemented as a tactical response to external pressures, such as changing customer expectations, disruptive technologies, and market shifts (Tan et al., 2020). Some retailers implementing contactless payment systems and resources and energy sector (Maroufkhani et al., 2022) as a strategic response to changing market and shifting consumer behaviour.

The concept of DT as a tactical response refers to the use of digital technologies to address specific business challenges and achieve short-term objectives. Tactical responses are often reactive in their nature, with organisations implementing digital transformation in response to immediate external pressures, rather than as part of a broader strategic vision. This approach to DT can be seen in organisations across industries, as in the example of healthcare providers using telemedicine to address the challenges of the COVID-19 pandemic (Lee et al., 2021). Despite the tactical nature of certain DT initiatives, they can still contribute to the broader goal of DT. Tactical responses can provide organisations with valuable insights into the potential benefits of digital technologies and help build momentum for broader DT efforts (Hanelt et al., 2021). Furthermore, tactical responses can help organisations stay competitive in the short term, while they work to develop a more comprehensive digital strategy.

Drawing on existing DT literature, this paper seeks to identify the process that contributes to the successful tactical implementation of DT that goes beyond organisational boundaries as DT overshoots a single organisation structure into a business ecosystem (Menten et al., 2021; Tan et al., 2020; Yoo, 2010). DT is thus a complex and multifaceted phenomenon used to improve performance and create value (Westerman et al., 2014). The DT tactical response of an organisation refers to its ability to respond quickly and effectively to a rapid changing environment through the use of digital technologies (Baskerville et al., 2020; Kozanoglu & Abedin, 2020). Organisations seeking to achieve short-term tactical objectives via DT initiatives incorporate multiple adaptation process to obtain sustainable competitive advantage including by leveraging their unique resources and capabilities as well as their networks (Barney, 1991; Duschek, 2004). Since the DT process is more than upgrade of systems and technologies it involves exploitation and exploration of organisational context including resources and people as key stakeholders of the change initiative (Hess et al., 2016). Hence, DT requires orchestrating multiples resources to respond to challenges and opportunities within and beyond the organisational structure requiring them to work collaboratively with other organisations in alliance (Duschek, 2004). In this paper we address the gaps in our understanding of how stakeholders orchestrate resources across multiple entities as part of the DT process to influence the transformation process and achieve intended objectives (Carroll, 2020; Rowe, 2018; Vial, 2019). The extant literature has explored the business and operational aspects of the DT processes without explaining how stakeholders orchestrate resources within their immediate environment to respond to challenges and opportunities and influence the DT process. Besides disrupting the business models and organisational structures DT requires engaging stakeholders in the process that are shared among multiple firms. This creates a shift in the way organisations can obtain different capabilities and resources to improve their reputation and improve their services (Kraus et al., 2021).

Resource Orchestration Theory

This study adopts the resource orchestration theory (ROT) perspective, which posits that an organisation's performance and its competitive advantage is determined by the assemblage and effective management of resources it possesses (Sirmon et al., 2011). ROT proposes that firms can use their resources and capabilities in ways that are difficult for competitors to imitate, leading to sustained competitive advantage (Barney, 1991; Sirmon et al., 2011). Resources can be tangible, such as physical assets, or intangible, such as knowledge, reputation, or relationships while capabilities refer to the firm's ability to use its resources to perform a particular task or set of tasks to create value. ROT suggests that firms can create competitive advantage by combining their resources and capabilities in unique ways that are valuable, rare, and difficult to imitate (Barney & Arikan, 2005).

ROT also proposes that resource orchestration involves the coordination of both internal and external resources. Internal resources are those owned or controlled by the firm, while external resources are those owned or controlled by other firms or individuals. ROT suggests that firms can create competitive advantage by leveraging external resources in conjunction with their internal resources (Cui & Pan, 2015).

ROT was built on the foundations of Resource Based view (RBV) and Assets Orchestration framework (Helfat et al., 2009). RBV states that possession of requisite resources is a necessary but insufficient condition for creating value. ROT extends this argument to assert that firms must also have the knowledge of how to accumulate, bundle, and leverage resources to generate sustainable returns. It added the distinction of incorporating feedback loops that generate continuous adaptation befitting with the dynamic environment for creating a sustainable transformation (Zhang et al., 2022). The impact of renewal from continuous learning and developing knowledge capabilities in the ROT framework is paramount considering the dynamic nature of altering the firm resource portfolio (Lanza et al., 2016). Thus, the exploration and exploitation of resources alongside the environmental contingencies determine how the resources usage by the firm can be translate into capabilities through the dynamic resource orchestration as those capabilities must exist for leveraging to occur (Sirmon et al., 2007). This perspective enhances the traditional view of resources, which often overlooks the contextual influence of the environment and fails to consider the dynamic reconfiguration of resources in response to changing circumstances (Cui & Pan, 2015). Resource orchestration recognises that an organisation can achieve better performance by continually reconfiguring diverse resources in response to environmental changes. Moreover, studies suggest that the actions taken to use resources, rather than the resources themselves, can influence performance (Melville et al., 2004). Resource orchestration addresses this by supplementing the traditional view of resources with the action on resource management (Sirmon et al., 2011).

Previous empirical research investigated various context in which the use of resource orchestration helps improve organisational performance and gain competitive advantage (Baert et al., 2016; Carnes et al., 2017; Pan et al., 2020). A process model was developed by Cui and Pan (2015) explaining how orchestration helps the successful adoption of e-commerce by manufacturers. As recent study conducted by Zhang et al. (2019) describes the use of big data for smart city development applying the resource orchestration perspective as a theoretical lens to analyse the case of Wuhu one of the first smart cities in China. Other examples include the study of how resource orchestration in startups can impact their performance by investigating three key contingencies of fonder experience, human capital investment and leveraging strategy (Symeonidou & Nicolaou, 2018). Furthermore, ROT extends RBV and addresses some of its criticisms in regard to the manager role in managing the resource portfolio (Danneels, 2011). Since resources also needs to be converted into capabilities to be leveraged (Danneels, 2011; Lanza et al., 2016), then converting the resource into beneficial competencies or capabilities remains a point of contention (Sirmon et al., 2011). Although ROT focuses on the nature and elements of "resource orchestration", this study explores in more details the process and steps used by a group of firms across their organisational boundaries in orchestrating their resources. This paper extends the discussions specifically into the DT phenomenon within inter-firm collaboration and coordination. It is not always clear how firms can identify their unique resources and it can be difficult to leverage their unique resources unless they transform them into capabilities (Danneels, 2011). Especially in the early stages of the development process, as in the case of new ventures, it is the identification and acquisition of resources, rather than deployment and mobilisation of resources that is crucial for the success of the project (Lichtenstein & Brush, 2001). More specifically in the context of DT process, where organisations engage multiple stakeholders beyond their structural boundaries to achieve their short-term tactical objectives, we identified a gap in understanding the process of identifying and leveraging resources to support the broader DT efforts. Thus, the aim of this paper is to answer the research question of how do stakeholders orchestrate resources across organisational boundaries in DT?

