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Managing Asymmetries for Data Mobilization under Digital Transformation

Nikolai Kazantsev [1], Dimitrios Batolas [2] and Leroy White [3]
[1]Institute for Manufacturing, University of Cambridge, Clare Hall College, Herschel Road, Cambridge CB3 9AL,
[2]University of Exeter Business School, DIGIT Lab, Tintagel House, 92 Albert Embankment, London, SE1 7TY, UK, and
[3]University of Exeter Business School, Streatham Court, University of Exeter, Rennes Drive, Exeter, EX4 4PU, UK
Corresponding author email: L.White2@exeter.ac.uk

Resource mobilization is a significant challenge for firms seeking survival and competitive advantage, especially in the context of digital transformation. Data has emerged as a vital resource, but its intangible nature adds complexity to the interactions between resource holders and seekers. This paper aims to address the gaps in understanding data resource mobilization by integrating perspectives on information, dependence, and orientation asymmetry using a social exchange perspective. The study focuses on the regulated animal healthcare industry, where a large established organization acts as the resource holder, universities act as intermediaries, and startups act as resource seekers. Through three years of data collection, the study finds that the context is rich in all three types of asymmetries and characterized by high uncertainty surrounding data as a resource. Actors engage in direct social exchanges to address information asymmetries and in generalized exchanges through intermediaries to deal with dependence and orientation asymmetries. The study contributes to theory by providing insights into the complex dynamics of resource mobilization in the context of digital transformation and proposes practical implications for managing multiple asymmetries and mobilizing data effectively for firm performance in regulated environments.

Introduction

Many firms engage in entrepreneurial behaviour as they identify and pursue opportunities (Shane, 2003), including introducing new products, services, materials or methods that hold potential for value for them (Shane and Venkataraman, 2000). To tap into these opportunities, firms rely on their environment to access various resources, including financial, human and social capital (Pfeffer and Salancik, 1978). Resources are all the tangible and intangible assets a firm can control or acquire to exploit an opportunity and thus can include, for example, access to expertise (Clough *et al.*, 2019). The dynamic interaction between opportunities and resources is at the core of scholarship on resource mobilization (Vanacker *et al.*, 2020). The mobilization of resources involves resource seekers searching for, accessing, and transferring key resources (Clough *et al.*, 2019) by identifying resource locations (Grossman, Yli-Renko and Janakiraman, 2012), broadening networks (Vissa, 2012), and signalling venture quality (Vanacker *et al.*, 2020).

To date, research on resource mobilization primarily concerns understanding how resource seekers, such as new ventures or startups (Shane and Stuart, 2002) operating in dynamic and uncertain environments (Ozcan and Eisenhardt, 2009), mobilize the financial resources they need from resource holders (Vanacker *et al.*, 2020). By comparison, there has been relatively little attention paid to the alternative resources mobilized by resource seekers, which may require different methods and relationships between seekers and holders (Clough *et al.*, 2019).

Particularly noteworthy is the challenge of mobilizing data as a resource as firms undergo digital transformation (Nambisan, Wright and Feldman, 2019). Digital transformation is essentially a form of organizational change, an organizational phenomenon (Van de Ven and Poole, 1995), but intimately linked to the widespread adoption and influence of digital technologies (Hanelt *et al.*, 2021) and the proliferation of 'big' data. Studies address whether the focal firm should emulate the digital transformational strategies of tech giants such as Google and Amazon by 'changing

everything' or explore alternative approaches to leverage existing resources and strategic positions (Furr, Ozcan and Eisenhardt, 2022). Thus, some studies highlight that digital transformation is crucial for mobilizing resources through activities such as attracting human resources with novel skillsets and fostering digital mindsets (Hanelt *et al.*, 2021).

Here, contemporary organizations increasingly recognize data as a strategic resource (The Economist, 2017). Accordingly, digital transformation is reflecting the shift in the sources of competitive advantage 'from exclusivity in technology to exclusivity in data' (Hartmann and Henkel, 2020, p. 359). While acknowledged as comparable to other resources controlled by firms, data poses challenges regarding the determination of its specific value, especially considering its intangibility compared with financial or human resources (Barney, 1991; Brennen and Kreiss, 2016; Ray, Monon and Mookerjee, 2020). Despite being viewed as a strategic resource, barriers such as competitive concerns and regulatory constraints often hinder data mobilization, highlighting the need for more research to clarify its potential and overcome existing uncertainties (Hartman and Hinkel, 2020).

Specifically, digital transformation means that firms attempt to create value from data through platforms by connecting multiple resource holders and seekers (Ceccagnoli *et al.*, 2012). Platforming success depends on attracting more users and high-value transactions, as platforms intermediate firm activities through a 'network effect', where the value increases with more participants (Gawer, 2014; Zhu and Furr, 2016). Thus, digital transformation enables firms to organize data generated from digital technologies, transforming data from an opportunity to a resource via a platform that mobilizes firms and other resources (Brennen and Kreiss, 2016). This is different from traditional resource mobilization concerns, in which ventures primarily seek financial resources from holders looking for positive returns. Thus, scholars are beginning to note that the extensive drive towards platforms and the proliferation of data render holder and seeker relationships more complex, presenting a challenge and an opportunity for understanding resource mobilization. Therefore, our research question is: *How do the interactions with resource mobilization players unfold to mobilize data from an opportunity to a resource, thereby mobilizing other resources in the context of digital transformation?*

While prior research has advanced our understanding of resource mobilization in the digital era, for instance in relation to crowdfunding (e.g. Cumming, Johan and Zhang, 2019), questions arise regarding the adequacy of the conventional theoretical assumptions in addressing resource mobilization in the context of digital transformation. Here, the majority of empirical studies use quantitative data examining the effects of attributes on mobilizing financial capital (Vanacker *et al.*, 2020), thereby hindering the ability to examine the interactions between seekers and holders (Murray, Kotha and Fisher, 2020). To address this limitation and our research question, we use an inductive theory-building approach to empirically examine resource mobilization (Eisenhardt and Graebner, 2007) in an animal research network orchestrated by AnimalCo—a leading animal health company renowned for innovations in animal welfare. Our approach helped us to comprehend actors' interactions in the broad digital transformation ecosystem and their impact on various forms of mobilization (Hanelt *et al.*, 2021). Our analysis and findings resulted in an understanding of data mobilization. We identified three distinct approaches, tailored to the divergent goals of stakeholders, that enabled data mobilization in the development of a platform. Our findings have implications for the literature on resource mobilization and digital transformation.

