CARING BY SHARING

A SINGLE CASE STUDY ON THE IMPLICATIONS OF HORIZONTAL INFORMATION SYSTEMS FOR PUBLIC SECTOR ACCOUNTABILITY

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Caring by sharing: A single case study on the implications of horizontal information systems for public sector accountability

Abstract

This paper aims to examine how accountability forms and conceptions are affected by the implementation of a horizontal information system in a public healthcare organization. Drawing on a qualitative case study of the healthcare organization of a mid-sized Swedish local government region, in which the analysis is framed by Adler and Borys' (1996) framework of enabling and coercive control, we contribute to the rather scarce literature on public sector digitalization and accountability in three main ways. First, we empirically demonstrate that the implementation of a new horizontal information system can enhance horizontal forms and conceptions of accountability. Second, our findings suggest that it does so by fostering an environment in which multiple interests and perspectives are considered – the system's design features and the process of designing it perceived as enablers for horizontal accountability given the related changes in data production and consumption. Third, we shed light on how the implementation context of hierarchal forms of accountability to some extent can discourage digitalization's enabling orientation. In some instances, increased horizontal accountability is thus rather expressed as an informal sense of shared accountability that does not necessarily translate into actions.

Keywords:

Accountability, digitalization, public sector, horizontal information systems, enabling and coercive control

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1. Introduction

As demographic trends are putting severe pressure on the system, healthcare is facing multifaceted challenges that cannot be solely solved through more resources or by individual actors alone. People worldwide are living longer; by 2030, 1 in 6 people will be aged 60 years or over; by 2050, the number of persons older than 80 will have tripled. These additional years are mainly lived in poor health, as evidence indicates that the share of life in good health has remained broadly constant (WHO, 2022). In addition, an increasing number of diseases can now be treated. Advances in medical research and technology have led to the development of new treatments and therapies. Conditions that were previously fatal are transformed into chronic diseases and those that were already chronic are now possible to live longer with (Lingman et al., 2021). As the demand for healthcare services hence increases, OECD healthcare spending is projected to outpace economic growth, reaching 10.2% of GDP by 2030 (OECD, 2019).

These challenges together point to the need to enhance the overall effectiveness of the healthcare system by focusing on efforts that maximize patient benefits in relation to allocated resources. However, as public sector organizations have traditionally operated in silos, healthcare systems are often highly decentralized and fragmented (Hellberg & Grönlund, 2011; Lingman et al., 2021). The lack of coordination and misalignment of incentives that typically follows pawns poor accommodation of patients' needs and inefficient resource allocation (Enthoven, 2009); when an organization optimizes each part in isolation, it may result in sub-optimizations for the organization as a whole. According to Lingman et al. (2021), the solution is spelled information-driven healthcare. The aim of information-driven healthcare is to break down these silos by leveraging data and information from all facets of the healthcare system in order to create a common, evidence-based, and holistic understanding of it. As such, it has the potential to facilitate an integrated and more effective care wherein resources are allocated to the parts by acknowledging their connection to the whole (Lingman et al., 2021).

Information-driven healthcare, in turn, is enabled by digitalization. Digital technologies have resulted in "datafication" of our society (Redden, 2018); with regard to public administration, both practitioners and researchers have *"articulated a new paradigm of 'digital government', which promises more integrated, agile, and holistic public sector organizations"* (Carlsson-Wall et al., 2022, p. 2). According to RBC Capital Markets (2020), the healthcare industry generates as much as 30% of the world's data volume. However, the mere availability of data does not necessarily translate into less fragmented care. Traditional healthcare information systems typically exist to serve vertical interest groups and are thus often deployed in a fragmented manner without any integration or interoperability, resulting in both siloed production and consumption of data (Braa & Rolland, 2000; Lingman et al., 2021). As such, the information needed in public healthcare organizations to generate actionable insights across care pathways is often

incomplete. Information-driven healthcare therefore relies on the adoption of horizontal information systems, which cut across organizational silos (Braa & Rolland, 2000) and thereby allow for more integrated production and consumption of data that can help foster a coordinated care across the healthcare continuum (Lingman et al., 2021).

The evolutions in the production and consumption of data and information that digitalization has brought about for public sector organizations over the last few decades have been suggested to bear salient consequences for accountability (e.g., Bertot et al., 2012; Cerrillo I Martínez, 2019; Lino et al., 2022; Otia & Bracci, 2022; Petrakaki, 2018; Plesner et al., 2018) – a notion that is considered critical in the improvement of quality of care, the containment of costs, and the rational use of resources in healthcare systems (Denis, 2014; Genovese et al., 2017). Due to the new approaches to data production, analysis, and interpretation that technologies such as horizontal information systems provide, traditional and hierarchical forms of accountability are seemingly being replaced by relationships whereby multiple parties instead hold each other accountable (e.g., Bertot et al., 2012; Hilbert et al., 2009; Pina et al., 2007). The use of such new technologies further allows for more interaction between previously distant categories of users and organizations, thus resulting in increased bi- and multidirectional exchange (e.g., Bryer, 2013; Dimitrijevska-Markoski, 2018).

Consequently, the issue of accountability in public sector digitalization has attracted increasing attention from scholars recently. However, despite the clear relevance of issues related to digital data production, use, and related accountability for public services to accounting scholarship, much of the previous research in this area has been conducted outside the accounting discipline. In their systematic literature review, Agostino et al. (2022) only found 11 papers published in accounting journals on the issues of public sector digitalization, accounting, and accountability – none related to healthcare. This is in stark contrast to the extensive attention given by scholars to the relationship between digital technologies and accountability in the private sector. Existing reviews and literature on private sector digitalization argue that digital technologies are redefining accountability relationships and blurring their boundaries (e.g., Arnaboldi et al., 2017; Knudsen, 2020). Public sector accountability, however, is, by definition, multifaceted (Bovens et al., 2014; Sinclair, 1995). Plural interests that reflect the coexistence of multiple logics must thus be considered and balanced (Brignall & Modell, 2000; Reay & Hinings, 2009). Considering that accountability in the public sector is conceived of as a means of upholding the principles of democracy – and not only effectiveness, efficiency, and economy – the implications of digitalization could thus have even more wide-ranging significance than for private administrations (Agostino et al., 2022). Although research has addressed public sector digitalization from a conceptual perspective, empirical evidence on whether and, if so, how digital data and technologies are changing our forms and conceptions of accountability is still lacking (Agostino et al., 2022). Prior studies mainly discuss the effects of digitalization as being "expected" or even taken for granted

(e.g., Ingrams, 2018; Liu et al., 2019; Pencheva et al., 2018). While suggesting that it could potentially enhance horizontal forms of accountability by fostering an environment in which multiple interests and perspectives are considered, empirical support remains limited to narrow observations of unilateral accountability, descriptions of implementation processes, and simulations of the potential of new digital evolutions to support decision-making (Agostino et al., 2022).

Responding to calls to explore the actual implications of public sector digitalization for accountability, this paper examines *how accountability forms and conceptions are affected by the implementation of a horizontal information system in a public healthcare organization.* To address this question, we draw upon a single case study of the healthcare organization of a mid-sized Swedish region (referred to as PublicOrg) that, over the last decade, has introduced a horizontal information system to facilitate the implementation of information-driven healthcare. Using data from interviews, we trace how the shift from siloed to integrated production and consumption of data across divisional boundaries enhanced horizontal accountability within the organization. Prior research teaches us that an understanding of how technologies affect organizations (and vice versa) requires knowledge both of those systems, the social dynamics that surround them, and their interactions (e.g., Orlikowski & Barley, 2001). Accordingly, we interpret this techno-social development with the help of the enabling and coercive control framework (Adler & Borys, 1996). Melding the technical and social, we consider how the design features, design process, and implementation of the new information system are perceived by employees to coerce effort and compliance or as enabling them to uphold their horizontal accountability toward the public. Our findings suggest that while both the features and process of designing it were perceived as enablers for horizontal accountability, the implementation context of strong hierarchical forms of accountability to some extent discouraged this enabling orientation. As such, increased horizontal accountability did not always translate into formal changes in behavior but was in some instances rather expressed as an informal sense of shared accountability. The case of PublicOrg thus allows us to contribute to the rather scarce literature on public sector digitalization and accountability (e.g., Agostino et al., 2022; Bertot et al., 2012) by demonstrating empirically that digital transformation can enhance horizontal forms and conceptions of accountability, while also emphasizing the importance of the implementation context when studying the effects of horizontal information systems in public organizations.

The structure of our paper is as follows. Section 2 reviews prior research in the domain and the method theory, and then integrates these two into a theoretical framework. Section 3 outlines the method employed, including research design, data collection, and data analysis. Guided by our theoretical framework, Section 4 presents and analyzes the empirical findings drawn from our case. Section 5 then discusses the main insights our thesis brings to the existing literature. Finally, Section 6 concludes the paper with a synthesis of our work, the limitations of our study, and some avenues for further research.

2. Theoretical background

The following section will review prior research in the domain (Section 2.1) and the method theory (Section 2.2) before these are integrated into a theoretical framework (Section 2.3) through which the research question will be addressed.

2.1. Domain theory

Section 2.1.1 discusses accountability in the public sector, including the notion itself, contrasting forms of it, and a more critical strand of literature. Section 2.1.2 reviews prior research on public sector digitalization, considering the move toward horizontal information systems and consequences of digital technologies for the production and consumption of data. Finally, Section 2.1.3 bridges the two domains by outlining important implications of digitalization for public sector accountability, while highlighting current gaps in the accounting literature.

2.1.1. Public sector accountability

The notion of accountability

The notion of accountability is frequently drawn upon in the accounting literature. In its broadest sense, accountability entails a relationship in which an actor is required to explain, justify, and take responsibility for his or her actions: *"the giving and demanding of reasons for conduct"* (Roberts & Scapens; 1985, p. 447). This to render behavior intelligible and *"to prevent conflicts from arising by verbally bridging the gap between action and expectation"* (Scott & Lyman, 1968, p. 46). At the heart of this relationship is stewardship: the steward, that is, the accountee, is entrusted responsibility over resources and obliged to present and answer to an account of its execution to the principal, or the accountor (Gray & Jenkins, 1993). More specifically, accountability is thus concerned with the question of who is accountable *to whom*, *for what*, and *in which manner* (Bovens, 2009; Messner, 2009). The transference of responsibility from principals to stewards has some authors (Smyth, 2012, p. 231-232) emphasize the need for control (reward and sanction) to formalize the concept (Almquist et al., 2013). In the contractual context of the accountability relationship between principals and stewards, the role of output measures linked to input resources (i.e., performance information) therefore becomes important (Broadbent et al., 1996). As such, accountability is clearly related to accounting (Laughlin, 1990). Roberts and Scapens (1985), for instance, propose that accounting information not only reflects, but through different forms of use also shapes particular patterns of accountability within organizations.