Methodology

Research context

The Parkland smart city program is a comprehensive initiative that aims to transform the participating city councils into a future-focused, digitally enabled cities that are resilient, sustainable, economically vibrant, connected, and inclusive. With a projected population growth from 1 million in 2016 to over 1.5 million by 2036, the Parkland city are expected to face challenges related to limited resources and growing demand for services. To address these challenges, the Parkland smart city program seeks to capitalise on the benefits of today's technology, establish a strong foundation for a digital city that can support future growth, and create an ecosystem to promote innovation in the Parkland city area. The Parkland smart city program was co-created with the participating city councils, the Commonwealth Government, some state authorities and a large volume of customer insights collected over 24 months. A significant stakeholders' engagement

program helped to define smart city initiatives included in the program. The program identifies high-capacity conduit, common access ducts, a network of "smart poles," and smart street furniture as essential foundations for the future city. In February 2021, the Parkland smart city program became the first of its kind to be listed on the Infrastructure Australia High Priority List, recognising the need for digital infrastructure to adopt technologies to reduce travel times, reduce resource use and emissions, improve health and better engage communities. As part of the DT process, data will be used to inform decision-making, advocate for policy change, streamline processes, improve access to information, deliver better services, increase community participation, satisfaction, transparency, and economic opportunity. The Parkland Sensor Network Project is a key initiative in building a smarter city. The project deployed a shared, scalable sensing network across eight council partners, which connects to the internet of things (IoT), enabling data sharing to enhance place-based planning and communication with citizens. The network uses public domain and environmental sensors to establish a network spine, enhancing the development of tools for data sharing and data analytics, and digital governance protocols. This project was a regional first, with councils sharing network and data resources and even extending the network coverage to combine all participating councils to monitor and manage resources effectively. The Sensor Network Project was the winner of Local Government category of the IoTAA's Smart Cities Award and was also nominated as a finalist in the 2022 iTnews Benchmark Awards. This was complemented by the creation of an Open Data Portal to collect data from the sensor network and blend it with other data obtained from different sources linked to the participating councils' different databases. The Open Data portal features aggregate data on the program level at the Parkland city portal as well as portals on each Council's website providing valuable information that could be leveraged to create so much more value. The Parkland aims to gain funding for an expanded sensor network and to drive increased collaboration between Councils to 'post' different and even more useful data sets. To kickstart the delivery of the program, foundations for consistent delivery of smart solutions in the Parkland city were established, and pilots are being delivered to generate a deeper evidence base. Policies and guidance materials like the Cyber Risk Management Framework are being delivered to apply to all projects and organisations deploying and managing smart technologies across the city. Digital connectivity infrastructure is being included in master planning and establishing planning requirements in instruments like Development Planning Controls to equip the city with digital plumbing. Data sharing platforms like the Spatial Digital Twin are being augmented and tested so it can perform as a workbench for the planning and operations of the Parkland City. Pilots were conducted to test technology solutions, data management approaches, and service models, build capability, and establish an evidence base for future, larger investments. Some projects have the potential to assist all levels of the NSW government to have a high-level overview of the condition of public assets such as roads in near-real-time to help streamline road maintenance tasks. For example, the Smart Digital Kerbside trial is developing a digital inventory of kerbside space allocation with real-time analytics of its use. The Envisioning in 3D project is a partnership between the NSW government and one of the participating city councils to deliver a dynamic 3D model of the entire area to assist local planners. Finally, the Digital Trust for Places and Routines project aims to investigate the opportunities and risks associated with the use of smart technologies in public spaces.

Research method

To examine the research question of how do stakeholders orchestrate resources across organisational boundaries in DT? We employed an interpretive case study research method. This method was chosen for several reasons. Firstly, an interpretive case study approach is particularly appropriate for investigating a "how" research question that has specific implications within particular domains of action (Walsham, 1995, 2006). Secondly, a case study method is well-suited to studying the complex interactions involved in decision-making processes, which often involve information processing during the planning and operational phases (Pentland, 1999). Finally, an interpretive case study approach is particularly useful for examining phenomena through the interpretive lens of relevant stakeholders who are involved in the case (Klein & Myers, 1999).

Data collection

Our research project was informed by established contacts within the group of councils, as one of our authors had engaged with some the informants during several seminars and industry conferences. Our goal was to collect data that allow us to investigate the process and interactions resulting from the collaborative

program between the group of councils using a common open data portal and sensor network across the boundaries to achieve each council respective and disparate short-term objectives. Our focus was on understanding the interactions between different actors observed during the DT process from individuals, organisational resources, and technological perspectives to answer our research question. We identified a range of stakeholders' groups that have different levels of influence on the process related to their roles and responsibilities as depicted in the Table 1 below. We conducted 11 semi-structured interviews in total, each lasting 60-90 minutes, divided into two batches of five and 6 interviews respectively to allow us to evaluate the identified gaps and plan for the next set of interviews for answering the research question. We recorded the interviews via TEAMS and Voice recorder and transcribed them for analysis. The semi-structured interviews had increased focus on the phenomenon under study over the course of the study. Interviews were spread among the participating councils and each interview considered the interviewee's organisational role, the department they worked for, the activities in which they had been involved, and the processes through which they identified challenges and solutions. We selected interviewees based on their level of involvement in the project, while maintaining a balance between different roles, departments, gender, and experience. We developed the list of interviewees in two sets, with the first set discussed and validated by the main project contact based on the criteria set above, and the second set emerging after preliminary analysis of the first interviews guided by the research question.

Informant role	Informant code	Council	Gender	Number of interviews	Stakeholders Group
Future Innovation Manager	JK	Alpha	F	2	Decision maker
Manager Smart City	AD	Alpha	F	1	Primary influencer
Senior Office City Innovation	ET	Beta	F	1	Primary influencer
Chief Information Officer	GG	Gamma	F	1	Decision maker
Enterprise Architect and IT Portfolio Coordinator	HZ	Gamma	F	2	Secondary influencer
Executive Director	JC	Parkland Authority	F	1	Primary influencer
Manager Community Learning	PP	Delta	F	1	Secondary influencer
Cyber Security Manager	NF	SG	M	2	Secondary influencer

Event type	Participants				
Digital.NSW conference on Oct 21 and Nov 2022	Public sector and tech industry [whole day event x 3 days]				
Smart Western Sydney Showcase on 2nd Nov 2022	Public sector officers, private industry representatives and academics [whole day event]				
Olympic Park Smart City Tour on 10th Nov 2022	x20 participants: Innovation managers, public officers at councils, Executive director NSW Smart Places Program.				