Theoretical background

Traditional resource mobilization literature

Research on resource mobilization has predominantly concentrated on the initial phases of the process, emphasizing the actions required by early-stage resource seekers to secure vital resources, particularly financial, human and social capital. As they need resources, these seekers are portrayed as orchestrators of resource mobilization, navigating the complexities of resource identification, access and transfer (Clough *et al.*, 2019). Information about their capabilities and intentions is initially limited among potential resource holders. Therefore, studies tend to focus on the alleviation of information asymmetry between resource seekers and holders (Akerlof, 1970) in order for financial resources to be mobilized and on how seekers signal their attributes and qualities to resource holders (Moss, Neubaum and Meyskens, 2015; Shane and Cable, 2002; Vanacker *et al.*, 2020). Here, scholars show that early-stage seekers strategically employ a variety of signalling mechanisms, such as showcasing expertise, previous successes or partnerships (Hallen and Eisenhardt, 2012). These signals are given to reduce uncertainty and increase the likelihood of attracting attention from resource holders (Vanacker *et al.*, 2020). Given the liability of newness, early-stage seekers may rely on alliances provided by third parties (Bafera and Kleinert, 2023), such as universities (Colombo, 2021). Expanding on this point, research indicates that those holding resources often ignore the quality signals of seekers unless they are accompanied by reputable third-party affiliations (Plummer, Allison and Connelly, 2016). Indeed, the literature shows that third-party entities, such as universities, play a crucial role in resource mobilization,

highlighting their efforts in forming partnerships to secure financial resources and in utilizing their intellectual capital to advance research and innovation (Bonando *et al.*, 2011; Colombo, Meoli and Vismara, 2019). Trust in reputable and prominent universities enhances the legitimacy of resource mobilization, as shown by prior literature referencing connections to quality-signalling organizations (Baum and Oliver, 1992; Podolny, 2001).

However, there are some notable limitations in extant studies. First, signalling theory tends to prioritize the specific dyadic direction as the seeker-to-holder relationship (Clough *et al.*, 2019), often overlooking the wider relational dynamics and social interactions that may shape resource mobilization (e.g. Shane and Cable, 2002). Some studies, however, delve into the initial signalling process of resource holders (Murray, Kotha and Fisher, 2020). For example, resource holders may signal the quality of their resource by advertising, offering warranty, or using cues such as brand name or price (Kirmani and Rao, 2000). They may also signal resource scarcity through strategic connections, regular meetings, and planned interactions during key events (Hallen and Eisenhardt, 2012). Research, here, indicates that these efforts may be vital for seekers aiming to forge connections with holders with uncertain and intangible resources (Vissa, 2011). However, further investigations into holders-seekers interactions are rare.

Despite this limitation, signalling theory remains pivotal, although it assumes an equal power distribution between seekers and holders, overlooking power imbalances that exist in many mobilization contexts (Harland, 1996; Katila *et al.*, 2022; Pfeffer and Salancik, 1978). Research suggests that resource holders hold power in this relationship (Emerson, 1962), whereas resource seekers are often far more dependent on resource holders, directly linking power and resource mobilization. For instance, in the biotechnology industry, collaboration between universities and established drug firms (Pisano, 2006) emphasizes power imbalances that can lead to situations in which promised resources are not delivered, causing mistrust and complicating alliance-building (Katila *et al.*, 2022). Resource dependency theory addresses power imbalances but may oversimplify resource mobilization by emphasizing the holder's power and control, potentially overshadowing the seeker's agency and strategic actions (Villanueva, Van de Ven and Sapienza, 2012). Furthermore, the theory may not sufficiently account for contextual and institutional factors such as non-market-orientation (Clough *et al.*, 2019) and organizational change, yet it remains valuable for understanding resource mobilization dynamics (Villanueva, Van de Ven and Sapienza, 2012). Here, it is suggested that more research on resource mobilization should address different market orientations (Clough *et al.*, 2019) and in particular non-market third-party actors who place an emphasis on appropriate action rather than on self-interest (He *et al.*, 2021).

A further limitation is that the literature predominantly emphasizes acquiring financial resources, overlooking other resources that may demand more distinct mobilization strategies (Clough *et al.*, 2019), including legitimacy, narratives, and intellectual property (Delmar and Shane, 2004; Hsu and Ziedonis, 2013; Martens, Jennings and Jennings, 2007). For instance, seekers engage in processes to augment other resources, enhancing human capital through a founding team, early employees and informal advisors as well as securing financial capital via external investments (Aldrich and Kim, 2007; Vissa, 2012). There is also a growing consideration of other intangibles and uncertain resource types, such as public goods (Mittermaier, Shepherd and Patzelt, 2021), where these resources are challenging to amass and retain for future utilization (Farny *et al.*, 2019). However, how non-financial resources are mobilized remains an under-explored area (Clough *et al.*, 2019). This lack may be due to the popularity of quantitative data on mobilizing financial capital and the relatively easier access to it (Alrich and Kim, 2007).

Resource mobilization via platforms

The advent of resource mobilization via platforms, notably crowdfunding, introduces a contemporary dimension to the traditional literature. Crowdfunding has significantly changed the resource mobilization landscape by democratizing financing and innovation (Cumming, Johan and Zhang, 2019; Mollick and Robb, 2016), allowing non-traditional investors to finance and enabling early-stage seekers to secure financial resources (Murray, Kotha and Fisher, 2020). Crowdfunding via platforms departs from conventional methods of resource mobilization in several ways. First, it allows seekers to attract resources from a dispersed pool of holders in exchange for equity, interest, rewards or even no direct return (Belleflamme, Omrani and Peitz, 2015; Mollick, 2014). Second, crowdfunding-platform owners take an active role in preselecting new ventures. Here, the prior literature shows that crowd serves as a stamp of approval, as ventures funded through crowdfunding campaigns are more likely to attract follow-up investments (Roma, Vasi and Kolympiris, 2021). These platforms have the resources to access more information by following a thorough, multistep due diligence process on behalf of the potential investors before the campaign (Löher, 2016), making the pre-campaign phase a critical step for success (Kleinert *et al.*, 2021). Thus, it is argued that the due diligence conducted by crowdfunding-platform owners can mitigate the information asymmetries between the holders and seekers (Löher, 2016; Vismara, 2018), with larger platforms more likely to conduct due diligence of

seekers (Cumming, Johan and Zhang, 2019). Third, with only a fraction of early-stage seekers being accepted by crowdfunding platforms among the total applications (Kleinert *et al.*, 2021), emphasis is placed on employing various signals that seekers can use to counteract the impacts of information asymmetry (Vismara, 2018). Research indicates that utilizing platforms enable seekers with no financial track record to access funding from potential investors globally (Ahlers *et al.*, 2015). The difference is that while the quality signals from seekers might be the same for both resource holders and crowdfunding platform owners, the latter may evaluate quality signals differently (Kleinert *et al.*, 2021). Fourth, investigations into resource mobilization via platforms for other non-financial resources (Ray, Menon and Mookerjee, 2020) are limited, although some studies show that platforms such as MTurk or Upwork mediate the mobilization of non-financial resources such as skills, matching workers and employers (Chandna, 2022).

Finally, while recent studies have provided insights into the dynamics of resource mobilization through crowdfunding platforms, limited studies address resource mobilization through other types of platforms. There remains a gap in addressing the strategies and processes available to all firms to mobilize resources on other types of platforms. Our goal, in particular, is to explore multi-sided platforms that enable digital transformation and entrepreneurship by facilitating interactions among diverse user groups (Nambisan, Wright and Feldman, 2019; Parker, Van Alstyne and Jiang, 2017). In particular, we aim to explore how all stakeholders have agency to impact resource mobilization, specifically their ability to mobilize data and subsequently other resources via platforms.