This generic definition of accountability as an exchange of reasons for conduct underlies the use of the notion in both the financial and management accounting literature; however,

many scholars agree that it is rarely this simple (see e.g., Messner, 2009; Munro & Hatherly, 1993; Roberts, 1991; Roberts & Scapens, 1985; Sinclair, 1995). Accountability is an ever-evolving, nebulous concept. It exists in many forms and is contextually bound, as the form accountability takes depends on the type of relationship concerned and the environment in which it is constructed (Cordery et al., 2010; Roberts & Scapens, 1985; Sinclair, 1995). Sinclair (1995, p. 231) describes it as multiple and fragmented; hence, *"being accountable in one form often requires compromises of other sorts of accountability"*. Given the heterogeneity of the interests at stake, public sector accountability is often described as a chameleon-like, complex, and multifaceted notion encompassing several dimensions (Mulgan, 2000; Sinclair, 1995). While accountability in the public sector thus can take several forms, the literature mainly distinguishes between internal and external (e.g., Romzek & Dubnick, 1987) and hierarchical and horizontal accountability (e.g., Hodges, 2012). Therefore, this study mainly focuses its analysis on these forms (see Table 1 for an overview, p. 8).

Accountability to external and internal stakeholders

External accountability relates to accountability toward stakeholders outside the organization (Romzek & Dubnick, 1987). Traditional public administration has focused on the "upward" straight-line relationship of political (or democratic) accountability from public servants to elected politicians, whereas newer forms emphasize "outward" or direct accountability to the public (Sinclair, 1995). Over the last few decades, however, the nature of accountability in public sector organizations has been subject to major changes (Almquist et al., 2013). New Public Management (NPM) is the umbrella term used to describe the new managerial models of administrative reform first embraced in the 1980s (Sinclair, 1995), for which changes in public sector accounting have been central (Hood, 1995). As an endeavor to make public sector organizations more result-, cost-, and efficiency-oriented (i.e., business-like), NPM reforms have been characterized as processes of "accountingization" by which financial imperatives and measures have come to colonize the public sector (Kurunmaki et al., 2003; Power et al., 2003). As accounting brings forth *"ways of seeing, calculating and managing"* (Miller, 1992, p.76), managers in the public sector now face accountability beyond the fields of compliance, to include also issues of performance and effectiveness. Followingly, focus has shifted from the traditional norms of external accountability more toward the conceptions of *internal* accountability (Sinclair, 1995).

Internal accountability refers to the exchange of accounts among stakeholders at the different levels within an organization (Romzek & Dubnick, 1987), often by means of reporting and control practices in which management-related information such as costs and returns are communicated (Messner, 2009). Sinclair denotes this managerial accountability, which *"requires those with delegated authority to be answerable for producing outputs or the use of resources to achieve certain ends"* and encompasses values such as cost effectiveness, efficiency, and managerial autonomy (1995, p. 222).

She further distinguishes between three subtypes: fiscal accountability, which measures whether money has been spent according to budget; process accountability, which oversees whether specific processes have been deployed; and program accountability, which measures whether defined outcomes have been realized (Sinclair, 1995).

From hierarchical to horizontal accountability

Typically based on relationships in which rights and duties are contractually derived and superior and subordinate clearly defined, NPM is further associated with *hierarchical*, or vertical, forms of accountability (Almquist et al., 2013). Hierarchical accountability is characterized by the "*delegation of authority from superior to subordinate and commensurate accountability from subordinate to superior*" (Jarvis, 2014, p. 405). Within this dyadic structure of superior–subordinates, hierarchical accountability orientates superiors toward surveillance of possible autonomous actions (Munro & Hatherly, 1993) – they impose accountability as a form of control over subordinates, to ensure that the accepted responsibility is discharged and reported upon upwards (Birkett, 1988). Their "contracts" are thus dominated by vertical (often accounting-type) information flows (Laughlin, 1990) and articulated by means of control technologies such as budgeting, for example (Munro & Hatherly, 1993). Hodges (2012, p. 30) further emphasizes the focus on compliance with established rules, regulations and procedures, referring to hierarchical accountability as "*the legal structures underlying public sector organisations and which conform to the processes of authorization and defined mandates. It is linked to liberal political theory in which bureaucrats deliver outputs while politicians should be responsible for outcomes*".

The direct line of delegation and accountability between the accountor and accountee that distinguishes hierarchical accountability from other forms provides for greater clarity and sanctioning authority (Jarvis, 2014); however, it can also be slow, bureaucratic, and suffer from a lack of transparency (Bovens, 2009; Jarvis, 2014). Therefore, despite still being the primary form of accountability, "*hierarchical accountability is also commonly criticized as an anachronism; a relic of a bygone era of democratic governance and public administration dominated by command and control approaches*" (Jarvis, 2014, p. 405). Its incompatibility with the complexity that characterizes contemporary public organizations means that the traditional top-down, principal-agent relationships are slowly giving way to more diversified, dialogic, and pluralistic accountability relationships (Bovens, 2009; Sinclair, 1995). Bovens (2007) denotes this *horizontal* accountability, which reflects the perceived moral or social obligations to report to stakeholders across organizations or the mutual obligation between bodies of equal standing to provide public services. O'Dwyer & Unerman (2007, 2008) instead term it holistic accountability, while Munro & Hatherly (1993) refer to it as lateral accountability. However, all have in common that they consider a range of stakeholders other than hierarchical superiors. This new form of accountability entails an intensification of lateral communication aimed at achieving mutual benefits (Munro &

Hatherly, 1993) as it concerns the horizontal performance of a network of organizations rather than the vertical performance of a single organization – concentrating on outcomes of collaborative efforts instead of individual outputs (Almquist et al., 2013). Accountability is owed for the organization's long-term impact on its environment; hence, "*such organizations need to develop trusting relationships with a broad range of stakeholders, be proactive rather than reactive, and involve stakeholders in dialogue and debate to agree the values and priorities that should drive organizational strategy*" (Cordery et al., 2010, p. 796). While traditional hierarchical accountability features formal top-down control and compliance, horizontal accountability thus emphasizes trust, collaboration, and dialogue as mechanisms for ensuring accountability.

Critical perspectives on accountability

A more critical strand of the accountability literature frequently reiterates a desire for accountability to "mean more" (Sinclair, 1995). Mulgan (2000) suggests that accountability has increasingly been extended beyond its core meaning of formal, external scrutiny to also include more abstract concepts such as the *"sense of individual responsibility and concern for the public interest expected from public servants"* (p. 556) – that is, *professional* and *personal* forms of accountability. Professional accountability refers to the duty or inward responsibility to professional standards and values that the public servant senses as a member of a professional group, which in turn holds a privileged and knowledgeable position in society. It thus strongly values professional integrity and expertise (Mulgan, 2000; Sinclair, 1995). Personal accountability instead is *"fidelity to personal conscience in basic values such as respect for human dignity and acting in a manner that accepts responsibility for affecting the life of others"* (Sinclair, 1995, p. 230)*,* resting on the tenet that accountability is ultimately driven by adherence to one's internalized moral obligations. Imposed by psychological controls rather than external, Sinclair (1995) argues that personal accountability is particularly potent and binding.

Some scholars blame the restrictive nature of contemporary accounting practices for contributing to the limited understanding of accountability (e.g., Gray, 2002; McKernan & MacLullich, 2004; Messner, 2009; Roberts, 1991; Shearer, 2002). They argue that accounting *"needs to go beyond the constraints that have been imposed on its language"* (McKernan & MacLullich, 2004, p. 345) if it is to allow individuals and organizations to account to and for each other in a more comprehensive way. The conventional language of accounting depicts people as simply economic agents who relate to one another through their self-interests alone. Consequently, it fosters a form of accountability that fails to fully recognize our mutual responsibilities and identities beyond just economic subjects (Messner, 2009). One systematic expression for such concern is Roberts' (1991) exploration of what he denotes *individualizing* and *socializing* forms of accountability. He argues that hierarchical accountability, in which accounting information plays a central role, can enact an individualized sense of self that is detrimental to our moral

attitude toward one another. In striving for recognition and acceptance in an organizational hierarchy where position and performance serve as objective confirmations of relative value and worth, individuals are drawn *"further and further into conformity with the standards of utility upon which 'success' depends"* and accounting imposes (Roberts, 1991, p. 360). These standards *"become the lens through which we judge ourselves, and compare ourselves with others"* (Roberts, 1991, p. 362). Once internalized, the self is discovered as solitary and singular, anxiously preoccupied with securing others' conformity; as such, hierarchical accountability can be seen to individualize.

By recognizing the co-existence of formal and informal structures within organizations, Roberts (1991) contrasts the individualizing form of accountability with more socializing forms that instead of calculation and instrumental reason nurture dialogue and openness (Messner, 2009). At the heart of these is the socializing talk that flourish in the informal spaces of organizations, where there is a relative absence of formal asymmetries of power and regular face-to-face contact between the people involved (i.e., circumstances in which people can humanize and socialize the experience of work by relating to each other informally and openly). Characterized by *"a quest for mutual understanding which go beyond the exchange of accounts through formal categories, as provided by accounting"* (Messner, 2009, p. 922), socializing forms of accountability thus confirm self in ways that instead emphasize the interdependence of self and others.

Table 1. Overview of key accountability forms

Accountability form	Description
External	Relates to accountability toward stakeholders outside the organization (Romzek & Dubnick, 1987)
Internal	Refers to the exchange of accounts among stakeholders at the different levels within an organization (Romzek & Dubnick, 1987)
Hierarchical	The *"delegation of authority from superior to subordinate and commensurate accountability from subordinate to superior"* (Jarvis, 2014, p. 405)
Horizontal	Considers a range of stakeholders other than hierarchical superiors and concentrates on horizontal rather than vertical performance (Bovens, 2007)
Professional	Refers to the duty or inward responsibility to professional standards and values that one senses as a member of a professional group (Mulgan, 2000)
Personal	Relates to the acceptance of responsibility that adheres to one's internal moral obligations (Sinclair, 1995)
Individualizing	Relates to an individualized sense of self that undermines our moral attitudes toward one another due to the restrictive nature of accounting associated with hierarchical accountability (Roberts, 1991)
Socializing	Characterized by social talk in informal spaces of organizations in a quest for mutual understanding beyond formal exchange of accounts (Messner, 2009)

2.1.2. Digitalization in the public sector

From vertical to horizontal information systems

Prior research highlights that digitalization has brought about significant changes over the last few decades in terms of the way data and information are being produced, disseminated, and consumed in public sector organizations (e.g., Myeong & Choi, 2010; Rogge, 2017; Sivarajah et al., 2015). One technology that these evolutions bear relevant implications for are information systems, which through a combination of software and hardware provide the infrastructure for collecting, storing, and processing the vast amounts of data generated in different parts of an organization. Empirical research on the impact on information systems in a public sector context, however, is scarce. As pointed out by Cordella and Iannaci (2010), among others, further research on the subject is thus warranted.