Table 1- Interviews and interactions table

The investigation took place between August 2021 and December 2022, concurrent with the analysis and theory-building process as prescribed by Pan and Tan (2011) to design and conduct the modelling in this study. We obtained and analysed a large volume of secondary data shared by the council organisation, including workshops documentation, emails, project reports, and minutes of meetings, in addition to many interactions during seminars and conferences with the council over the two-year period, all used in the conceptualisation process. This large amount of secondary data, mixed with the first-order data, increases the reliability of the study (Yin, 2011). We participated in two one-day workshops delivered by the council, the first a hackathon for solution ideation and the second to present the case study and share insights about the process development. The analysis process was guided by the review of literature to establish a good level of correlation between the phenomenon under investigation and the adopted theoretical lens. The subsequent analysis and data collection produced an enhanced understanding of the issues pertaining the topic of study and were guided by further review of the literature to confirm our selection of the resource orchestration (RO) theoretical lens as a perspective used to investigate the phenomenon of interest.

Data analysis

For the analysis of the transcribed interview dataset, a combination of coding techniques including open coding, axial coding and selective coding were used. The open coding technique, which is commonly used in qualitative research studies and has its origins in grounded theory (Strauss, 1990, Strauss and Corbin, 1994), was used to generate first order codes. First order codes were relevant to the research objective of exploring the process of the DT taking place across multiple organisational boundaries with different tactical objectives using common technology platforms. These first order codes were then labelled with conceptual labels in the second order coding process. This step aimed to capture the various activities involved in the process and to expose high-level recurrent themes that were linked to the theoretical constructs through axial coding. This technique helps to generate meaningful insights of the phenomenon under investigation (Strauss & Corbin, 1994; Strauss, 1990).

To ensure anonymity and data confidentiality, each informant was assured of data confidentiality, particularly when potentially sensitive information was sought (Walsham, 2006). The first-order codes were generated from the interviewees' accounts and the researcher's experience, which covered about two years of activities from the project inception to realisation, including engagement with various stakeholders' groups. The perspectives of the informants were mainly represented by verbatim quotes from the primary stakeholders, including the Innovation Manager, the Project Manager, the various streams team leads, and the city future advisory panel members. The accounts from the interviews revealed the interpretations of the influential players who were participating in the transformation process. Additional relevant observations and inferences were drawn from the researcher's own experience, secondary data obtained from archival sources, and the large documentation database, including the smart city roadmap, minutes of meetings, website, social media, and project reports. Secondary data was mostly used for triangulation purposes.

Figure 1. Data structure -adapted from Corley and Gioia (2004)
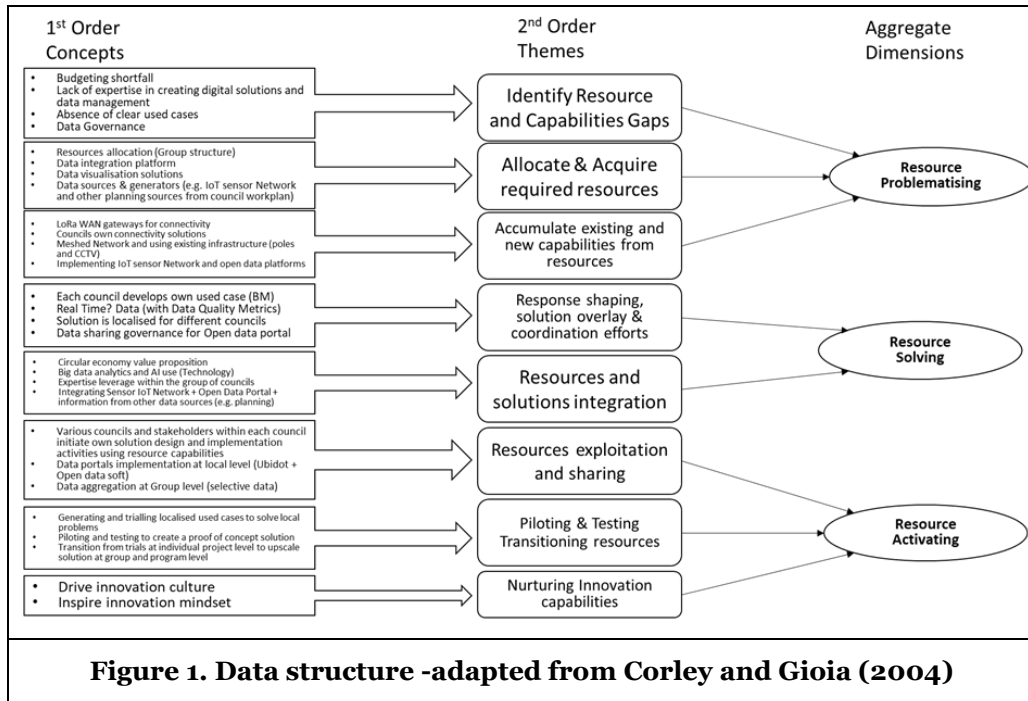
Finally, a selective coding technique was used to integrate the theoretical conceptualisation and refine the interactions to establish a coherent model of the observed phenomenon. The hermeneutic process was used to examine the interview data, relevant literature, and the emerging model to fine-tune the model (Myers, 1995). The emerging model was discussed extensively with the research team, including senior academics, to obtain feedback that helped improve the model. This cycle of fine-tuning lasted several months until theoretical saturation was reached, and the case study findings were comprehensively challenged and explained to ensure that no additional information could be added or modified to improve the emerging model.

Findings

This paper investigates the case of the Parkland city, a group of city council organisations that created a shared platform of open data portal and sensor network across their geographical areas to collaborate on solving long-term problems by initially achieving short-term objectives. The tactical response approach was an adequate first step as each council has different requirements and suffer from different problems that are contextualised within their local government areas. In the following we present the findings from the case study and how the Parkland city orchestrated their resources during the DT process to achieve their objectives. The study identifies the process used by the parkland stakeholders to endeavour the DT initiative through resource problematising, resource solving and resource activating. As a result, councils created focal projects that address the immediate concerns within each council separately, using common and disparate resources. The group is then able to rationalise the resource pool through a feedback loop and become more resourceful in upscaling each project to the group level after proof of concept is established with maintaining a local flavour of the solution.