Method and analysis

Given the limited theory on resource holders' and seekers' processes to mobilize non-financial resources via platforming in the context of digital transformation, we used inductive theory building within a single case study (Eisenhardt, 1989) to address our research question. For the case study, we focused on the animal healthcare industry and specifically on AnimalCo as a particularly suitable setting for investigating data as a resource, owing to its unique contextual characteristics. First, in the UK's £7.8 billion animal healthcare industry, the generation and availability of data offer many opportunities for data-driven innovation (Global Animal Health Market, 2022). However, this data is often left underexploited by companies in the industry (Chui, Manyika and van Kuiken, 2014). Second, AnimalCo is an established firm concerned about potential industry disruption, embarking on a digital transformation journey to leverage its current resources and strategic position (Furr, Ozcan and Eisenhardt, 2022). As such, it considered building a world-first open platform to support the data ecosystem in the animal health industry, enrolling universities as a third-party partner. The idea of the platform was to facilitate the interaction of a wide range of firms, and particularly to enable many seeker firms to find and exploit data as an opportunity from resource holders. Because resource commitments between the holders and resource seekers are yet to be ascertained, their digital transformation strategy is highly uncertain. Thus, the case is optimal for providing an opportunity to understand how actors mobilize data from an opportunity to a resource and create value under the conditions of digital transformation (Table 1).

Data sources

Much academic work on inductive theory building allows exploration through rich qualitative data collection (Eisenhardt, 1989) from several sources. This study used primary and secondary qualitative data comprising 157 quotations from project materials, industrial reports and web pages. Additionally, one of the authors, an embedded researcher at AnimalCo, observed more than 200 hours of meetings, which were recorded in field journals. This researcher became deeply immersed in the resource mobilization phenomenon by personally contributing to some of the activities, watching processes unfold over time, and bringing the relevant literature to bear on the study (Eisenhardt and Graebner, 2007).

Our primary qualitative data was collected through in-depth interviews between May and July 2021. We sampled multiple professionals working in animal healthcare and data science within the setting. A total of 25 interviews, targeting the most experienced stakeholders (Table 2), were conducted in the setting, and covered various facets of resource mobilization. These stakeholders were the most informative and appropriate sources of information for our study because of their deep understanding of actions taken for data mobilization, as they understood how companies leverage data for innovation and how to gain a first insight into the value of animal health data. By using open-ended questions, ensuring anonymity and employing triangulation with the secondary qualitative data, we gained a comprehensive understanding of processes for data mobilization. All interviews were audio-recorded and transcribed. Our approach with diverse data sources and strategic interviews provided convergence information and effectively minimized informant bias (Brown and Eisenhardt, 1997). In summary, by leveraging many data sources, the team could piece together a thorough chronicle of the endeavours undertaken by actors in our setting (Eisenhardt and Graebner, 2007).

Table 1. Case description

Case	Problem	Data mobilization solution	Data utilization	Benefits
AnimalCo - IoT-enabled Dog Collar	Canine pruritus affecting dogs, subjective visual scoring and delayed treatment.	Developed an IoT-enabled dog collar to collect real-time behavioural data for early detection of pruritus.	Benchmarking, personalized care, deep learning models, data sharing, pet state control programs.	Early detection, reduced treatment costs, improved treatments, insights into regional disease prevalence.
Veterinary of the Future – Clinical Records	Limited access to clinical patient records for 1 million dogs in the UK.	Proposes leveraging proprietary clinical patient records for large animal clinics, insurance and small veterinarians.	Benchmarks, targeted insurance pricing, increased data value for small veterinarians.	Enhanced communication, improved insights, ease of access for vets, owners and insurers.
AnimalCo Data in Small Animal Practice	Limited time for vets to analyse data, hindering preventive care.	Utilizes an app to track dog wellness, disease progression and monitor healthy pets.	Improved tracking, early disease prediction, actionable insights.	Enhanced veterinary care, improved pet health tracking and early disease prediction.
FishCo – Data-driven Analytics for Salmon	High losses in organic salmon farming due to unpredictable fish diseases.	Proposes pooling private farm data with publicly accessible data for predictive analytics.	Collaborative analytics, subscription-based or recovery percentage-based revenue model.	Automatic identification of outbreaks, wider sustainability benefits, potential revenue generation.
Mosquito Net – Creating Value for Data	Lack of motivation to share data openly, potential undervaluation of data.	Proposes creating a market for data to assign value, assessing if people are willing to pay for it.	Recognizing value through market creation.	Encouraging data sharing, assigning value to data and fostering better practices.

Analytic approach

After collating documentary evidence, assembling observations and conducting interviews, we built a database using NVIVO 14 to analyse our data systematically. We assessed the data through the lens of our research question (e.g. Graebner, 2009). We followed an iterative process by immersion in the data, reading and re-reading the field notes, documents and interviews, and engaging in discussions between the authors, paying attention to emerging concepts and, in particular, to the actors' activities about sources of data (e.g. sensor data) and control over those data. Doing so meant identifying relationships, patterns and themes and ensuring that these mapped to our resource mobilization phenomenon of interest. Consistent with the principles of inductive reasoning, our theoretical analysis of resource mobilization and the interactions with the actors evolved alongside our empirical analysis. We sought to develop a broad conceptual framework, following a sequence of steps to reveal how the actors could mobilize data and other resources under the conditions of digital transformation.

First, we focused on the relationships, patterns and themes addressed in the existing literature on the process of mobilizing resources (Clough *et al.*, 2019; Vanacker *et al.*, 2020). Consistent with the resource mobilization literature, we observed that the firms in our study referred to the identification of resource-holding locations as searching, emphasizing securing access as ensuring data-sharing agreements with holders and the transfer and deployment of resources through instituting governance mechanisms (Clough *et al.*, 2019). The difference between our setting and the literature is that seeker firms rely heavily on data from various holders that may not be directly accessible to attract further resources such as research funding, whereas holder firms need more convincing to release their data. Thus, our context provided us with a new orientation for resource mobilization. For example, the increasing need for seeker firms to signal their quality became obvious through statements such as, '[we] put together pieces of data telling a story …"something is wrong with the pet"'. Thus, they use narratives and storytelling to persuade resource holders to commit resources (Garud *et al.*, 2022). As another example shows, whereas extant studies have assumed that only holders have agency in mobilization studies (Vissa, 2012), we found in our study that other players were concerned with locating and incentivizing holders to share their data, as demonstrated in the statement, 'the root of all barriers resides in the fact that the owners of data of interest are numerous, both internal and external to [AnimalCo], with no obvious incentive and benefit to share their data', showing seeker agency in reaching out to the holders