Building on information system literature in the private sector, traditional information systems have primarily been vertical in nature – designed to facilitate vertical information flows and feed upper levels of the organization with relevant information for decision-making (Braa & Rolland, 2000). In such systems, data is typically stored and maintained on a local basis in a series of independent systems, where access is restricted to the function where the information reside. However, the evolution of digitalization has provided an opportunity to integrate data sources and thus support more horizontal solutions. Along these lines, new demands with regard to participation, collaboration, and transparency has caused a shift from vertical information systems to the deployment of more horizontal information systems in the public sector (Bertot et al., 2014; Braa & Rolland, 2000). A horizontal information system, which cut across functions, aim to facilitate information integration and knowledge-sharing across the organization. A central concept being the integrated information architecture summed up as the single database concept (Chapman & Kihn, 2009), the horizontal information system is typically focused on transparent access to information for many different "communities-of-practice" and categories of users (Braa & Rolland, 2000). The shift toward horizontal information systems implies that work practices as well as different technologies become increasingly interconnected and integrated, thus also driving organizational collaboration and deviating toward a more enabling form of management (Braa & Rolland, 2000). While moving from silos to more integrated operations allow for a more holistic perspective of the organization, it also presents new challenges. As the information system cut across different practices and cultures, the implementation process is often both more time consuming and challenging, particularly then among public sector organizations that are strongly regulated, driven by multiple logics, and traditionally operate in stovepipes (Braa & Rolland, 2000; Hellberg & Grönlund, 2011).

While horizontal information systems undeniably provide an opportunity to increase transparency and promote knowledge-sharing and collaboration in public sector

organizations, there is also a need to better understand how the production and consumption of data and information are affected by this type of digital technology (Agostino et al., 2022). This as the data produced is used as input to the information system and the output of the system in turn is consumed by users. Thus, how the information system is configured both affects and is affected by the production and consumption of data in a dyadic relationship.

Changes in production and consumption of data and information

Agostino et al. (2022) claim that public sector digitalization has implications for the *production* of data and information along five dimensions: (1) *who* is generating the data, (2) *where* data are generated, (3) *what* type of data is being produced, (4) *when* data are generated, and (5) *how* data are analyzed and translated. First, the introduction of digital platforms has made it possible for users to provide their own input, causing a shift in who produces the information. As a result, the data production, which historically has been characterized as centralized and hierarchical, is now generated to a larger extent by the users and happens virtually everywhere, thus moving toward a more decentralized and horizontal model (Agostino et al., 2022; Kum et al., 2015). Next, the type of data being produced has shifted over time from financial and non-financial transactional data produced predominantly by professionals to textual and visual data generated by users or co-produced together with professionals (Currie, 2020; Driss et al., 2019). Furthermore, public sector organizations have moved from past data collection to real-time data generation (Currie, 2020) creating a potential for public sector organizations to increase the accuracy in decision-making. When it comes to how data is analyzed and translated to be consumed by users, prior studies have mainly focused on the technical aspects and discussed appropriate techniques (e.g., data mining and reporting of big data) in different empirical settings (e.g., Kum et al., 2015; Xu et al., 2017).

Another stream of research offers different perspectives on how the *consumption* of data has changed following the introduction of digital technologies in the public sector. Whilst much existing research highlights the positive aspects of digitalization, numerous studies also point to the difficulties users face in relation to locating and understanding available information, hence leading them to miss relevant data (e.g., Tunney & Thomas, 2015). Additionally, the increasing availability of big data, which requires specific skills and knowledge to analyze and transform into comprehensible and actionable insights, may exacerbate the issue (Agostino et al., 2022). Asaro (2019) further debates the importance of understanding how the underlying systems work to extract valuable information, including their potential drawbacks such as how historical data patterns can be self-reinforcing and how outliers are handled. Studies have also investigated user perception of big data with contrasting results. In some cases, big data is perceived with skepticism by users (Guenduez et al., 2020); in other papers, it is shown to contribute to fostering quality, trustworthiness, and legitimacy (Fredriksson, 2018).

2.1.3. Public sector digitalization and accountability

The above-described evolutions in the production, dissemination, and use of new types of data and information have been suggested to bear salient consequences for accountability (e.g., Bertot et al., 2012; Cerrillo I Martínez, 2019; Otia & Bracci, 2022; Petrakaki, 2018; Plesner et al., 2018; Wong & Welch, 2004). The issues of accounting and accountability in public sector digitalization have thus attracted increasing attention from scholars recently. However, despite the clear relevance of digital data production, use, and related accountability, the contributions in this area have mainly been developed outside accounting scholarship. In the subsections that follow, we therefore draw upon Agostino et al.'s (2022) literature review on digitalization, accounting, and accountability to discuss the current state of the art of research on public sector digitalization – focusing on its implications for accountability related (1) to the production and consumption of data and information, and (2) to the effects of digital data and technologies.

Relating changes in the production and consumption of data to accountability

Agostino et al. (2022) suggest that the new features of data and information *production* that digitalization entails have several implications for public sector accountability. On the one hand, traditional, hierarchical accountability seems to be replaced by horizontal, pluralistic, and coproduced forms of accountability. This as new real-time, self-made, and even collaborative approaches to data production enable multiple parties in peer relationships to instead hold each other accountable (e.g., Bertot et al., 2012; Hilbert et al., 2009). On the other hand, the real-time and multicentric production of data creates challenges related to the reliability and quality of data, and thus bear potential implications for data quality assurance and accountability (Birchall, 2015; Halachmi & Grieling, 2013). Ensuring high quality data and reliability is imperative as it increasingly provides the basis for decision-making and prioritizations, where the outcomes more broadly could have an impact on trust. Yet, scholars express growing concerns over the fairness, accountability, and transparency of algorithms used in critical decision processes (e.g., Asaro, 2019). Adding to this, Agostino et al. (2022) discuss the implications for accountability in the process of translating data – that is, making it available to the users. For example, questions concerning who should be accountable for the selection, elaboration, and presentation of data as well as which ethical and reporting standards that should be followed remain yet to be explored (Kellog et al., 2020; Kolman, 2020).

The *consumption* of digital data and new technologies is further suggested to affect accountability in two main ways (Agostino et al., 2022). First, it seems to enhance the potential for dialogic forms of accountability (Brown et al., 2015). More specifically, prior papers propose that digitalization could help overcome polarization by moving toward dialogic, diffused, and pluralistic forms of accountability that allow for more interaction, and thus a bi- or multidirectional exchange, between different users and organizations (e.g., Bryer, 2013; Dimitrijevska-Markoski, 2018; Fink, 2017). Second, the

increased use of digital data seems to imply an increased blurring of accountability. As data becomes more accessible and different actors use it for different purposes, ranging from decision-making to dialogue and co-production, who is accountable for what becomes increasingly vague (Agostino et al., 2022).

Effects of digital data and technologies and implications for accountability

From the perspective of public sector accountability, the availability and new forms of digital data bear important consequences for governments, managers, citizens, and other stakeholders. Previous research mainly discusses the effects of digitalization on accountability as being "expected" or taken for granted; however, these claims are not necessarily supported by empirical evidence (e.g., Ingrams, 2018; Liu et al., 2019; Pencheva et al., 2018). According to Agostino et al. (2022), only a limited number of studies identify empirically possible reverberations of digitalization by pointing both to positive and desirable effects, as well as to unexpected and less desirable ones.

Agostino et al. (2022) split the effects of public sector digitalization – both expected and empirically identified – with regard to implications for accountability into two main categories: (i) improvements to policies and services (e.g., Sa & Grieco, 2016; Zhao et al., 2016) and (ii) increased accountability, transparency, legitimacy, and trust (e.g., Mendieta & Alonso, 2017). As such, a first stream of papers suggests that digital transformation will improve public services and policies by enabling better identification of needs and allowing for the use of more powerful analytical tools in planning, designing, and providing interventions (Agostino et al., 2022). However, a number of studies also stress possible negative consequences of digitalization for public services (e.g., Marjanovic & Cecez-Kecmanovic, 2017; Power, 2016; Treré, 2016). Digital technologies are commonly viewed as not only having the potential to stipulate new forms of empowerment but also as being capable of reproducing power structures extant in the context in which they are used; *"systems that 'learn' from humans may end up reproducing the same biases and penchants for stereotyping, thereby making them even more systematic and institutionalized"* (Agostino et al., 2022, p. 165). As such, digital evolutions in the public sector, including algorithms, artificial intelligence, and predictive analytics, result in new preoccupations with accountability for public managers, policymakers, and scholars alike with regard to social equity.

The second stream of studies that devote their attention to the effects of digitalization on accountability, transparency, legitimacy, and trust generally suggests that the "datafication" of the public sector is expected to strengthen these relationships (e.g., Ramirez & Tejada, 2019; Royo et al., 2019; Vydra & Klievink, 2019). However, as the consequences of digitalization for accountability may take on different meanings and nuances (Koppell, 2005), the practical implications of this are subject to a variety of interpretations. In some studies, the availability of more data is described as evidence of increased accountability (e.g., Garde Sanchez et al., 2014; Manes Rossi et al., 2018;

Murillo, 2014). Those that take this stance refer to the word "transparency" and conceive of accountability as being *"a unilateral exercise of the provision of data"* (Agostino et al., p. 165). This view, however, has been criticized for being naïve and too narrow – the mere availability of data does not necessarily translate into greater accountability per se. Birchall (2015), for instance, stresses the risks associated with providing data in lieu of actual responses to needs.