Resource problematising

The Parkland city recognised early on that each council is suffering from disparate issues that are not necessarily common across the group. However, the group was set to benefit from creating this collaboration initiative to receive the needed funding from the federal government. The innovation acceleration fund and other government grants available at the time including a "city deal" constitutes a valuable resource for the group to tap into.

Using the monetary resource from the grant funding is tied to creating this collaboration initiative between the participating councils as clearly highlighted by the executive director of the Parkland city authority:

"the Parkland happened around the same time as the city deal was signed, so there has been a the concept of a city deal came from the UK and it was adopted by the Australian Government of the time and then the idea of the city deal was that the three levels of government should work together to focus on specific projects or priorities that were mutually agreed, and that the idea was that by working together you would cut out some of the duplication, replication, leverage off each other more effectively, make more use of our resources, et cetera. So that's the core of the city deal, if you like. And so there was a city deal that was we were one of the first" [JC]

However, the collaboration efforts require the identification of the problems first that needs solving for each council and that can later be upscaled to the group level. The absence of a clear use cases to identify opportunities was driven by lack of awareness of what problems exist and what resources are available to resolve them:

"We don't have any awareness either of what we have or what's possible. So we're trying to look at all options and see what we can do to resolve all four issues. And sometimes they intersect, obviously. You know, you have a lack of awareness about problems and resources to solve them." [JC]

Besides, each council have their own different type of resources available for them, for example there were some connectivity solutions that are deployed in some of the councils but are not available for others as highlighted by the senior innovation officer at beta council:

"well, we already had our gateways in so some used Sydney Water gateways. Some, I think, maybe installed some new gateways. We already had our own so it was just sort of bringing everyone up to the same" [ET]

In which case the Parkland authority and each council had to identify this gap in resource availability across the group to determine what capabilities are needed. For some councils they borrowed resources from other participating organisations such as the LoRaWAN gateways from Sydney water. As another key resource the funding was again a key problem:

"it's just a matter of getting it funded. And the reality is councils don't have that kind of money. Ideally, what I actually want to do is create what is called the one WAN gateways, you know and to be able to do that and create the network. But for that's sort thing I've just gotta find another way to get the money" [JC]

The main problem for the councils was identifying the problem in the first place, then analyse what resources are available and what resources are needed as a result of this collaborative initiative:

"my personal view is what really are our abilities? we were really resource constrained. Whereas a lot of what our inputs was trying to gain value in establishing that collaboration that creates value" [JK]

The CIO of gamma council puts it down to the need to identify the specific problem that requires a specific skill set and specific resources to solve, then work on acquiring missing resources and accumulating more resources:

"It was no specific problem to solve, but the problem to solve was how do we find a problem and get it done with or without the resource that we got, or we need." [GG]

The data generated from the sensor network and other sources especially when it is shared on open data platform presents a problem in itself. This problem is not only limited to creating data governance and risk of cyber security attacks but also for creating value out of the data analytics for data generated from IoT devices in the sensor network. While they are valuable resources, both the data and IoT devices are presenting a security and maintenance problem awaiting to be converted into a solution to specific problems.

"the sensor network, it's about each council using some IoT devices, learning what's involved in that, and then how we bring to create the real value of the IoT devices, the data and how you use the data. So then the data portal is a bit of repository for that data? And so, with that, with the portal, there are the issues of data security, storage and maintenance. The open data portal is split between platforms Ubdot and the Open Data soft each has its own nuances." [JK]

The Parkland would identify emerging themes associated with resource challenges such as "geographic connectivity barriers", "access to digital resources", affordability and digital ability, and resources for spreading awareness and exposure to digital literacy.

Problematising the resources aids the Parkland to think about what specific problems they are facing and specifically each council in identifying use case for structuring their resources. Resource structuring relies on problematising to identify resources needed to be acquired and what skills need to be accumulated or what resources can be divested to focus on problem solving.

Resource solving

Defining the problem to solve is definitely not an easy task to accomplish, however using resource problematising helps identify specific gaps and needs that helps convert resources issue into potential opportunities for them.

The solution comes from within the problem as in being able to bundle the structured resources by reshaping them. The reshaping of resources occurs out of integrating multiple and diverse resources to achieve a certain outcome as indicated by the Manager of Community Learning centre:

"there's a city insights team that is looking at diverse capabilities for example collecting all of the data sets across Councils, all the physical assets and all the engagement surveys and trying to put them all together to get ideas about what problems they can solve*"*[PP]

Creating capabilities through the acquired and accumulated resources leads to transforming these capabilities into value generation. This happens by integrating resources into specific solutions like in the example of pairing adequate human resources skills and expertise with the requirements for the problem solving which is reflected in the comments from the Enterprise Architect and IT Portfolio Coordinator

"I guess it depends on what are the parameters that you're working with. The resources that you have, and the type of skill set that they have. This involves grouping things in terms of type of data, funding, and human resources, you know, including the applications that we have in house, the infrastructure that we have in House and outside. What does that look like from a big picture if we're looking from a bird's eye view, what is it that we have and what are the parameters? We're essentially creating capabilities based on the parameters that we have" [HZ]

Some of the parameters for solution creation may require minor incremental improvements of resources capabilities to adjust with the intended result. Other parameters call for extending existing capabilities into adjacent areas of solution provisioning without radically altering the resource itself such as adapting the use of the resource in ways that provide a resolution for the arising matter as explained by the City Innovation Senior Officer

"skills were developed over a relatively short time period for some resources, while resource allocation also included borrowed supplies from other areas that were not specifically intended for that purpose in the first place" [ET]

Shaping the council response is done by overlaying the required resources with appropriate skills and capabilities to work on the identified solution to the problem. This involves coordination efforts that are crucial to addressing the key challenges. Several key aspects of these efforts, including the resources capable of developing unique use cases and business models, determining the importance of real-time data and the need for data quality metrics.

"I think the different way different councils used that project focuses on the abilities to deliver as we were really resource constrained. Some councils have been able to gain a lot more value for the project then others as they were able to integrate their resources capabilities and convert the problem into opportunity" [AD]

The localisation of solutions by reflecting a local flavour preserving each council distinct factors is resource dependent. The role of data sharing and governance in open data portals is another example of resource solving. Each council's unique use cases and business models represent an important aspect of the response to specific problems using resources and solution overlay efforts. Localisation efforts are determined by a variety of factors, including local demographics, environmental conditions, and economic considerations.