Table 2. List of respondents

IP	Company	Interviewee position	Role regarding resources	Experience, years
IP1	Large pet-care company	Director of digital health innovation	Seeker	30+
IP2	Medium-sized software development company	Innovation and business development director	Intermediary	30+
IP3	UK-based university	University senior relationship manager	Intermediary	15+
IP4	Global animal health company	Strategy lead in companion animal health	Holder	15+
IP5	Global animal health company	Head of digital, data and analytics	Holder	15 +
IP6	Data-driven start-up	Tech entrepreneur	Seeker	15+
IP7	Global animal health company	Director strategic development	Holder	15+
IP8	Smaller-size strategic consulting firm	Managing partner in outcomes research	Holder	20+
IP9	UK-based data innovation unit	Data scientist	Intermediary	15+
IP10	Global animal health company	Partner in outcomes research	Holder	15+
IP11	UK-based data innovation unit	Data scientist/ App developer	Intermediary	10+
IP12	UK-based data innovation unit	Strategy lead	Seeker	15+
IP13	Global animal health company	Business transformation partner	Holder	20+
IP14	Global animal health company	Director of outcomes research	Holder	30+
IP15	Global animal health company	Global medical director in livestock diagnostics	Holder	15+
IP16	UK-based university	Research assistant in data-driven virology	Intermediary	3+
IP17	Global animal health company	Director of business operations and strategy	Holder	20+
IP18	UK-based data innovation unit	Expert in tropical animal health and data-driven innovation	Intermediary	15+
IP19	UK-based university	Associate dean of research and innovation	Intermediary	20+
IP20	Global animal health company	Pig and poultry business unit director	Holder	15+
IP21	Global animal health company	Companion animal veterinary lead	Holder	20+
IP22	Smaller-size strategic consulting firm	Consultant in data outcomes research	Holder	15+
IP23	Smaller-size strategic consulting firm	Managing partner in data outcomes research	Holder	20+
IP24	Global animal health company	Senior director of a large animal health company	Holder	20+
IP25	Global animal health company	Customer relations director of a large animal health company	Holder	15+

(Clough *et al.*, 2019). Overall, our initial analysis showed how the perspectives on data shaped the considerations for data mobilization in the ecosystem. Through open coding, we identified these distinct and recurring topics as first-order codes (Corbin and Strauss, 1990). The team discussed the codes and resolved any discrepancies in order to reconcile the topics with the coding (see Figure 1).

Next, we used thematic analysis (Gioia, Corley and Hamilton, 2013), a method that allows researchers to consider pre-defined initial ideas by engaging with the data inductively. The analysis provided an intermediary step between our coding and more abstract conceptualizations. Identifying mechanisms adopted for this step involved comparing and contrasting the similarities and differences in the actions and interactions of stakeholders throughout various stages of resource mobilization, which formed the basis for our second-order themes (see Figure 1). For example, with uncertainty around the provenance of the data held by holders, we recognized attempts at due diligence of data holders as well as signalling as mechanisms to increase knowledge about the quality of the data for seeker firms, as shown by the statement, 'the quality of the shared data needs to be assessed before we can engage in any data-sharing practices'. Similarly, for university partners, to signal their quality they adopted a number of mechanisms such as matchmaking to aid the mobilization process as shown by 'matchmaking is attracting the right people to turn data into insights'. As a final step, we further reviewed and interpreted the statements and categorized the second-order themes into aggregate dimensions of

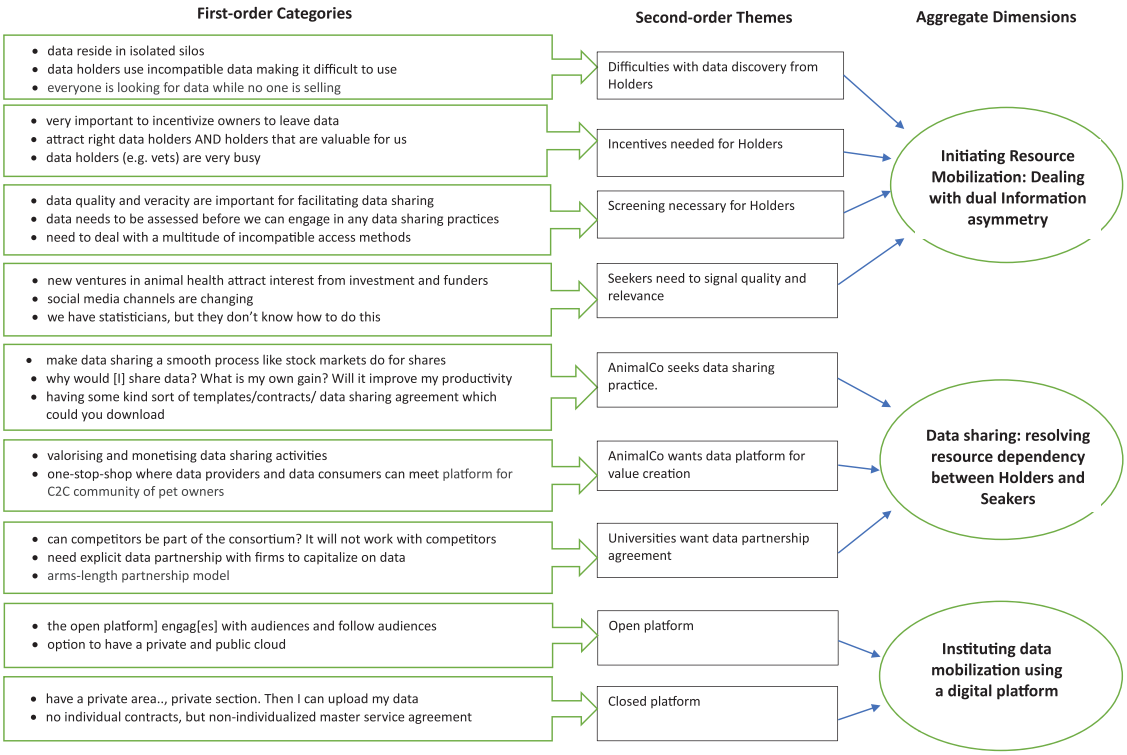

Figure 1. Data coding categories [Colour figure can be viewed at wileyonlinelibrary.com]

enabling data mobilization (Figure 1). Through this process, we identified three distinct dimensions that influenced data mobilization at different stages of actors' resource mobilization attempts.

Our analysis revealed that different actors used different approaches to address data searches in order to mitigate uncertainty and identify controlling resource holders' locations. Identified as data discovery, actors employed more targeted strategies beyond mere signalling, recognizing the need to incentivize resource holders to make their data available. AnimalCo sought to integrate resource holders into its operations through promoting screening to ensure the provenance and quality of the data. We noted this dimension as *initiating resource mobilization*.

The reluctance to share sensitive information creates barriers to collaboration and data sharing. To overcome this, AnimalCo considered a data platform allowing a wide range of data to be securely connected, valorized, shared and exploited. Their intention was to adopt a platform to make data sharing a smooth process, as stock markets do for shares. The distinct issue of trust appeared to be crucial in overcoming the challenge of data sharing, particularly regarding AnimalCo, a key player in the industry. Establishing transparent and secure data-sharing practices is vital for building trust among resource holders and seekers. We coded this dimension as *enabling data sharing*.