Other papers propose that digitalization can lead to better participation in decision-making and the delivery of public services via the aforementioned horizontal, dialogic, and pluralistic forms of accountability. However, little evidence exists with regard to whether and how digital transformation is actually changing our forms and conceptions of accountability (Agostino et al., 2022). More studies are thus needed that specifically address if and how digitalization can enhance pluralistic dialogue by fostering an environment in which multiple interests and perspectives are considered. Indeed, existing research indicate that digital accountability primarily has been approached as a technology-driven exercise rather than with regard to its lasting effects on accountability (Agostino et al., 2022).

To summarize, prior research has identified some possible effects of digital data and technologies on accountability in the public sector. However, empirical evidence is still lacking and has mainly been limited to descriptions of implementation processes, narrow observations of unilateral accountability, and simulations of the potential of new digital evolutions to support decision-making (Agostino et al., 2022). More research is thus warranted to address the actual outcomes of digitalization given the outputs of it (e.g., data, databases, and reports) and with regard to its implications for public sector accountability. Against this background, this study thus aims to explore the following research question:

> *How are accountability forms and conceptions affected by the implementation of a horizontal information system in a public healthcare organization?*

2.2. Method theory

In the following, Section 2.2.1 presents Adler and Borys' (1996) framework of enabling and coercive control. The four key design characteristics of enabling and coercive control systems are then described in detail in Section 2.2.2. Finally, Section 2.2.3 elaborates on the use of the framework in previous literature.

2.2.1. Enabling and coercive control

Adler and Borys (1996) have developed a conceptual model partly reconciling the two conflicting views of the human, or attitudinal, outcomes of bureaucracy. On the one hand, there is a negative view arguing that the bureaucratic form of organization stifles

creativity, fosters dissatisfaction, and demotivates employees. On the other hand, there is a positive view arguing that it provides needed guidance and clarifies responsibilities, thereby easing the role stress and helping individuals be and feel more effective. The authors identify two generic types of formalization – one designed to enable employees to master their tasks and the other designed to coerce effort and compliance, where the different types result in different attitudinal outcomes. The former is denoted enabling control and the latter coercive control. The authors find that enabling and coercive control can be contrasted along three dimensions: (1) the design features of a formal system, (2) its design process, and (3) the implementation of it. Whether systems are perceived enabling or coercive depend directly on their features and how the procedures are implemented; the features themselves are influenced by the design process and the goals that govern it (Adler & Borys, 1996).

In addition to this, two streams of research on technology complements the view with a debate regarding whether automation leads to deskilling and degradation of work or to upgrading and enrichment. Here, Adler and Borys (1996) describe how the design of the technology can either aim to enhance users' capabilities and help them leverage their skills and intelligence or, alternatively, aim to reduce resilience on expensive resources (e.g., highly paid employees) with a fool-proofing and deskilling rationale. With this rationale, the user of the technology is thus viewed as either the source of the problems to be eliminated or the source of skill and intelligence to be supported. Adler and Borys (1996) use Xerox photocopiers as an example to illustrate how coercive and enabling features affect the attitudinal outcomes of the users and draw on a framework based on four key design features of formal systems – namely repair, internal transparency, global transparency, and flexibility – to be elaborated on in the following.

2.2.2. Four key features of enabling and coercive control systems

Repair relates to how easy is it is for users of a system to repair the process in case of a breakdown, rather than allowing it to interrupt the workflow. With a coercive logic of procedure design, superiors oversee the process, and the usage of the system is standardized, meaning that it is not designed to help subordinates determine whether the process is operating well, navigate inevitable contingencies, or identify improvement opportunities. As a result, workarounds can abound. In contrast, the enabling logic generate procedures that facilitates responses to real work contingencies, and breakdowns signal problems of the system and become opportunities for improvement – that is, the process emphasizes learning and collaboration (Adler & Borys, 1996).

Next, *internal transparency* concerns the extent to which managers are able to see through and understand the logic of the system (Adler & Borys, 1996; Jordan & Messner, 2012). With a coercive logic that aims to reduce the reliance on users' skills, little visibility of the system is provided and information is presented in a language familiar to technicians rather than the users. As such, systems are designed to help supervisors rather than their

employees. An enabling approach instead entail that information about the system is presented in a language intelligible to the operator, key components are explained, and the rationale of rules are clarified (Adler & Borys, 1996).

If internal transparency refers to the internal functioning and underlying assumptions of the system, *global transparency* relates to a broader system view, referring more specifically to the extent to which managers understand the up- and downstream implications of their work (Jordan & Messner, 2012). For example, in the context of a budget process, global transparency is achieved when this process increases managers' understanding of the firm's strategy and operations (Chapman & Kihn, 2009; Jordan & Messner, 2012). With a coercive approach, Adler and Borys (1996) argue that global transparency for subordinates is a risk to be minimized and that they should focus on their given tasks – moving beyond that will be discouraged by the superiors as *"that's not your job"* (Heckscher, 1994, p. 20). Instead, broader system status information is distributed on a restrictive need-to-know basis (Adler & Borys, 1996). The authors further outline that with a coercive logic, employees do not have insight regarding how the system is connected with organizational participants. With an enabling logic on the other hand, employees are provided with contextual information to afford them an understanding of where their own tasks fit into the whole organization, with the aim to help them interact independently with the broader organization. In this view, understanding the broader context and encouraging employee participation is essential for the success of the system.

Finally, *flexibility* refers to the extent to which the system is flexible – that is, how it balances standardization and customization. More specifically, a system with low flexibility minimizes what the users can do – rather, it is the system that *"takes the controlling decisions after the operator has entered the data"* (Adler & Borys, 1996, p. 74). A flexible system, on the other hand, allows users to modify functionality and adapt interface to suit their specific work demands and needs. Using a coercive approach to procedure design, systems are designed with little user involvement and manuals for usage are detailed out. The enabling logic, in contrast, suggests that the system should be made to fit the organization, and that local knowledge could be used to experiment with the system design in a beneficial way (Adler & Borys, 1996; Jordan & Messner, 2012).

While the design features of the system are the main focus of Adler and Borys' (1996) theory, the design process and the implementation of the system also play an important role. It is highlighted that if the rationale underlying design is usability, then the process will likely be characterized by (1) early and continual user-focus, (2) an integrated view of various aspects of usability, (3) ongoing user-testing, and (4) an iterative process that allow for improvements. Following this line of reasoning and given that employees receive appropriate training and resources, user involvement will likely have a positive effect on both technical and attitudinal outcomes and thus be perceived as enabling. In contrast, a more coercive approach to the design process would minimize user involvement as it then is seen to constitute a risk of politicizing the process. With regard

to the implementation, the authors argue that a system designed with an enabling intent and enabling features can still be implemented coercively, and further note that the implementation of a system is usually accompanied by some modifications to adapt the technology to local conditions (Adler & Borys, 1996). Thus, it can be concluded that it is not only the design features that affect whether a system is perceived as enabling or coercive but also the design process and the implementation of the system.

2.2.3. Use of model in previous literature

The theory presented by Adler and Borys (1996) has been frequently drawn upon in the accounting literature throughout the last decades. The first scholars illustrating the usefulness of the theory for understanding the functionality of management control systems was Ahrens and Chapman (2004). They found that an enabling approach to control could improve performance, but also pointed out that management control systems by nature are prone to coercive uses as they are *"complexly bound up with issues of hierarchy and performance"* (Ahrens & Chapman, 2004, p. 297). Another example is Wouters and Wilderom (2008) who relate Adler and Borys' framework to incompleteness of accounting information and suggest that problems with incompleteness can be handled when managers are involved in the process of designing and developing the control system. The incompleteness of information is also addressed by Jordan and Messner who propose that, in the context of a control system, Adler and Borys' (1996) design characteristics could be seen as solutions to this issue. Expanding upon Adler and Borys' (1996) theory, Jordan and Messner (2012) further propose that the four design features should be viewed as the outcome of an on-going interaction between different actors involved, i.e., top management and operational managers. Whether operational managers regard a system as enabling for their work is suggested to depend to a great extent on how top management use that system for control purposes and how they communicate about its relevance.

In our review of previous literature, we can conclude that Adler and Borys' (1996) framework has been proven useful in a variety of accounting-related contexts ranging from sense-making to performance outcome (e.g., Chapman & Kihn, 2009; Jordan & Messner, 2012; Junne, 2018; Jørgensen & Messner, 2009; Wouters & Wilderom, 2008). These studies suggest that whether a control system is enabling or coercive depends on how the design and implementation process is organized, connecting back to the four features of repair, internal transparency, global transparency, and flexibility originally outlined by Adler and Borys (1996). However, gaps still remain related to the usefulness of the theory in a highly institutionalized public sector context given the complexities that characterizes it, such as strong regulations, multiple logics, and fragmented operations.

2.3. Theoretical framework

To address our research question of how accountability forms and conceptions are affected by the implementation of a horizontal information system in a public healthcare organization, we integrate Adler and Borys' (1996) model of coercive and enabling forms of control and the literature on public sector digitalization and accountability into a theoretical framework. Prior accounting literature has found Adler and Borys' model useful for analyzing the impact on performance highlighting a complex relationship (e.g., Chapman & Kihn, 2009), for instance, and, more recently, how accountability enactment affects the perception of enabling or coercive practices (Junne, 2018). However, it has to our knowledge hitherto not been used to analyze how the implementation of a control system, such as an information system, impact accountability forms and conceptions in a public sector context. We believe this to be of interest since it has been suggested that the creation of a new information system constitutes an essential component in the creation of accountability (Heeks, 1998) and that the increased availability of data has caused a shift toward more horizontal forms of accountability (Agostino et al., 2022). Furthermore, it has been argued that Adler and Borys' (1996) four factors can provide a useful structure to explore how power relations and accountability are enacted, and that this in turn depend on whether practices are perceived as enabling or coercive (Junne, 2018).