By tailoring solutions to the specific needs and circumstances of each council, organisations can ensure that their efforts are effective, efficient, and sustainable. Whether real-time data is needed in allowing to monitor the effectiveness of the solution initiatives and quickly make adjustments, when necessary, depends on the problem and solution. Not all problems require solutions needing real time data.

"We found out that for solving some issues, we really don't need that real-time data, or fast connection. Yes, we still need large amount of accurate data but not necessarily real time all the time".

The integration of big data analytics and AI technology in the solution provisioning is also another type of resource solving mechanism that aggregates resources in a certain way to facilitate the solution. Besides, these technologies can help organisations analyse large amounts of data to identify trends, patterns, and insights that can inform decision-making and identify areas where resources can be optimised, solutions can be improved, and outcomes can be enhanced.

Leveraging expertise within the group of councils is another key aspect of resource integration. By sharing knowledge across councils, organisations can tap into a broader range of skills. This approach involves establishing communities of practice, sharing best practices, and facilitating peer-to-peer learning.

Finally, the integration of the sensor network of IoT devices with the open data portal and other data sources is an effective resource for providing a solution. The sensor network of IoT devices provides data in real time, where it matters, on environmental conditions, resource usage, and other factors that can inform decision-making. By integrating the IoT network with open data portals and other data sources, councils gain a more comprehensive understanding of the challenges they face and develop more effective solutions. In conclusion, the integration of resources and solutions provides an effective way to addressing the problems and overlaying appropriate resources for the solution provisioning.

Resource activating

Various stakeholders within each council transition from solution design and planning to solution implementation by allocating activities that match their resource capabilities. These may include tangible and non-tangible resources like human resources, systems and tools, as well as knowledge accumulated from previous projects. Each resource brings a unique capability and a different perspective with a set of skills to achieve the desired outcomes. By working together, stakeholders across multiple organisations leverage their resources, identify new opportunities for resource exploitation and work effectively on specific task.

"each council alone can't make the data portal alive sort of thing. So we had to just push through and get it. We had a data sharing agreement and that is a positive thing. So to actually transition from having nothing to have an open data in a small space of time is really incredible. that is what the councils have done as they have their varied level of maturity in data capability across the councils. But because of this project we were able to just bring them all together" [GG]

Resource exploitation and sharing are essential to sustainable development, and they are necessary for promoting economic growth across the participating councils. Leveraging resources through sharing them becomes increasingly complex in a resource constrained situation. One effective strategy used by the councils to manage them effectively is to allocate each resource within the group as well a from outside industry partners to an active piloting and testing case based on the required capability:

"That's the big capability to keep in mind how to shift into action. We knew we were going to have IoT sensors, and there was going to be data. But we didn't know what kind of platform or how that would work. So but what we did is to leverage the industry briefing and the industry engagement from the Parkland city, where all these solutions were put forward by all these different industry partners. And so that and that's how we came to find the packet solution and the Open Data socket and others. I don't think if we hadn't leveraged that kind of engagement that the project necessarily would have found that. We do need it to have this ability. There is value in being able to harmonize datasets with different field names into scalable data." [JK]

Activating the data portals with the two dimensions of *Ubidot* (only used for troubleshooting the IoT devices) and *Open Data Soft* (for sharing data with the public) allows for the integration and sharing of information at the local level withing the council and with the public on need basis only. The public does

not need to be informed about Ubidot data as this is seamless to them and strictly managed by the IoT network operator. But for the councils the two dimensions of the portals provide a platform for stakeholders to access and share data related to resource management and efficiency of devices.

"*Ubido data is not shared with the public as it is reserved for the council to monitor the performance of the IoT devices*" [JK]

Resource activation is achieved by sharing information about capabilities that are fit for purpose when allocating resources to undertake actions for problem solving. Stakeholders can make informed decisions about how to allocate and reallocate resources effectively by distributing activities and start experimenting with the solution through piloting and testing. In a tactical response that is characterised by a short-term and quick turnaround solution provisioning organisations suffer from constrained resources that are scarce and overloaded

"*So, that we need someone who would be able to participate in these digital innovative projects, because it's not business as usual. It's beyond that, so we needed someone who was not caught up in their daily activities to dedicate that resource to the short-term pilot project on a very short notice and often these resources are already assigned to other work*" [ET]

Experimentation and incremental improvement are help with the resource transitioning into action. The ongoing testing and refinement of the proposed solutions ensures that solutions remain effective and relevant over the course of the project. By using an iterative approach stakeholders continue to improve and refine the solutions, making them more effective and impactful over time.

Nurturing innovation capabilities to stay relevant and remain competitive is a legitimate target in today's fast-paced world by driving an innovation culture and inspiring an innovation mindset. Councils drive innovation culture by creating an environment that encourages and supports innovation. This approach requires a shift in organisational thinking, from a focus on being risk averse to an emphasis on continuous improvement through experimentation. Resources are used to foster an open and collaborative work environment and promote a willingness to take calculated risks. In activating the capabilities that were created from collaboration activities, councils empower stakeholders to think creatively and challenge the status quo, leading to the development of new ideas and solutions:

"*We promote the support of circular economy and obviously reduce waste. Increase recycling of waste and increase innovation. So I did actually try quite hard to get that tool funded by the state government and failed. What's actually ended up happening was that they then ran an innovation challenge. And I encouraged our team to go for the innovation challenge and they have got through the 1st Part of that innovation challenge, and they did a pilot within the council so we know it works and it's already had some of the data done*" [JC]

Discussion

DT allows organisations to deploy and adapt digital technologies for improving efficiencies and remain competitive by exploring innovative solutions for sustainability and value creation (Gimpel et al., 2018). However, unlike IT-enabled transformation, the initiation of a DT response is a more complex process that involves diverse stakeholders and goes beyond the organisational structural boundaries (Wessel et al., 2021). To answer our research question, we look into how the DT unfolds from a process perspective to understand the inner-workings and outcomes (Chanias et al., 2019; Wessel et al., 2021). This study informs us on the movement and configuration of resource attributes underpinning a DT process across multiple organisational boundaries (Baiyere et al., 2022). The process of resource problematising, solving and activating happens across multiple organisations using resource pooling that share common platforms. Resources are then appropriated to the specific needs of respective organisations' and deploy the tactical response through the activities of resource shaping and re-organising.

Below we present a process model in Figure 2 depicting the DT process using the resource orchestration perspective (Sirmon et al., 2011) applied by stakeholders across multiple organisational boundaries. DT as a tactical response is initiated through triggers such as funding and sudden shift in public policy with pressure to create solutions for arising challenges such as environment pollution, recycling and sustainability, or exploring new opportunities for innovation that are enabled by new technology products & services. The labels in the process model are based on the RO theory and the corresponding verticals steps

are based on the aggregate dimensions of Figure 1. The theorisation of the sequential process dimensions is drawn from mapping the RO theory to the analysis of primary and secondary data and theorise the flow of events and actions in the DT process.