Lastly, regarding resource transfer, governance mechanisms, power and trust are crucial in data mobilization. Here, the findings highlighted that the variation of choice of governance mechanisms differed among firms: some opted for formal arrangements based on contracts and subscriptions, while others sought to choose to engage resource seekers in informal governance arrangements built on trust. As a result, greater attention was paid to organizing and institution-building at this stage. Some players preferred open systems with diverse resource holders, ensuring continued resource access. Others emphasized closed systems, building strong relationships with a select few resource holders aligned with their specific integration needs and supporting AnimalCo's mission. We coded this dimension as *instituting data mobilization*.

Figure 1 below provides a comprehensive overview of our data framework. We use this as a basis for our analysis to theorize how firms mobilize resources when establishing data platforms that enable resource mobilization and data sharing. By expanding on our analyses, we constructed a theoretical framework elucidating the activities employed by the actors in mobilizing data through data platforms, consolidating emergent insights into a data mobilization framework.

We employed two strategies to prevent retrofitting the data to fit our theorizing (Wodak and Busch, 2004). First, we considered multiple theoretical explanations

throughout the research process, eliminating alternatives to align the findings with the clearest interpretation based on resource mobilization concepts (Dubois and Gadde, 2002). Second, we implemented triangulation between different data types, ensuring theoretical saturation (Bryman, 2008) and inter-coder consistency (O'Connor and Joffe, 2020). Through documented peer review and discussions, we addressed observer bias (Eisenhardt and Graebner, 2007), achieving external validity by reviewing the academic literature on resource mobilization. Any discrepancies were resolved through peer review and discussion (Kassarjian, 1977).

Findings

Initiating resource mobilization

The data indicated that embarking on a digital transformation journey in the animal health industry presented a significant resource mobilization opportunity for AnimalCo. An internal report stated:

> The way forward for [AnimalCo] is … to ensure access to knowledge hidden in diverse collections of data in the animal health value chain. This will provide the 'fuel' … major returns in terms of growth and competitiveness. [Data Innovation Hub].

However, AnimalCo encountered challenges in leveraging data. These challenges featured widely in the findings and were referred to as concerns for 'data discovery'. For instance, seekers, including data scientists at university research institutes, express interest but struggle to find reliable data sources. Other respondents note substantial disconnected data in animal healthcare stored in isolated, unrefined silos [IP15]. Thus, the interviews revealed that seekers faced challenges initiating resource mobilization and communicating their interests directly with holders. Here, the findings confirmed that information asymmetry from a seeker's perspective was evident and that seekers needed mechanisms to signal their '*confidence, credibility and reliability*' [IP1] in understanding the value possibilities of the data.

AnimalCo also recognized the need for data discovery as dealing with information asymmetry generated by the invisibility of data between holders and seekers. One respondent clarified:

> Data providers [resource holders] have access to detailed … information …, while [resource seekers] may only have limited knowledge about the sources and reliability of the data they acquire. [IP1]

The primary challenge identified is a lack of awareness regarding the specific locations where the desired data is stored. The findings highlighted that transparency, visibility and equal access to data resources were challenges for identifying suitable data holders, as were the uncertainty and complexity of the data. Here is how a respondent from AnimalCo illustrated the challenge:

> The problem is, there's no single, common way to access all this data. This makes sharing difficult because you'd have to deal with many different methods, models, and formats to use the data in software solutions [IP1]

As such, AnimalCo decided to explore different mechanisms to initiate data discovery. First, the findings highlighted the need for AnimalCo to incentivize resource holders to reveal their interests and share their data. This was due to the reluctance of the data resource holders '*with no obvious incentive[,] to share their data*'. As a data resource holder respondent summarized:

> Why would I share data? What is my own gain? Will it improve my productivity? [IP18]

However, the respondents emphasized the difficulty in determining suitable incentives. As one respondent noted:

> Incentive depends on the strategy. What do we give to the individual for data? …, what can we offer differently? [IP13]

Second, to enable data discovery, AnimalCo explored a process in which holders' data could be categorized as 'core' or 'non-core', with a distinct integration process required for each type. It was stated that key considerations for determining a dataset's 'core' status included the quality and significance of content, the potential audience for the data, and the existence of any usage restrictions. Therefore, this process implied that it was imperative to apply additional rigour to appraise the data before integrating and making it accessible. It was also stated that data with restrictions is unlikely to be considered core. Thus, AnimalCo considered initiating a process of screening data holders, which can be interpreted as a process of due diligence.

The accounts suggest that the environment for initiating resource mobilization through data discovery highlighted dual-sided information asymmetries affecting AnimalCo's orchestration efforts. Therefore, it was identified that to initiate resource mobilization, and to enable data discovery, the actors had to address the dual-sided information asymmetry between seekers and holders. Thus, seeker signalling and screening holders became crucial for initiating the mobilization of data as a resource. Seekers wanted to employ several signalling strategies to convey their credibility and seriousness to the resource holders. A screening process can be interpreted as a process of due diligence, where holders play an active role as they are interested in the outcome. It was also understood that these processes could be crucial in locating resource holders and enabling seekers to discover details about resources and signal their

credentials, which ultimately needed a trusted third-party partner.

Here, the findings revealed that AnimalCo saw universities as a key third-party partner, not only for hosting data but also for playing a crucial role in facilitating the discovery of and access to relevant data sources. They saw universities as important to signal credibility: as one respondent put it, the '*USP [Unique selling point] of University – [is the] credibility for industrial partner… as data is hosted in University –'* [IP3]. But AnimalCo also recognized the multifunctional role that universities could play in enhancing screening, incentivizing, and ensuring credibility signalling from seekers. The university partners were also seen as pools of intellectual capacities in discovering and accessing relevant data that could be achieved through mechanisms such as *matchmaking* and *hackathons*.

Matchmaking was described as 'attracting the right people to turn data into insights… attracting many data sets does not do it'. Another respondent [IP14] noted that matchmaking could provide a 'quick provision of insights that can incentivize smaller companies lacking statistical expertise or analytical resources to seek out potential partners'. University respondents claimed that matchmaking not only builds confidence and credibility among stakeholders but also fosters collaboration. Hackathons were seen as an opportunity to create a 'data marketplace' for trading data between different subjects, predominantly as B2B transactions [IP5]. As such, the findings emphasized utilizing matchmaking and hackathons to highlight mutual gains and enhanced outcomes for all involved in resource mobilization. It was understood that the university partners play a crucial role in locating resource holders and enabling seekers to discover details about resources and signal their credentials, which ultimately needed a platform for creating a marketplace for data.