While the implementation of an information system has been shown to shape organizational priorities and procedures, scholars have argued that the system itself is not a direct cause of behavior; rather, it can better be considered a formative context (e.g., Ciborra & Lanzara, 1994). Adler and Borys' (1996) framework of enabling and coercive control is therefore of particular relevance to our study, as it is developed from a detailed analysis of technological design features combined with an overarching philosophy of control through which these features may be expected to shape accountability. Adapting the framework to the context of this thesis (see Figure 1 for an illustration), we suggest that a horizontal information system has the potential to (1) *repair* information by incorporating different sources of data in the same database and (2) enable *global transparency* by making visible how one part's action affect the organization at large. Further, it is expected to promote usability by ensuring that (3) users understand the system (*internal transparency*) and (4) can adapt it to their individual needs (*flexibility*). We suggest that the extent to which the system is designed to enable users to consider multiple interests by offering a holistic perspective of the organization will bear implications for how accountability forms and conceptions are affected by its implementation. We further infer that the extent of *internal transparency, flexibility,* and user involvement in the *design process* will likely not directly shape accountability but rather constitute a precondition for other design features to be perceived as enabling (or coercive) since these aspects mainly concern the usability of the system. With regard to the implementation of the system, we suggest that it is influenced by the context's

prevailing accountability forms, which in turn affect whether the implementation process is perceived as enabling or coercive.
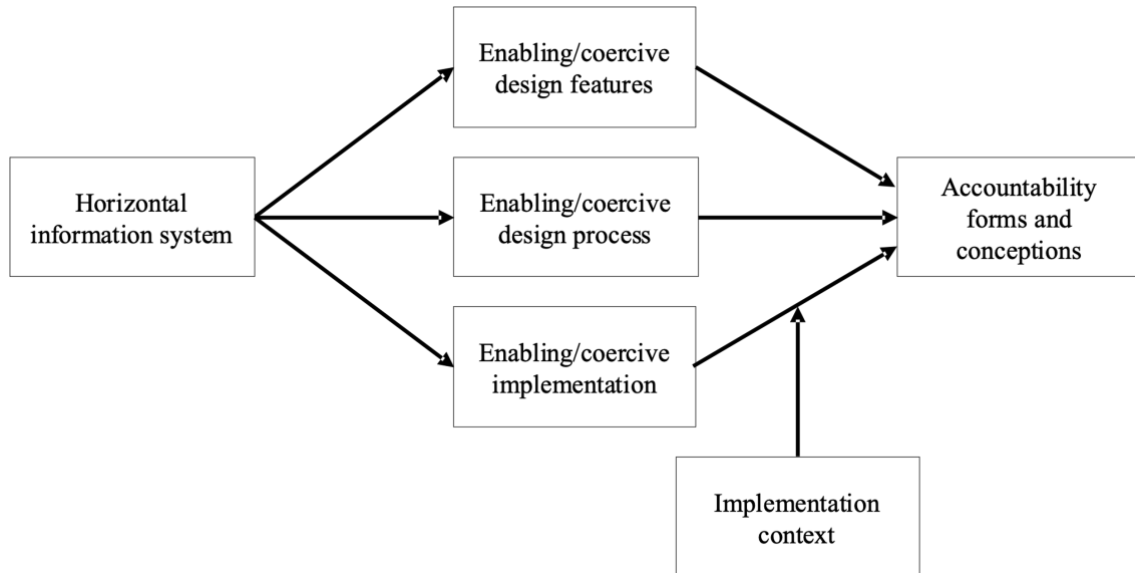
Figure 1. The adapted Adler and Borys (1996) framework

Against this background, we propose that Adler and Borys' (1996) theory of enabling and coercive control allows for the development of a deeper theoretical understanding of the relationship between public sector digitalization and accountability. More specifically, we suggest that the extent to which the design features (i.e., repair, internal transparency, global transparency, and flexibility), the design process, and the implementation of a control system are perceived as enabling or coercive by employees, can help explain how public sector accountability forms and conceptions are affected by the implementation of a horizontal information systems.

3. Method

This section will discuss the method employed. First, Section 3.1 motivates our research design, including the choice of study and empirical setting. Thereafter, Section 3.2 presents the data collection process. This is followed by a description of how the data has been analyzed in Section 3.3.

3.1. Research design

3.1.1. Choice of study

According to Pratt (2009), qualitative research is appropriate for addressing "how" questions (as is the aim of this study); for understanding the world from the perspective of those studied (which is necessary for exploring the multiple, contested, and dynamic forms and conceptions of accountability within a public organization); and for examining and articulating processes (such as the implementation of a new information system). To unpack the effects of how horizontal information systems are designed and employed in practice, and how they are implicated in public sector accountability forms and conceptions, we therefore draw on a qualitative case study conducted in a single organization (Ahrens & Dent, 1998; Lukka & Modell, 2010).

Eisenhardt (1989, p. 534) describes the case study as a *"research strategy which focuses on understanding the dynamics present within single settings"*. A *single* case study then, which truly isolates the dynamics of interest, offers a setting that is even more focused (Dubois & Gadde, 2002; Edmondson & McManus, 2007; Eisenhardt, 1989), leading the researcher to see new theoretical relationships (Dyer & Wilkins, 1991). This method was chosen in favor of the multiple case study as the latter, although it allows for comparative insights, requires a trade-off with regard to the deep understanding of a particular setting (Dyer & Wilkins, 1991). A single case study made it possible to investigate the phenomenon of interest in its detailed context, against a rich background of organizational processes, tensions, and competing interests; as public sector accountability, by definition, is multifaceted (Bovens et al., 2014), plural interests that reflect the coexistence of multiple logics must be considered (Brignall & Modell, 2000; Reay & Hinings, 2009). This contextual, in-depth understanding, along with the contrasting findings within the case, thus allowed for an appreciation of the dynamics that surround the design and use of a new information system – as well as the actors involved. Our choice of study therefore provided a plausible, contextually rich explanation of the implications of digitalization for public sector accountability that has theoretical value; *"theory that is born of such deep insights will be more accurate and more appropriately tentative because the researcher must take into account the intricacies and qualifications of a particular context"* (Dyer & Wilkins, 1991, p. 615).

3.1.2. Choice of empirical setting

For the selection of empirical settings in qualitative case studies, Emmel (2013) emphasizes the need for fit with the particular phenomenon of interest and provision of meaningful data for the research in question. Maxwell (2012, p. 97) refers to this approach as purposive sampling, in which *"particular settings, persons, or activities are selected deliberately to provide information that is particularly relevant to your questions and goals"*. The choice of PublicOrg's healthcare organization as empirical setting for the case study was thus mainly based on its relevance to the research question and the authors' access to data. The region in question has attracted both national and international attention for its contribution to the digital transformation of healthcare through its pioneering, data-driven methods. As Swedish healthcare organizations traditionally are fragmented and operate in silos (Lingman et al., 2021), it is one of few examples on the implementation of a horizontal information system that cut across the organization in such a setting (The Swedish National Board of Health and Welfare, 2019). Traditionally characterized by a rigid hierarchical organizational structure, PublicOrg's healthcare organization was thus deemed an information-rich case of particular interest to our research question as it could provide empirical evidence on how public sector accountability forms and conceptions are affected by the implementation of a new, horizontal information system.

In addition, and given the potential difficulties and challenges of gaining entry for data collection purposes into large and complex organizations in which people value the opportunity cost of their time highly (Easterby-Smith et al., 2002), the selection of empirical setting was dependent both on the region's willingness to participate and on our tutor's access to it through a national research project on information-driven healthcare that both parties are involved in. By helping to achieve an agreement with the organization on what, when, and how empirical data were to be collected, he facilitated our access to a rich and diverse dataset that allowed for comprehensive understanding of the relationship between digitalization and public sector accountability.

3.2.   Data collection

Empirics have mainly been collected through semi-structured interviews with relevant parties from the case organization. While maintaining access was challenging due to the fact that interviewees were very busy, we managed to anchor our project across multiple levels in the organization and were able to interview 12 employees in total. It was important to interview both users and producers of data and information within the organization to understand how accountability forms and conceptions have been affected by the new system given its different features, the process of designing it, and how it has been employed in practice. Interviewees were also selected to capture different forms of accountability relations across the organization, as well as to reflect the multiple interests

and perspectives present in a healthcare system. In addition, three interviews were held with members of a Swedish University (one professor in nursing, one professor in health innovation, and one board member of the school's health data research center) who have also been part of developing information-driven healthcare in the region. These interviews thus allowed us to gain a deeper understanding of how the implementation of a horizontal information system in the case organization affects accountability forms and conceptions from a more theoretical, external point of view.

The first round of interviews included interviewees that were identified as relevant for our research question based on their formal role in the organization or their role in developing and implementing the horizontal information system to promote information-driven healthcare. This selection was done in dialogue with our contact person in the management group of PublicOrg's healthcare organization, who also provided and facilitated access to these people. When a second round of interviews were conducted to include further perspectives and deepen our understanding of the formulated research question, the snowballing technique by which participants recommend other relevant actors (Bryman & Bell, 2011) was instead used to determine subsequent interviewees. This approach was deemed appropriate as it allowed us to identify relevant people to interview based on issues that needed further exploration.

In total, 18 interviews were conducted with 15 different interviewees during the spring of 2023 (see Appendix A for full interview details). 13 were held virtually and five were conducted on-site and face-to-face, all lasting between 30 and 80 minutes. Compared to a fully structured interview method that promotes standardization, our semi-structured interviews consisted of a combination of structured and open-ended questions, thus offering flexibility to both interviewer and interviewee. Interviewees were allowed to structure their answers freely and expand on their responses to questions of particular relevance to them, leading to more in-depth and rich data; the interviewer could adapt to the interviewee's responses by asking follow-up questions, thus allowing the direction of the answer to lead the conversation toward new interesting findings (Bryman & Bell, 2011). While most questions were constant for all interviewees, the interview guide (see Appendix B) varied to some extent depending on their professional role. The interviewees agreed to participate in the study by signing a consent form that described the aim of the study, informed them about the terms and conditions of the interview, and disclosed what personal data would be processed. After asking for initial permission, all interviews were audio-recorded and transcribed, and detailed notes were written up within a day. Both researchers were present in all interviews; one responsible for leading the interview and one for taking notes and asking follow-up questions based on how the conversation developed. According to Eisenhardt (1989), this increases the chances that case evidence is viewed in divergent ways.

In addition to our interviews, we reviewed both company-internal documents such as presentation slides and illustrative examples of dashboards, as well as publicly available

documents such as the region's recent budgets and annual reports. This also included a handbook on information-driven healthcare (Lingman et al., 2021) based on experiences of practitioners and written by members of the case organization in collaboration with researchers from different fields. These additional sources helped us formulate interview topics, find new areas of interest during the data collection phase, and obtain a deeper understanding of information-driven healthcare and the implementation of a horizontal information system from multiple perspectives. This information-gathering process was conducted before, during, and after the interview period to allow for triangulation of our data sources; by analyzing these documents we could validate and corroborate the findings obtained during the interviews (Bowen, 2009; Messner et al., 2017). Thus, this process has been helpful in ensuring the reliability of the evidence (Vaivio, 2008; Yin, 2014).