Reshaping for value creation & re-organising for value capturing

Our findings highlight the action of resource reshaping and reorganisation as a valuable practice in achieving desired outcome through value creation and value capturing respectively from resource orchestration perspective (Sirmon et al., 2007; Sirmon et al., 2011). Organisations are under constant pressure to create and capture value from resources, and resource shaping and reorganisation can help them achieve these goals via a DT process focusing on resources capabilities. As a result, organisations can leverage these resources to enhance their response to challenges and opportunities and stay competitive (Vial, 2019).

Figure 2. Process Model for Cross-Organisational Resourcefulness in the DT Process
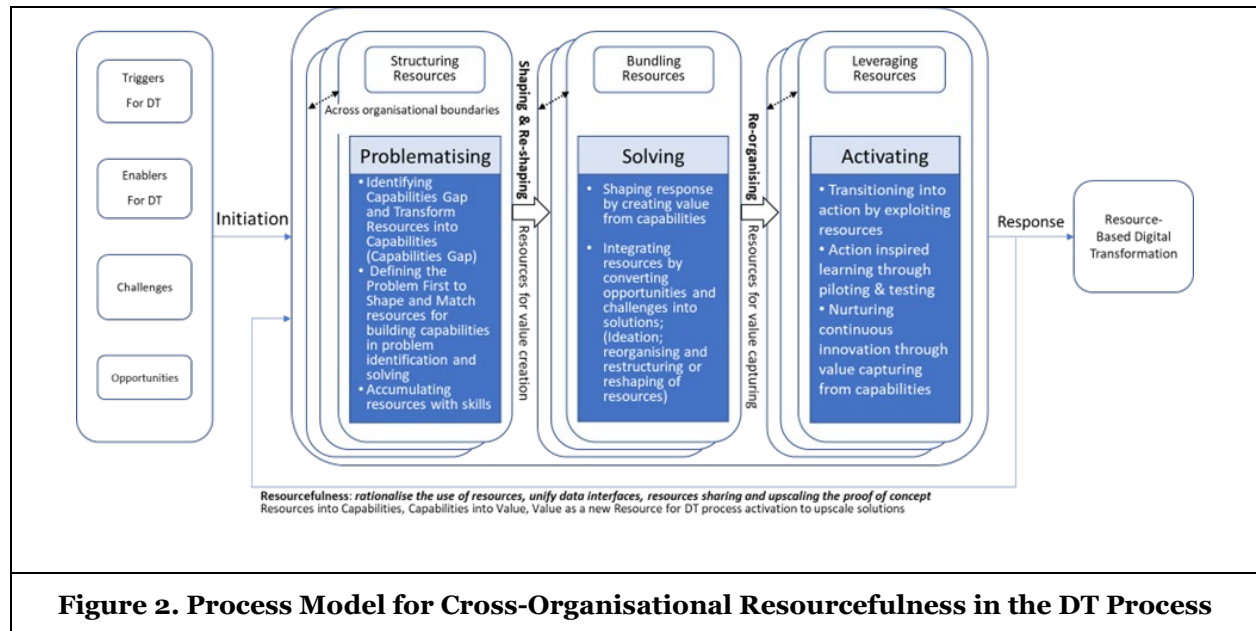
Resource shaping and reshaping involves transforming existing resources into new forms with improved or new capabilities to create value. This can involve acquiring new resources, accumulating valuable existing resources or divesting from non-useful resources (Sirmon et al., 2007; Sirmon et al., 2011), all this based on the identified problem before launching into solution exploration. Shaping and reshaping the resources can take the form of creating new products or services, developing new business models, or the implementation of new processes or technologies. This can also involve the integration of resources across different functions, departments, or organisations to create new value propositions.

Resource reorganisation, on the other hand, involves changing the way resources are distributed or redistributed among the group based on resource capabilities to capture value. This involves the reconfiguration of existing resources by creation on new specialised teams or business unit and allowing secondment with short term resource borrowing needed to achieve specific objectives. The resource reorganisation is a way to bundle resources based on identified solutions and matching resources capabilities to solving the associated problems. At this stage stakeholders ensure that they have a stabilised resource stream with the capabilities to solve the problem. Stakeholders may look to expand existing capabilities by adding minor enrichment of skills or resource developments otherwise they may require exploring new emerging capabilities (Sirmon et al., 2011).

Both resource reshaping and reorganisation have a significant impact on value creation and value capturing from resources (Sirmon et al., 2007). By reshaping resources, organisations can create new value propositions, expand into new markets, and differentiate themselves from competitors by divesting underperforming assets (Vial, 2019). Resource reshaping can also help organisations optimise their

operations, reduce costs, improve efficiency and alter their identity towards how they are viewed by their customers (Tabrizi et al., 2019; Wessel et al., 2021). By reorganising resources, organisations can capture value by leveraging their existing strengths, acquiring new capabilities and transition into action.

Transitioning from problematising and ideation for solving the problems using resources is achieved by starting the experimentation through piloting and testing activities. This agile method of developing a solution leads to upscaling the solutions at the group and program level with a proof of concept that gather support from all stakeholders who start to see value in the solution. Once a proof-of-concept solution has been developed and tested, it is important to scale it up to a larger audience to achieve maximum impact. This leveraging of resources requires coordination and collaboration among various councils and stakeholders to ensure that the solution is implemented effectively and efficiently (Sirmon et al., 2007; Sirmon et al., 2011). The outcome of rationalising resources and unifying data interfaces materialises by upscaling the solution from a pilot and test phase to mainstream operations with larger scale operations and solution replication. This is achieved by crossing from identifying resources to creating capabilities from these resources and then converting these capabilities into business value.

In conclusion, resourcefulness is achieved at group level by rationalisation of resources through resources sharing and unifying of data interfaces leading to the upscaling the proof of concept. Resource reshaping and reorganisation are powerful tools for value creation and value capturing based on resource capabilities especially for a tactical response with resource constrained environment. By transforming existing resources into new forms of capabilities and then reorganising resources to capture value from capabilities, stakeholders influence the DT process managing and optimise their resources.