Enabling data sharing

The interviews revealed that AnimalCo's focus on accessing resources centred around building 'an ecosystem of data models, data sets, data sharing contracts, and specialized management services' [IP13]. AnimalCo recognized that they needed to develop a platform aiming to 'discover, collect, and correlate data from various sources within the animal health industry'. The respondents understood that using the platform would underscore the challenges associated with balancing the need for data sharing with safeguarding sensitive information in the complex landscape of the animal health industry. This was considered crucial to addressing data providence and sharing challenges. The findings also affirmed AnimalCo's belief that accessing one resource would lead to accessing others, as exemplified by the following statement:

> emphasizing opportunities for data reuse and the development of data products or services to attract financial resources and partnerships. [IP17]

To achieve this, AnimalCo collaborated with their university partners to develop and refine an early platform prototype, leveraging expertise to maximize the value and effectiveness of data platform ecosystems. This position is supported by the finding that, for instance,

> [universities] were [invested in] by AnimalCo 6 years ago to create an ecosystem where we connect different internal tools and external tools. [IP13]

However, the interviews revealed concerns about data sharing via the data platform, particularly regarding privacy, security, identifiable data, and data ownership. In particular, the data holders felt entirely visible and vulnerable to seekers, while seekers remained obscure to holders hiding behind their data capabilities, highlighting a power imbalance. The analysis of the interviews also showed that this imbalance created a sense of mistrust for the resource holders, with one stating that there is a 'problem of inequality…: those who contribute data are not those who get value' [IP5] . At the same time, the limited alternatives for seekers to obtain necessary data grant greater bargaining power to the resource holders. This dependence, it was claimed, would impede data mobilization, as seekers relying heavily on holders may face delays in data availability. This dependence reduces seekers' power for data access, giving the dominant power to holders, particularly those with more attractive data.

Thus, addressing these imbalances for data sharing was important to the stakeholders for mobilization, as illustrated below:

> you are the partners … my outcomes are your outcomes … we are sharing the goals, the benefits … people want to have something in return … in this case it is shared [data]. [IP16]

The stakeholders sought to establish clear guidelines and agreements to address the power imbalances, as exemplified by the following:

> having some sort of templates/contracts/ data sharing agreement which you could download … is needed … making sure that everyone involved should be aware of the challenges. [IP19]

Thus, establishing data-sharing practices and protocol became a key concern in alleviating power imbalances.

Institutionalizing data mobilization

The findings show that to enable data sharing further, the stakeholders attempted to establish forms of governance for data as a resource, including allocating

rights to the resource and distributing created value. The findings highlighted that clear formal governance was necessary to overcome the power imbalance concerns. It was claimed that well-defined contracts would promote a more efficient and satisfactory data exchange between parties, in particular ensuring clarity and establishing expectations regarding the quality and quantity of the data to be shared. Thus, AnimalCo seized the need to regulate data with the resource holders. First, they worked on the governance framework with resource holders, which included data-sharing incentives, data privacy regulation, and the ability to share third-party information. The governance framework was expected to be accepted and followed by every actor:

> Data governance is also important … to be acquired by people. If data is coming from me and going to platform … and somebody else could access it, there has to be a set of rules, a set of governance points where the accessibility of data from the user/producer to use that data is protected enough and secure enough. [IP18]

But some of the respondents wanted some form of light governance. For instance, it was claimed that this would 'allow the creation, transformation, evolution, curation and exploitation of data sets, together with soft competencies around them' [IP13]; that is, governance and social interactions.

The findings showed that trust plays a vital role here. Many respondents raised this issue; for example:

> Trust is the big thing … people must be reassured that they are giving something precious to them… I am thinking in line of social media… trust is to be able to say… I will reveal everything to you. [IP18]

The interviews and documents showed that AnimalCo relied on creating a genuine and trusted environment for resource holders through universities as trusted partners. Here it was suggested that the university partners could further reduce power imbalances by supporting data sharing because of their non-market credentials, technical know-how and expertise, which were seen as invaluable for building trust. As a result of insights, with the universities involved in data curation and governance, data sharing could be seen as both authentic and desirable, whereby holders may reciprocate in kind by offering increased access to data in return.

However, this highlighted that there was another type of asymmetry in the interviews. For instance, it was claimed that universities are seen as trustworthy because their 'research purpose [in general] excludes commercialization', meaning that the outcomes of research activities can be reused for data curation [IP5], and the following commercialization. Ideally, the university, as a *trusted third party*, would take 'responsibility for data preparation, [where] profit is a driver, and [a] university is not good at this' [IP5]. This misalignment in objectives had several implications. For example, there was a concern that the resource-holders' orientation prioritizes privacy, security or proprietary concerns, while it was thought that the universities' orientation emphasizes openness, transparency or data exploration. The universities' concern for third-party sharing was highlighted, shown by the following quote:

> Making [anonymized] data available for research teams, third-party sharing must be allowed. [IP5]

In this context, we can infer some elements that relate to the non-market orientation of universiries towards the data sources. Consider the statement:

> It's not about money… I do not believe in selling data…. Its unspoken money: advantage, future of the business…. To prepare app which uses data …. Gives me a certain outcome….. [IP18]

The interviews showed that universities prioritized non-market logic when building the platform. In particular, one respondent claimed that the leading goal of such collaborations is public good, namely increasing animal well-being, supported by data, such as early disease diagnostics and treatment. However, a broader perspective cannot exclude pure market motivations. AnimalCo's strategy included marketing and investment capabilities, which may help to find venture capital for start-ups on the platform, thus indirectly accessing data resources and exploiting the outcomes. Therefore, AnimalCo intended to be the primary beneficiary of resource mobilization, as they will sell the data commercialization outcomes back to the resource holders (e.g. as subscriptions for new apps).

Regarding these different orientations, based on the interviews and documents, AnimalCo hoped that the activity of transferring resources would be via *an open platform approach*, including open data and open data sources, underscoring the value and potential benefits of open data. They suggest that making data openly accessible can lead to more data shared on the platform, public funding, collaboration, innovation and the potential for new insights. Support includes:

> The open strategy – attract grants, work sponsored by grants. [IP1]

However, other respondents thought that AnimalCo should pursue a closed-platform approach. They also referred to the need for data-sharing agreements, negotiations, and legal frameworks, indicating the challenges and barriers associated with accessing closed data. These respondents suggested that specific data sources,