3.3. Data analysis

We have adopted an abductive approach to research in that established theory has been confronted with the empirical world continuously throughout the research process by constantly moving back and forth between problem, theory, and data (Ahrens & Chapman, 2006; Bryman & Bell, 2011; Dubois & Gadde, 2002). According to Lukka and Modell (2010, p. 467), *"abduction is about developing ('inventing') theoretically informed explanations to new, and often surprising, empirical observations"*. Such an open-minded approach is particularly fruitful when theory is nascent and the objective is to discover new things (Dubois & Gadde, 2002; Edmondson & McManus, 2007), thus deemed appropriate for our study since information-driven healthcare is a relatively new phenomenon and empirical evidence for the effects of digital data and technologies on public sector accountability is still lacking (Agostino et al., 2022). Followingly, the data collection was alternated and integrated with data analysis in an iterative process through which recurring theoretical themes emerged from empirical observations and informed further data collection (Edmondson & McManus, 2007; Eisenhardt, 1989). The analytical process thus involved several rounds of coding and frequent reference to research.

We began analysis already during the interview process: after each conducted interview, interesting ideas were immediately discussed, analyzed, and noted down. Following the logic of Dubois and Gadde (2002), emerging themes were then used to amend subsequent interview questions to reflect the current status of the analysis. Consistent with an abductive research approach, our research question also evolved over time as we engaged iteratively with empirical evidence from the interviews and extant literature that helped us make sense of our findings. While we initially had Orlikowski and Gash's (1994) conceptual framework for technological frames of reference in mind to analyze how the sense-making of a new information system (either by different organizations or professions) relates to accountability, it became apparent throughout the process that Adler and Borys' (1996) theory of enabling and coercive control constituted a more

effective and informing framework to analytically capture the nuanced dynamics of a horizontal information system implementation. This mainly due to the emergence of differences in employees' perceptions of the system's enabling orientation with regard to accountability in terms of its design versus its implementation.

Having completed nearly all interviews, the data was initially arranged in terms of common themes, such as different forms of accountability (e.g., hierarchical, horizontal, external, internal, formal, and informal), and specifics linked to the information system (e.g., the single database, integration of different data sources, predictive analyses, and dashboards). Theorizing our data, we then related these empirical themes to the main theoretical concepts of the enabling and coercive control framework (i.e., how the information system is designed to foster repair, internal transparency, global transparency, and flexibility, and how these design features, the design process, and the implementation in turn are perceived as coercive by employees or as enabling them to uphold different forms and conceptions of accountability; see Appendix C for a coding tree). We observed that the shift from siloed to integrated production and consumption of data enhanced horizontal accountability within the organization. Drawing on the framework of enabling and coercive control, we interpreted this techno-social development as being enabled by the new information system's *design features* (see Section 4.2) and the *process of designing* it (see Section 4.3). However, we also found that the *implementation* context to some extent discouraged its enabling orientation due to the existence of contrasting accountability forms (see Section 4.4). As such, the framework of enabling and coercive control was pertinent in guiding the analysis of our empirical findings. Organizing our data into quote tables based on the categories deducted from Adler and Borys' (1996) framework (described above) and categories developed inductively from the empirical material (i.e., the need to differentiate between employees' contrasting accountability forms), allowed for an in-depth discussion and a theoretically guided narrative that enriched our understanding of how public sector accountability forms and conceptions are affected by information technologies.

4. Empirical analysis

This section will present and analyze the empirical findings drawn from our case through the lens of our theoretical framework, which integrate the domain theory of public sector digitalization and accountability and the method theory of Adler and Borys' (1996) enabling and coercive control. Section 4.1 provides the background to PublicOrg's implementation of a new horizontal information system and the context in which it has been implemented. Thereafter, its implications for accountability forms and conceptions are analyzed: Section 4.2 focuses on the system's design features, Section 4.3 on the design process, and Section 4.4 on its implementation.

4.1.   Background and context

The case organization PublicOrg is a mid-sized Swedish region. Composed of multiple divisions including city planning, traffic, culture, education, and healthcare, its mission is to promote continued development and growth in the region and offer its residents good healthcare. The healthcare division, which functions like a stand-alone organization with divisional managers and local support functions (e.g., finance, IT, and HR), employs around 9,000 people and is responsible for providing high-quality care to the region's residents. It consists of five divisions which are overseen by the Healthcare Director: (1) Hospitals, (2) Primary Care, (3) Ambulance, Diagnostics and Health, (4) Psychiatry, and (5) Region Service (see Figure 2 for a simplified organizational structure). These divisions in turn have an appointed Executive Director who is responsible for managing and coordinating operations and resources across all clinics, units, and functions within that division. Each division is governed by a political committee, which entails an "upward" straight-line relationship of political accountability from public servants to elected politicians. While the regional politicians are not involved in the healthcare organization's daily operations, they do oversee its strategic direction, goals, and objectives.
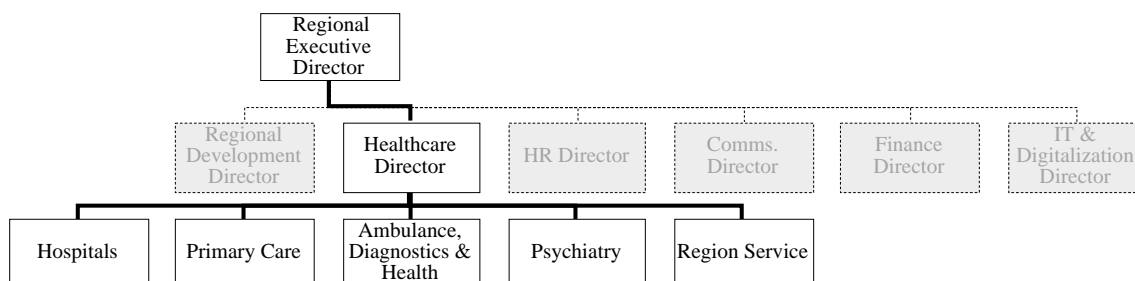

Figure 2. Simplified organizational structure of PublicOrg

The healthcare organization of PublicOrg has traditionally been decentralized and fragmented. Followingly, accountability has mainly been hierarchical in nature and

discharged vertically to superiors or political counterparts – further characterized by a strong focus on fiscal accountability since PublicOrg's most important financial target is to achieve a balanced budget. To achieve this, the overall healthcare budget is broken down into divisional budgets, which then are used as financial tools for the resource allocation within each division. However, as a public healthcare organization, the region also has a statutory responsibility to deliver "good and close healthcare" (SOU2020:19) to its residents. According to Sweden's National Board of Health and Welfare this implies an integrated care and a holistic view of the patient's needs throughout entire care pathways. As such, PublicOrg additionally owns horizontal accountability for the delivery of care to the public across both divisions, medical specialties, and professions.

To fulfill its external obligation, PublicOrg's healthcare organization has throughout the last decade developed and implemented an initiative called information-driven healthcare. The aim is to break down existing silos and instead create an integrated healthcare system in which resources, based on data-driven insights, are allocated efficiently also according to horizontal priorities – the underlying rationale being that this could help the region overcome the challenges that healthcare is facing by enhancing the overall effectiveness of its system. Since data in the organization traditionally were structured in a fragmented manner according to vertical interest groups (i.e., divisions and functions), the strive for an integrated care led the implementation of a new process-oriented, horizontal information system that would allow for a holistic overview and monitoring of the healthcare system as a whole.

PublicOrg began to build the infrastructure for this new information system around 2014. This involved the combination of data from different divisions into a single database – a first iteration of the new system that allowed for more centralized data analysis in the organization. In 2016, PublicOrg then entered a three-year long partnership with a US medical school. Together they initiated an information system integration project during which they continued to build on the old system's infrastructure to combine clinical, financial, and human resource data into the same database, today referred to as CIDD. A such, data from all facets of the organization could for the first time be found in the same place. Since the project with the medical school ended, PublicOrg has focused on how to implement the new horizontal information system in the organization at large to transform the integrated data into actionable insights that can help improve the effectiveness of the healthcare system as a whole. Drawing on Adler and Borys' (1996) framework of enabling and coercive control, the following sections analyze whether and, if so, how the design features, design process, and implementation of the new system have been perceived as coercive by employees or as enabling them to uphold their accountability to the public.

4.2. Implications of the system's design features for accountability

4.2.1. Repair enables outward and horizontal accountability through completeness of information and new types of analyses

Before the introduction of the new information system, data in PublicOrg was stored on a local basis and used almost exclusively by those who needed it to perform their formalized managerial tasks. Hence, employees did not encounter data outside their domain and different divisions did not use data from other parts of the healthcare chain. As such, it was difficult for organizational members to enact horizontal accountability, which was recognized by management as a prerequisite to provide good care:

> We realized that the facts we need exist in the data that we have, and we did have loads of data, but it was isolated in different cans. The controllers looked at financial data in one can, the clinicians looked at clinical data in another, and the lawyers looked at legal data in a third. So, everyone just sat in their different functions and looked at the data they were responsible for, but for us who are accountable for the whole picture, we needed to integrate it and be able to consider multiple perspectives at the same time. To be able to do so we needed to make sense of all available data simultaneously, and to do that we needed a database where all data are gathered in one place, which is why we started to build it [the new information system]. (Strategist)

Due to the old system's silo structure, financial data was previously often used as the sole source of information to inform resource allocation in the organization. Connecting this to the concept of completeness of information, scholars have argued that accounting information usually does not capture all the dimensions of performance (Jordan & Messner, 2012). In the context of healthcare, this means that if a manager makes decisions solely based on cost information, there is a possibility that certain significant aspects of the organization's performance, such as the quality of patient care, may not receive adequate attention. Our empirics suggest that prior to the implementation of the new information system, the information used in PublicOrg for decision-making related to budgeting and resource allocation, for instance, could thus be considered an incomplete representation of organizational performance and as such also an incomplete guide for appropriate action (Hopwood, 1972; Jordan & Messner, 2012):

> Budgeting and resource allocation have been based solely on previous experience and strongly guided by historical costs. You just put up a finger in the air to feel where the wind blows from. It was the best we could do. To be able to do better estimations of resource utilization, and make sure that we allocate resources to the right place and right activities, based on evidence rather than experience, we need this [new information system]. This because we are prone to put a band-aid on the wound but never ask why we get the wound in the first place. And in these cases, I believe that information-driven healthcare can be incredibly helpful. (Executive Director Division 2)