Theoretical contributions

DT phenomenon involves a complex process with impacts that go beyond the organisational boundaries of the firm (Wessel et al., 2021). The need for companies to adapt to changing circumstances has become critical in order to engage in sustainable business and remain competitive (Kraus et al., 2021; Vial, 2019). This case study sheds light on how the DT process is influenced through stakeholders' orchestration of resources using applied parameters for a tactical short-term response through collaborative engagement between multiple organisations. In doing so, this paper makes several contributions to the DT phenomenon and the Resource Orchestration Theory (ROT) and its application in practice.

First, the study contributes to expanding our knowledge of the DT phenomenon by highlighting the process of resource management depicted in the model presented in Figure 2 for a cross-organisational collaborative environment, where DT is essential to achieve short-term objectives serving as a proof of concept for larger scale deployment. The paper provides insights into the sequential aspects of the process and the impact that stakeholders' orchestration of resources has on the DT process (White, 2012).

Second, the paper highlights the parameters used for resource management in a cross-organisational collaborative environment where DT is used as a tactical response producing a resource-constrained environment. This is especially relevant where interactions go beyond organisational structural boundaries between digital resources and human resources, considering many aspects of resources management, including business agility that fits the response type and speed (Kozanoglu & Abedin, 2020; Menten et al., 2021).

Third, the paper also contributes to resource orchestration theory by expanding on the premises of the ROT into the stakeholders' space that complements the managers' role of orchestrating resources (Sirmon et al., 2007). Our findings expose the process's inner workings by sequentially applying resource problematising, resource solving, and resource activating. While the ROT offers a good theoretical lens to understand how resources are mobilized, coordinated, and leveraged to achieve strategic goals our study unveils the parameters used for conducting those steps by the stakeholders' groups leading to theorising the stakeholders influence on the DT process as an area that needed further empirical exploration (Currie et al., 2022). Fourth, the paper highlights the importance of resourcefulness as a key attribute of resource orchestration. Resourcefulness enables stakeholders from cross-organisational structures to rationalise resources and engage effectively and efficiently in transforming the short-term successes to become strategic goals. This is achieved through the upscaling of the solutions obtained from the DT a tactical response.

Practical contributions

The paper offers practical implications for organisations engaging in collaborative DT processes. First, it emphasises how stakeholders can work collectively through their constrained resource environment to achieve disparate outcomes specific to each organisation while using common platforms and objectives. Collaborative DT requires cross-functional and cross-organisational collaboration, and stakeholders collaborate effectively to achieve successful outcomes by becoming more structured in the way they define the problem, avail the solution and transition into action by activating their mutual and separate resources.

Second, the paper highlights how collaborating organisations can become more resourceful when moving from a DT tactical response to upscale at the program level. Resourcefulness is critical in managing resources effectively in DT, and it enables organisations to orchestrate resources more efficiently across the boundaries in an agile way during the DT process as it evolves from a tactical response to a strategic program-level response.

Our study highlights to practitioners the importance of resource management process and more specifically the concept of resourcefulness in DT as a tactical response. The model in Figure 2 provides a sequential process with practical implications for organisations engaging in collaborative DT process.

Finally, the study provides a foundation for future research on stakeholders' resource orchestration in DT and its impact on organisational performance under other conditions such as in a more competitive environment or other resource constrained settings. Ultimately, this research can help organisations achieve successful collective outcomes in DT from their collaboration and drive innovation in their respective industries.

Concluding remarks

This study is motivated by creating a deeper understanding of the DT process and how stakeholders, with their diversity, influence the resource management process which is valuable for both practitioners and academics (Baiyere et al., 2022). Since DT as tactical response is characterised as being a resource constrained environment and involves a diverse range of stakeholders, an analysis of a cross-organisational resource orchestration process within this context provides valuable insights into the DT phenomenon. The cross-organisational context is influenced by stakeholders' collaborative environment where DT is taking place. While many prior studies suggest that the DT process is not only influenced by technological advancements our study promotes how it is shaped by the stakeholders' orchestration of resources in a cross-functional and cross-organisational tactical setting with a dynamic process.

The main limitation of the case study lies in its contextuality and the challenge of making generalized abstractions, which can be mitigated by further research in different contexts. Our study is conducted within the Australian context and is bounded by the selected organisational practices under the conditions of their limited competition and collaborative agreement. This may provide a specific context towards how these organisations engage into collective resource orchestration activities. It would be interesting to examine other settings where organisation belong to different industries to examine cross-organisational and cross-industry resource orchestration.

References

Baert, C., Meuleman, M., Debruyne, M., & Wright, M. (2016). Portfolio entrepreneurship and resource orchestration. *Strategic Entrepreneurship Journal, 10*(4), 346-370.

Baiyere, A., Mosconi, E., Wessel, L., & Indulska, M. (2022). Information Systems Journal Call for Papers Special Issue: Frontiers in Digital Transformation Research Special Issue Editors. *Information Systems Journal, Special issue.*

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management, 17*(1), 99-120.

Barney, J. B., & Arikan, A. M. (2005). The resource-based view: origins and implications. *The Blackwell handbook of strategic management*, 123-182.

Baskerville, R. L., Myers, M. D., & Yoo, Y. (2020). Digital first: The ontological reversal and new challenges for IS research. *Mis Quarterly, 44(2), 509-523.*

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. v. (2013). Digital business strategy: toward a next generation of insights. *Mis Quarterly*, 471-482.

Carnes, C. M., Chirico, F., Hitt, M. A., Huh, D. W., & Pisano, V. (2017). Resource orchestration for innovation: Structuring and bundling resources in growth-and maturity-stage firms. *Long Range Planning, 50*(4), 472-486.

Carroll, N. (2020). Theorizing on the normalization of digital transformations. In Proceedings of the 28th European Conference on Information Systems (ECIS), An Online AIS Conference, June 15-17, 2020.

Chanias, S., Myers, M. D., & Hess, T. (2019). Digital transformation strategy making in pre-digital organizations: The case of a financial services provider. *The journal of strategic Information Systems, 28*(1), 17-33.

Cui, M., & Pan, S. L. (2015). Developing focal capabilities for e-commerce adoption: A resource orchestration perspective. *Inf. Manag., 52*, 200-209.

Currie, W. L., Hsu, C., Van Vliet, B., & Weerakkody, V. (2022). Digital Transformation as Geo-Political, Organizational and Technological Nexus. *Journal of Information Technology*.

Danneels, E. (2011). Trying to become a different type of company: Dynamic capability at Smith Corona. *Strategic management journal, 32*(1), 1-31.

Duschek, S. (2004). Inter-firm resources and sustained competitive advantage. *management revue*, 53-73.