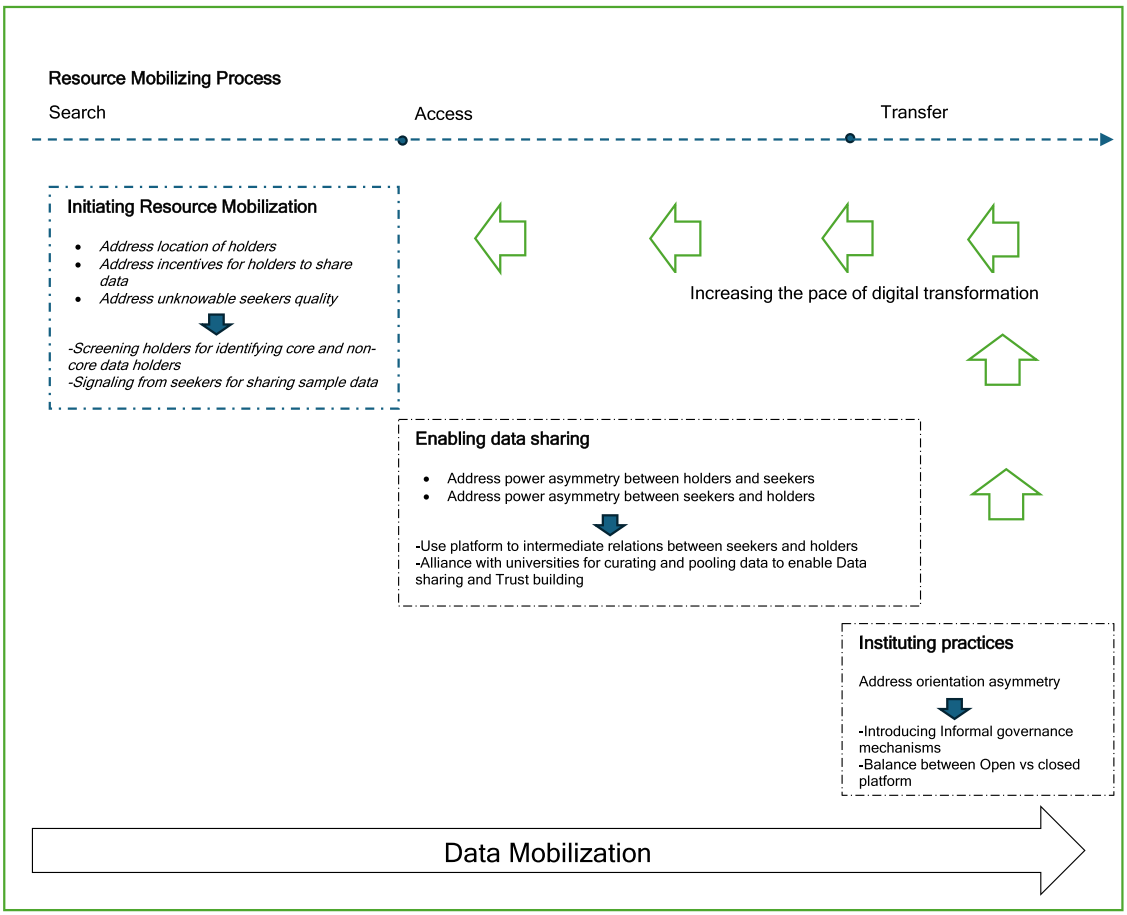

Figure 2. Framework for data mobilization under digital transformation [Colour figure can be viewed at wileyonlinelibrary.com]

such as proprietary databases and clinical records, may not be readily available or accessible for open data purposes. They mentioned constraints in short-term contracting within university settings. This is the most significant barrier in dealing with universities as third parties during data mobilization, which suggests that closed data may require specific arrangements and permissions to be accessed.

While some access challenges require negotiation and legal considerations, the findings recognize a blend between open and private data supporting research and commercialization. One respondent stated:

> I would think about the option to have a private and public cloud. Say I can have a private area where I could have a data portal, private section. Then I can upload my data. [IP13]

Thus, AnimalCo sought to mobilize data resources by institutionalizing relations with its partners. Hence, AnimalCo embarked on achieving digital transformation through further phases of data due diligence, collaboration, trust-building and legitimacy building, in particular by working with their university partners to align industrial and academic objectives.

Discussion

Prior research specifically focused on digital transformation highlights how firms seek to exploit existing resources and strategic positions (Furr, Ozcan and Eisenhardt, 2022; Hanelt *et al.*, 2021). One crucial resource in this context is data, characterized by high uncertainty over its value (Levitin and Redman, 1998). This study discovered that digital transformation alters our understanding of resource mobilization, particularly regarding holders' and seekers' behaviours concerning information, power and orientation asymmetries and how firms seek to develop platforms to intermediate relationships and actions. Here, the process of data mobilization represents continuing, evolving and cumulative change. Thus, the connection with resource mobilization holds a promising avenue for advancing and understanding digital transformation (Hanelt *et al.*, 2021).

Our findings highlight, in a holistic way, how data is mobilized through three means, addressing various asymmetries and imbalances. We outline this as a framework in Figure 2. First, stakeholders initiate resource mobilization to facilitate search and access to resources, or data discovery, through screening and

signalling, which are used to deal with dual-sided information asymmetries. The platform owners encourage due diligence on holders and create opportunities for third-party partners and seekers to signal their quality through activities such as hackathons and matchmaking. Second, once resource mobilization is initiated, stakeholders look to create data-sharing opportunities. This encourages the introduction of the platform as a data-sharing market, which helps to alleviate power imbalances and reinforces the need for trust, formal governance, and data-sharing agreements. Finally, stakeholders look to institute practices and policies to transfer data resources, and seekers can increase their opportunities to access other resources. For instance, data curated by a trusted third party and venture capital will attract more data-seeking firms. The availability of data and services will, in turn, draw more paying customers, contributing to value creation. This requires developing a balance in platform governance between an open and closed approach.

These findings contribute to the literature in several ways. First, prior studies focus on financial resources, with the majority examining one-way (seeker-to-holder) the dominant attention to information asymmetry and signalling (Vanacker *et al.*, 2020). The absence of attention to this aspect could be attributed to the prevalence and comparatively simpler availability of quantitative data related to the mobilization of financial capital (Alrich and Kim, 2007). While highly informative, these studies lack a holistic examination of the dynamic processes forming the foundation of resource mobilization with other resources. Using an inductive theory-building approach, our findings suggest that when it comes to intangible resources such as data, mobilization poses major challenges for both seekers and holders. This perspective shares similarities with other intangible resources, such as intellectual property, explored in previous studies (Clough *et al.*, 2019). In particular, seekers need to access this intangible resource, such as large unstructured data sets, to create value (Levin and Redman, 1998). Accessing external data resources is crucial for seekers to realize their goals and ambitions, but it often leaves little room for selectivity over resource holders (Vanacker *et al.*, 2020). However, the context for data differs from that for other resource mobilization settings owing to the limited transparency between seekers and holders regarding data collection and manipulation before exchange (Heckman *et al.*, 2015) and data quality (Huang *et al.*, 2021), as well as post-exchange use (Heckman *et al.*, 2015). Therefore, the novel aspect of our work lies in the assumption of a dual-sided information asymmetry in resource mobilization. Unlike in the traditional model, there is a sense in which both sides have an information disadvantage regarding the quality, uncertainty (Huang *et al.*, 2021) and value (Ray, Menon and Mookerjee, 2020) of the resource to be mobilized. Our study shows how platform owners deal with these uncertainties, often described in another part of the literature as two-sided market intermediaries that provide a one-to-many matching service (Belleflamme, Omrani and Peitz, 2015), facilitating transactions between holders and seekers (Taeuscher and Rothe, 2021; Tang, Zhang and Ning, 2023). We suggest that future studies should draw on this extended literature on dual-sided intermediaries (Huang *et al.*, 2021) and the implications for resource mobilization.