Jordan and Messner (2012) propose that incompleteness of information can be addressed through repair work. Recognizing incompleteness as an issue in the decision-making process and consequently the allocation of resources, PublicOrg decided to build a more sophisticated, horizontal information system. Our interviews revealed that the new system

repaired information, and thus made it more complete, in two main ways. First, it inherently incorporated multiple perspectives in its design. This by including both different types of data (e.g., financial, clinical, and human resource) and data from different parts of the organization (e.g., divisions, clinics, and functions) in the same database. This resulted in increased consideration of multiple interests and perspectives in decision-making processes – our empirics suggesting that the new information system thus was perceived by employees as an enabler for more horizontal, or holistic, forms of accountability (Adler & Borys, 1996):

> The integration of data has forced people outside of their comfort zones, and when that happens people realize that this is pretty complicated – "are we supposed to take into account legal considerations all of a sudden? And patient safety?" says the accountants, "but that doesn't fit into my excel sheet". So, it's been a very exciting journey during which everyone has had to consider new perspectives to understand each other. (Strategist)

> Previously, it wasn't possible to view all this data simultaneously because it was divided into silos. Today, the new information system makes it possible to look at an issue from different perspectives. Therefore, it isn't worth as much to be the person who has the right to have an opinion on all issues. Instead, the focus lies on ensuring that the decisions we make have captured as many different perspectives as possible. You can't really work as a manager in an organization if you don't have a grasp of both your organization's operations, finances, and HR situation. (Director 1)

An example of the usefulness of including multiple types of data in the new system was how it helped PublicOrg develop a new costing system called Patient-Encounter Costing (PEC). The new system was based on activity-based costing and allowed PublicOrg to identify cost drivers and calculate the cost per activity throughout the healthcare value chain using input from the integrated information system – thus moving from "silo calculations" to "system calculations". By combining clinical, resource, and cost data in the same system, PEC could be used to measure actual healthcare consumption and estimate capacity needs or surpluses. Perceived as a more complete guide for appropriate action, the use of PEC thus led to cost savings without compromising the quality of the care delivered (Jordan & Messner, 2012):

> PEC helped us realize that the resource intensity in the healthcare system is the highest in inpatient care. To reduce the need for inpatient care, we chose to invest more in our emergency departments back in 2017 to provide them with the resources needed to finish patients there instead of admitting them. For example, we increased the number of doctors at the intake, which allowed them more time to make accurate assessments. This was a huge investment, but it proved to be cost-effective in the sense that we now have been able to reduce the number of hospital beds. […] We started this journey with 650 hospital beds and are now down to around 470. Simply put, a hospital bed costs about one million to operate, so you can just quick and dirty calculate the opportunity costs. […] Since we don't have higher occupancy levels in inpatient care today than we did seven years ago, this was a successful initiative. (Strategist)

The second way in which the new information system led to repair of information was that it enabled new types of analyses. Prior to its introduction, PublicOrg relied heavily on its old database (referred to as BIR) to oversee and control the healthcare organization. The purpose of BIR was mainly for managers to be able to control what different divisions produced and to see their respective budget results, thus mainly facilitating the production

of routine reports (Chapman & Kihn, 2009). The new system was instead designed with a more enabling logic, whereby users were able to make changes to the format and make-up of measurement reports. As such, it could be used for different, and more forward-looking, types of analyses – for example what-if analyses and predictive analyses:

> We've developed dashboards and other tools that enable managers to do what-if analyses. […] For example, you can create a cohort of patients and see how the total costs change regardless of where they are in the system. […] If you want to work with strategic questions then you want to take into account multiple factors to be able to predict what will happen, and with the help of new tools such as AI, for example, we can get ideas of what we should do. (BI & Data Scientist)

An example of how the new types of predictive analyses powered by artificial intelligence proved useful in resource allocation, and staffing more specifically, was highlighted by a data scientist in PublicOrg:

> We have a thing that we do at the emergency room where we look at the inflow of patients. It's a mix of business intelligence in a dashboard that visualize the inflow of patients, what you seek care for, if there is waiting time, and how long time it will take to get through. You can also see how many patients are red, green, and orange and based on that predict how many will come in the next hour, or in two or three hours, so that you're able to staff accordingly. This is a great way to save resources without compromising quality [of care]. (BI & Data Scientist)

Our interviewees suggested that the possibility of repair that the new information system offered thus helped improve the overall effectiveness of the healthcare system. This as both the new types of analyses and the combination of different data sources in PEC could be used to identify interventions that maximize patient benefits in relation to allocated resources – something that was not possible before the introduction of the new system. Drawing on Adler and Borys' (1996) framework of enabling and coercive control, our findings thus indicate that the horizontal information system was perceived as an enabler for employees to better enact their external, or "outward", accountability toward the public – they could both deliver better care to their patients and make more efficient use of the taxpayers' money:

> We are accountable for offering the citizens the highest possible quality of care within the framework of the resources that society can allocate to healthcare. The vision [with information-driven healthcare] is thus that it can help us provide better care – more tailored and focused treatments for already ill patients and more accurate predictions of who will become ill – while using resources more efficiently. [...] So in our efficiency improvement efforts, which are guided by this new information system, the goal is to release funds that we can use to provide other healthcare services – more and better care. It's not about providing financial returns to the owner, but it's equally important to constantly work on efficiencies to free up resources that can be invested in creating better and better healthcare. (Director 2)

4.2.2. Limited internal transparency promotes workarounds that ultimately enable horizontal accountability

Our interviews revealed that the internal transparency of the new information system was primarily perceived to be limited to data professionals, responsible for the technical aspects in developing the system, and later also for extracting the data and visualize it in comprehendible ways. Some managers highlighted that while this constituted a barrier to

scaling the usage of data within the organization, it was necessary to ensure the reliability and quality of the data:

> You need someone who can build a database and understand how the system works – if I enter 5 and 6 comes out, you need someone who understands what happened along the way. (Controller)

> He [a data scientist] is one of the foremost experts on the data itself – what data we have, what it means, how it fits together, and how to analyze it based on specific questions. He has that knowledge, but there are very few people [in the organization] who actually have that. [...] And that's a barrier – it doesn't scale, the way we work with it today. (Director 1)

While the system's internal transparency thus was perceived to be low among managers in the organization, new collaborative ways of working with data fostered cross-professional discussions revolving the underlying data and, in turn, an opportunity to improve the data quality when errors were found. Hence, expanding on Chapman and Kihn (2009), our interviews revealed that while a thorough understanding of the nature of the system being repaired was lacking, pluralistic dialogues and collaborative efforts seemed to mitigate the lack of understanding and helped in efforts to repair the system:

> It's very important when working with data in general, but especially with operational development data related to resources, to truly understand what the data is showing because it's easy to draw hasty conclusions if one doesn't accept that this is quite difficult and complex. That's why we work in these cross-professional teams when we analyze data. The doctors, managers, controllers, and others work closely together to avoid drawing hasty conclusions. (Strategist)

Also, the participation and ability to question the numbers presented allowed organizational members to build trust in the underlying data despite their inability to comprehend its limitations, which in turn both improved the quality of the data and fostered productive discussions focusing on solutions, rather than on the data in itself:

> We adjusted the new database. If something was wrong with the data, we went to the root of the problem to correct it. So that has also enabled us to improve the quality of the data in the database and allowed us to identify holes that we could fill, so now it rarely happens that people question the data itself. Instead, we now talk directly about the question at hand. That increases the efficiency in the work within the management group a lot because we no longer need to talk about the map, instead we can talk about solutions. (Strategist)

Another important change raised by the interviewees was that the organization started to visualize data in new ways that made it easier to understand for managers – that is, the information was translated into a language familiar to the users (Adler & Borys, 1996). For example, they started to work with dashboards, with the core purpose of making data more accessible to the users:

> When I started working at [PublicOrg] about 10 years ago, data was not visualized at all. It was just tables and very dry and raw. And that's probably also a challenge – people have been used to looking at data in that way, quite dryly, like "yes, we had 10 patients last week and now we have 15", and so on. You do want to keep track of this, but it may not provide a lot of value to the business. But now, in basically everything we do, we try to visualize it in a good way so that it becomes more accessible to the user. (Business Analyst)

Combining our observations, the cross-professional collaboration and access to data in more comprehendible ways (e.g., through dashboards) could be viewed as workarounds that helped managers overcome the system's lack of internal transparency and enabled increased use of integrated data within the organization. Our empirics suggest that making sense of the data was crucial for non-data professionals to recognize the information system as useful in their professional roles in the first place. Thus, we rather interpret internal transparency in the case of PublicOrg as a precondition for other design features to be perceived as enablers for horizontal accountability than as having a direct effect on accountability forms and conceptions itself.

4.2.3. Global transparency perceived as an enabler for less individualizing and more horizontal and dialogic forms of accountability

PublicOrg's traditional database BIR had, in line with Adler and Borys' (1996) reasoning, been designed with a logic perceived as coercive by its users. As typical for traditional information systems, data were structured to facilitate vertical information flow according to the organizational chart in multiple, independent systems and mainly used for reporting work. Hence, BIR mainly encouraged line managers to prioritize their own budgets (i.e., vertical, internal accountability) and did not provide them with any contextual information that could help them understand where and how their actions fit into the healthcare organization as a whole. The lack of linkages between processes across the healthcare chain associated with the old system thus led to suboptimizations for the healthcare organization at large by preventing efficient use of resources:

> A patient might visit different divisions along a care pathway. First, it's picked up in an ambulance, then it's taken to the hospital, then it's directed to primary care, and all of a sudden three divisions are involved in the process. If primary care instead would take on certain activities that usually are done at the hospital, the need for hospital care would decrease, leading to savings double as high as primary care's investment. However, we could never have implemented such a change with our old system, as it didn't position the individual division in relation to the healthcare system as a whole. Then, primary care instead would have prioritized to optimize its own budget and been unwilling to make the necessary investment, resulting in suboptimized use of resources and increased costs on the total. (Strategist)

The horizontal information system was instead designed to enhance global transparency. Our empirics suggests that it did so in three main ways. First, broader system status information was no longer distributed on a restrictive need-to-know basis. On the contrary, the starting point was that *everyone* in the organization should have access to *everything* – restrictions only being imposed if needed for patient safety reasons. As Adler and Borys (1996) argue, this seems to have encouraged employees in PublicOrg to move beyond their specific realms:

> "We believe that we can achieve the greatest impact by avoiding a monopoly on conducting analyses. When people gain access to numbers, data, and information, they generally become curious. This curiosity can spark initiatives and ideas on how to design the healthcare system or develop care processes in smarter ways. And sometimes, people followingly take complete

ownership of developing a new way to manage diabetes care or lung cancer care on their own initiative." (Executive Director Division 1)