Gimpel, H., Hosseini, S., Huber, R., Probst, L., & Röglinger, M. (2018). Structuring digital transformation: a framework of action fields and its application at ZEISS. *Journal Of Information Technology Theory AND Application*. https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1726&context=jitta

Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *Journal of Management Studies, 58*(5), 1159-1197.

Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D., & Winter, S. G. (2009). *Dynamic capabilities: Understanding strategic change in organizations*. John Wiley & Sons.

Hess, T., Benlian, A., Matt, C., & Wiesböck, F. (2016). How german media companies defined their digital transformation strategies. *MIS Quarterly Executive, 15*(2), 103-119.

Klein, H. K., & Myers, M. D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *Mis Quarterly*, 67-93.

Kozanoglu, D. C., & Abedin, B. (2020). Understanding the role of employees in digital transformation: conceptualization of digital literacy of employees as a multi-dimensional organizational affordance. *Journal of Enterprise Information Management*.

Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital Transformation: An Overview of the Current State of the Art of Research. *SAGE Open, 11*(3), 21582440211047576.

Lanza, A., Simone, G., & Bruno, R. (2016). Resource orchestration in the context of knowledge resources acquisition and divestment. The empirical evidence from the Italian "Serie A" football. *European Management Journal, 34*(2), 145-157.

Lee, C.-H., Wang, D., Desouza, K. C., & Evans, R. (2021). Digital transformation and the new normal in China: how can enterprises use digital technologies to respond to COVID-19? *Sustainability, 13*(18), 10195.

Lichtenstein, B. M. B., & Brush, C. G. (2001). How do "resource bundles" develop and change in new ventures? A dynamic model and longitudinal exploration. *Entrepreneurship Theory and Practice, 25*(3), 37-58.

Maroufkhani, P., Desouza, K. C., Perrons, R. K., & Iranmanesh, M. (2022). Digital transformation in the resource and energy sectors: A systematic review. *Resources Policy, 76*, 102622.

Melville, N., Kraemer, K., & Gurbaxani, V. (2004). Information technology and organizational performance: An integrative model of IT business value. *Mis Quarterly*, 283-322.

Menten, S., Smits, A., Kok, R. A., Lauche, K., & Van Gils, M. (2021). Change agents' crossing of organizational boundaries for digital transformation. Academy of Management Proceedings,

Myers, M. (1995). Dialectical hermeneutics: a theoretical framework for the implementation of information systems. *Information Systems Journal*. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2575.1995.tb00089.x

Pan, S. L., Cui, M., & Qian, J. (2020). Information resource orchestration during the COVID-19 pandemic: A study of community lockdowns in China. *International Journal of Information Management, 54*, 102143.

Pan, S. L., & Tan, B. (2011). Demystifying case research: A structured–pragmatic–situational (SPS) approach to conducting case studies. *Information and Organization, 21*(3), 161-176.

Pentland, B. T. (1999). Building process theory with narrative: From description to explanation. *Academy of management review, 24*(4), 711-724.

Prügl, R., & Spitzley, D. I. (2021). Responding to digital transformation by external corporate venturing: An enterprising family identity and communication patterns perspective. *Journal of Management Studies, 58*(1), 135-164.

Rowe, F. (2018). Being critical is good, but better with philosophy! From digital transformation and values to the future of IS research. *European Journal of Information Systems, 27*(3), 380-393.

Salmela, H., Baiyere, A., Tapanainen, T., & Galliers, R. D. (2022). Digital Agility: Conceptualizing Agility for the Digital Era. *Journal of the Association for Information Systems, 23*(5), 1080-1101.

Sebastian, I. M., Ross, J. W., Beath, C., Mocker, M., Moloney, K. G., & Fonstad, N. O. (2020). How big old companies navigate digital transformation. In *Strategic Information Management* (pp. 133-150). Routledge.

Seo, D. (2017). Digital business convergence and emerging contested fields: A conceptual framework. *Journal of the Association for Information Systems, 18*(10), 3.

Sirmon, D. G., Hitt, M. A., & Ireland, R. D. (2007). Managing firm resources in dynamic environments to create value: Looking inside the black box. *Academy of management review, 32*(1), 273-292.

Sirmon, D. G., Hitt, M. A., Ireland, R. D., & Gilbert, B. A. (2011). Resource orchestration to create competitive advantage: Breadth, depth, and life cycle effects. *Journal of management, 37*(5), 1390-1412.

Strauss, A., & Corbin, J. (1994). Grounded theory methodology. *Handbook of qualitative research, 17*, 273-285.

Strauss, A. L. (1990). Basics of qualitative research : grounded theory procedures and techniques. Newbury Park, Calif. : Sage Publications.

Symeonidou, N., & Nicolaou, N. (2018). Resource orchestration in start-ups: Synchronizing human capital investment, leveraging strategy, and founder start-up experience. *Strategic Entrepreneurship Journal, 12*(2), 194-218.

Tabrizi, B., Lam, E., Girard, K., & Irvin, V. (2019). Digital transformation is not about technology. *Harvard Business Review, 13*(March), 1-6.

Tan, F. T., Ondrus, J., Tan, B., & Oh, J. (2020). Digital transformation of business ecosystems: Evidence from the Korean pop industry. *Information Systems Journal, 30*(5), 866-898.

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The journal of strategic Information Systems, 28*(2), 118-144.

Walsham, G. (1995). Interpretive case studies in IS research: nature and method. *European Journal of Information Systems, 4*(2), 74-81.

Walsham, G. (2006). Doing interpretive research. *European Journal of Information Systems, 15*(3), 320-330.

Wernerfelt, B. (1995). The resource-based view of the firm: Ten years after. *Strategic management journal, 16*(3), 171-174.

Wessel, L., Baiyere, A., Ologeanu-Taddei, R., Cha, J., & Blegind-Jensen, T. (2021). Unpacking the difference between digital transformation and IT-enabled organizational transformation. *Journal of the Association for Information Systems, 22*(1), 102-129.

Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading digital: Turning technology into business transformation*. Harvard Business Press.

White, M. (2012). Digital workplaces: Vision and reality. *Business information review, 29*(4), 205-214.

Yin, R. K. (2011). Applications of case study research. sage.

Yoo, Y. (2010). Computing in everyday life: A call for research on experiential computing. *Mis Quarterly*. https://www.jstor.org/stable/20721425

Zhang, D., Pan, S. L., Yu, J., & Liu, W. (2019). Orchestrating big data analytics capability for sustainability: A study of air pollution management in China. *Information & Management*, 103231.

Zhang, D., Pee, L. G., Pan, S. L., & Cui, L. (2022). Big data analytics, resource orchestration, and digital sustainability: A case study of smart city development. *Government Information Quarterly, 39*(1), 101626.