Specifically, our study identifies and confirms two mechanisms for reducing dual-sided information asymmetry: screening and signalling, as shown in the information economics literature. This literature shows that screening is the act of obtaining information by the uninformed party, whereas signalling is the disclosure of information by the informed party (Stiglitz, 2000). While diverging from conventional studies on financial resources, these mechanisms align closely with the characteristics observed in crowdfunding (Cumming, Johan and Zhang, 2019). However, crowdfunding research focuses on platforms facilitating the screening of seekers (Löher, 2016). Our study highlights the screening of holders for data mobilization. When subjected to screening, these holders can be effectively categorized into two distinct groups: core and non-core. This dual categorization forms a basis for distinguishing between essential holders and non-core contributors, capturing the multifaceted nature of resource holders.

Second, our study expands on extant research by illustrating resource mobilization with third-party partners. Extant research focus on third-party entities, including universities, examining how they contribute to resource mobilization (Bonardo, Paleari and Vismara, 2011).

These studies employ signalling theory to elucidate how partnership with a university facilitates the process of resource mobilization, enhancing the perceived legitimacy and credibility of the entities seeking resources, particularly in terms of financial capital (Bonando et al., 2011; Colombo, Meoli and Vismara, 2019). Our study shows that third parties can initiate resource mobilization through activities such as matchmaking, establishing meaningful relationships between seekers and holders, enhancing signalling credibility, and enabling limited resource access through hackathons. In many respects, these processes resemble what Hallen and Eisenhardt (2012) call 'casual dating', wherein seekers form ties with holders by arranging deliberate, repeated meetings with multiple resource holders before soliciting resources. Further, AnimalCo invested in the universities so that they would play a crucial role in managing the platform for effective data curation to enhance data reliability and usability. This confirms the findings

of previous studies highlighting the important role that 'technologically proximate' third-party firms have in initiating resource mobilization (Clough *et al.*, 2019).

Third, scholarship on resource mobilization focuses on resource access depending on dealing with power imbalances (Pfeffer and Salancik, 1978). Here, the concern for the uncertainty for seekers accessing intangible resources and the dependency that holders create for seekers have been emphasized (Clough *et al.*, 2019). Previous research has shown that the dependency between the seeker and holder can expose the seeker to vulnerability (Wry, Cobb and Aldrich, 2013). The concept here is that the power of holders can serve as a constraint on opportunistic behaviour. Our study shows that, concerning data, individual resource holders (i.e. animal owners) have little power and are therefore reluctant to share data. Using the platform as a market for data sharing helps alleviate any attempt at opportunistic behaviour, reinforcing the need for trust, formal governance, and data-sharing agreements. In particular, we show rebalancing power asymmetries in data sharing by encouraging and empowering the data holders to play an active role in setting data-use terms. These may lead to mechanisms, for instance pooling data based on seekers' technical know-how, enabling seekers to establish contracts with resource holders even under conditions of power asymmetry (Wry, Cobb and Aldrich, 2013), with the result that the value of aggregated data increases. Our study, therefore, offers insights into an emerging research stream on data sharing by explaining dependency relationships based not only on contractual relations but also on distinct trust-building activities (Scarbrough *et al.*, 2013).

Fourth, regarding the transfer of resources, previous studies indicate that market logic and formal governance are the primary approaches utilized to organize and facilitate resource mobilization endeavours (Clough *et al.*, 2019). Our study further supports this claim, showing how stakeholders institute practices to mobilize resources. For instance, universities play a crucial role in enabling firms to secure governance and legitimacy, necessary for continued resource mobilization (Desa, 2012). However, extant studies have underresearched the effects of different market orientations on resource mobilization (Clough *et al.*, 2019). Both the university partners as a third party and non-market firms, and AnimalCo strove to improve animal welfare and therefore wanted to demonstrate the use of data for the public good. Previous research has also explored the relevance of hybrid organizations, such as social enterprises that pursue both market and non-market objectives, in managing orientation asymmetry (Battilana and Lee, 2014). These studies show the need for hybrid forms that align seekers with resource holders while balancing market and non-market logics (e.g. Battilana and Dorado, 2010). In contrast, our study diverges from this view by highlighting that none of the firms are necessarily hybrid firms. Instead, we underscore the importance of institution building for parties relying on intangible resources such as data, as securing legitimacy becomes crucial for maintaining continued resource access and transfer (He *et al.*, 2021). Prior research has neglected institution building, focusing instead on issues of scaling up rather than on organizational emergence. Further research should explore institution building for digital transformation not as a one-time occurrence but as an ongoing, perpetual process involving dynamic groups of actors subject to constant change (Hanelt *et al.*, 2021).

Finally, the focal firm faces informal governance challenges arising from organizational emergence. Some holders and seekers emphasize trust, ethics, collaboration, shared goals, knowledge dissemination, and ecosystem building, while others focus on contracts and data-sharing agreements. AnimalCo considered the type of organization it should become to improve its marketing capability and reputation to commercialize data-sharing outcomes and sell them back to the resource holders. This was played out regarding whether the firm should adopt an open digital hub and platform, flexible and ready for use by anyone that facilitates resource mobilization. However, open systems need to consider the evolving influence of holders and seekers, who bring diverse perspectives and resources from outside the focal organization when engaging with shared digital technology. For example, research has shown that heterogeneous settings can reshape the value creation dynamics of focal companies (Parker, Van Alstyne and Jiang, 2017). The alternative is to adopt a closed-platform approach, emphasizing the need for data-sharing agreements, negotiations and legal frameworks. The firm found that different data sources may require specific arrangements and permissions for access. Certain data sources, such as proprietary databases and clinical records, may require specific arrangements and permissions for access.

In terms of practical implications, the study highlights the challenges of mobilizing intangible resources such as data and suggests digital strategies to form digital organizations. As intermediaries, AnimalCo offer advantages such as protecting data holders' interests, rebalancing power, supporting data sharing, and facilitating data pooling for research or public interest. The benefits for each party involved can include financial returns, establishing new collaborations, entering new markets, and benefits from joint projects/efforts. Future work could explore the application of a digital transformational perspective to resource mobilization, as this appears suitable for examining how emerging digital organizational structures are studied.

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Dr Nikolai Kazantsev is a Research Associate at the Institute for Manufacturing (IfM), and a Research Fellow of Clare Hall College, University of Cambridge. His research interests are in preparing production for the next pandemic, and digital transformation.

Dimitrios Batolas is a Postdoctoral Research Fellow at DigitLab, University of Exeter Business School. Prior to this, he conducted doctoral research at Aarhus School of Business and Social Sciences, Aarhus University (Denmark). He has been a Visiting Research Fellow at the Center for Advanced Hindsight, Duke University (USA). His research interests are business ethics, moral psychology, and digital transformation.

Leroy White is Professor Management at the University of Exeter Business School. His research interests are in management practices, leadership, Digital Transformation and partnership working.