Second, and in line with Chapman and Kihn's (2009) findings, PublicOrg's horizontal information system contributed to global transparency by allowing for extensive process mapping. The scope and content of the new system made it possible to link healthcare activities, or patient encounters, across the individual steps within a patient's care process. Compared to previously, the region could now follow a patient's journey along entire care pathways and across vertical units. As such, the design of the information system allowed for a comprehensive view of the healthcare system as a whole, providing a holistic understanding for top management of how different components are interconnected:

> If you're a business group, which we can liken ourselves to, what counts in the end is the bottom line on the consolidated income statement. Consequently, we [top management] aren't that interested in the result of a single unit, but rather in each unit's contribution to the combined results. For that, we need to be able to see the whole picture and not only what a single unit does – only then can we realize what moving resources from one part of the system to another will do to the total. [...] We look at patient journeys – how patients move through the emergency department, radiology, a hospital ward, and so on. To keep track of these processes and the costs related to the activities within them, you need to gather and structure data in a different way – and that's what we did. Compared to the old one, our new system is structured around care processes and much more patient-centered, allowing us to follow a patient's journey along entire care pathways. (Strategist)

Thanks to the new system's contribution to global transparency in terms of process mapping, PublicOrg's operational managers could to a greater extent also understand where and how their actions sat in relation to larger organizational goals, strategies, and agendas – that is, the up- and downstream implications of their work (Adler & Borys, 1996; Chapman & Kihn, 2009). This was recognized as important in improving the overall efficiency of resource utilization:

> Primary care's patients are our patients too. […] Thanks to our new information system that allows us to follow patients across entire care pathways, [...] we can now see that if an activity usually employed at the hospital is performed earlier in the healthcare chain instead – say primary care – it wouldn't only have positive implications for the patients, but we could also bring the investment home multiple times in terms of less consumption of hospital care, which is much more resource intensive. So, on the total in [PublicOrg] it's a no brainer. But then everyone needs to buy in on this and accept accountability for the system as a whole. This includes me – I have to accept that this means that I may need to down-size my own division and move resources to another part of the healthcare chain, as this is better on the total. (Executive Director Division 1)

> I feel personally accountable for the citizens of the region – that means all citizens, not just "mine". [...] And that's what I am trying to emphasize – that it doesn't matter where the money come from, because ultimately, it's the taxpayers in the region who are paying, whether it goes to me or to the hospitals. I believe it's a zero-sum game. (Executive Director Division 2)

To identify areas of improvement in their own operations, primary care just recently decided to analyze the inflow of patients at PublicOrg's emergency departments:

> We wanted to investigate the flow of patients to the emergency departments to learn whether it's actually true that so many people go directly there without first consulting a primary care physician – and, if so, where in the flow we could implement measures to reduce the influx to the emergency department, as the provision of care is more expensive there. So far in our data

analysis, we have identified certain times during the day that people are more prone to pass us by and specific groups that have a higher tendency to do so, such as parents with young children. While we initially believed that the evening and weekend clinics were more of the problem, we have realized that they are not; instead, it's likely our healthcare centers that should take the blame. (Digitalization Lead Division B)

These observations further point to an increased sense of shared horizontal accountability in PublicOrg's healthcare organization. This as employees now to a greater extent were concerned with the use of resources in the healthcare system as a whole – and not just the vertical performance of a single organization within it. Drawing on the theory of enabling and coercive control (Adler & Borys, 1996), management seemed to perceive the new information system as an enabler for such horizontal accountability – global transparency being an important design feature that made visible issues beyond one's formal, vertical, and managerial accountability. A strategist discussed how process mapping helped visualize the mutual obligation between bodies of equal standing in the healthcare system to provide public services across organizational boundaries, further acknowledging healthcare providers' outward accountability to patients, as well as their inward duty to professional standards:

> When data are structured in a way that allows you to follow a patient throughout his or her journey across the healthcare system, it becomes very clear that one is accountable for the delivery of care beyond one's own unit or division. Previously, the hospital could simply discharge a patient without taking into consideration the next step in the process, which resulted in a lot of additional work for primary care or the municipality. But if you're made aware of that additional work, you will likely acknowledge that accountability, as all healthcare professionals ultimately want to do good and ensure the patient's recovery.

The strategist further provided two examples of activities implemented by PublicOrg's hospitals as a result of data-driven insights to minimize the burden on other bodies in the healthcare system:

> Already when a patient is admitted to inpatient care, the hospital defines a preliminary discharge date. This gives the municipality a heads up several days earlier than they would otherwise have received. When then discharging a patient from a ward in inpatient care, you could choose to do it at any time of the day. However, to facilitate the discharge process and ensure that the recipient is ready to receive the patient, it's better to do it in the morning than in the afternoon. Otherwise, the municipality might have to receive the patient after working hours, which is more burdensome for them. Therefore, the region's hospitals have decided to bring forward the discharges from inpatient care to before noon.

In PublicOrg, this horizontal form of accountability was to some extent even formalized. Around six years ago, they introduced a new professional role called process lead. As process lead, you are held accountable for the oversight and optimization of processes in the healthcare organization at large related to patient care, treatment, and outcomes for a specific diagnose (e.g., heart failure, renal failure, diabetes). This resulted in a matrix organization of line and process organizations – that is, both vertical and horizontal accountabilities. While line managers answer for whether money is spent according to budget and defined outcomes in day-to-day operations are realized (i.e., fiscal and program accountability), process leads are responsible for mapping out current processes

to identify areas for improvement, developing new procedures to improve patient outcomes, and monitoring the effectiveness of implemented practices. The findings are reported both to affected line managers and the director of healthcare. This formalization of horizontal accountability – beyond simply a *sensed* moral or social obligation to report to stakeholders across organizations – was also perceived as enabled by the new information system's contribution to global transparency:

> Process leads are accountable for optimizing the delivery of care in a specific healthcare process, regardless of where the patients are located within the system. This requires comprehensive understanding of the patient's journey throughout the entire care pathway, which is something the new information system helps visualize through dashboards. These dashboards – we're in the process of developing one for chronic obstructive pulmonary disease but we already have one for heart failure – provide a tool for process leads to track the development of their specific disease in terms of incidence and prevalence. They allow for monitoring of the size of the patient population over time, the number of new diagnoses per year, changes in mortality rates, the frequency of relapses, and so on. When utilized by process leads to identify trends and potential areas for improvement across the healthcare system, they can thus inform decision-making and ultimately lead to better patient outcomes. (Director 2)

Better patient outcomes were, in collaboration between process lead and line organizations, for example achieved in heart failure. Thanks to the possibility of process mapping, PublicOrg was able to identify procedures that did not comply with evidence-based guidelines for appropriate pharmacotherapy. A process lead described the information-driven corrective measures undertaken to increase the access to ultrasound examinations of the heart:

> We had a concrete problem with low access to ultrasound examinations of the heart in a specific city – an important test for heart failure. So, we took two steps. First, we increased the production by 25% net. This worked well in the beginning, but then accessibility decreased again. That's when we realized that this isn't just about production, but also about the inflow of patients. In the next step, we did a pilot by assigning specific doctors to assess referrals and decide whether to accept a patient into the queue or not. Previously this was done by anyone working in that position, but during our pilot period of 4-5 months there were only two. By controlling the inflow, we were able to reduce the queue by 17%. This wouldn't have been possible to investigate or address without a dashboard illustrating the inflow and outflows of heart failure patients. (Process Lead)

Such preventive actions, in turn, led to fewer hospital admissions; as heart failure patients are heavy users of healthcare, costs were thus significantly reduced.

Further in line with both Adler and Borys' (1996) and Chapman and Kihn's (2009) reasoning, the third way PublicOrg's horizontal information system contributed to global transparency was by encouraging interaction between previously distant individuals – both in terms of profession and organization – as data entered in one place flowed through to others:

> Being able to follow patient flows in the data, which span across different parts of the organization and often even extend outside the organization, increases the incentive for interaction between previously distant individuals. This interaction, in turn, have led to enhanced collaboration; today, we have intertwined agendas and share each other's ambitions, understanding that we are important in achieving each other's goals. (Director 1)

This too bore consequences for accountability. Our empirics suggest that the new information system's design enhanced horizontal, dialogic, and coproduced forms of accountability by opening up possibilities for increased bi- and multidirectional exchange aimed at achieving mutual benefits – for example, between line managers and process leads. A divisional executive director pointed to how the new information system helped develop trusting relationships between a broad range of stakeholders and involve them in dialogue and debate to agree the values and priorities that should drive PublicOrg's strategy:

> I experience that we can engage in dialogue among divisions in a more mature way when we actually can follow the data across. We have so many individual beliefs about the nature of the world; when we approach it from completely different perspectives – as we did when the actual facts were structured in silos – we'll therefore never truly be able to understand each other. But now that we can look at the data collectively and use it to agree on mutual priorities, we can tackle these issues together in a more objective and rational manner and thus deliver better care to our citizens. (Executive Director Division 2)

Drawing on Adler and Borys' (1996) theory, employees thus also seemed to perceive the horizontal information system as an enabler for less individualizing, and more socializing, forms of accountability. The traditional focus on budgets and individual outputs associated with the old system were expressed to foster a form of accountability that failed to fully recognize mutual responsibilities and rather encouraged internal competition. In contrast, our empirics suggest that the healthcare organization now was much more concerned with holistic outcomes of collaborative efforts. Interviewees seemed to relate this change to the new information system, pointing to how the dialogue and global transparency that it promoted enhanced forms of accountability that rather confirmed self in ways that emphasized the interdependence of self and others:

> Previously, there's been internal competition between different divisions, as each division has only been held accountable for its own budget. It's easy to become somewhat selfish and develop an "us versus them-mentality" when you feel a certain pressure from above. And even if your actions create a mess for someone else in the chain, you can't actually see those consequences when data are structured in silos. With our new system, it becomes clear that if we do this or that, it will affect the hospital or primary care negatively instead, which fosters dialogue across professions and organizational boundaries. You then realize that we work for the same organization and can agree on the same goals, acknowledging our mutual accountability for providing high-quality care to citizens. (Controller)

> Being able to visualize data on how one unit's carelessness turns into a costly problem for someone else has led to better discussions across organizational boundaries. The "somebody-else's problem-ism" has as an effect become less prominent – yes, it might be somebody else's problem, but you can solve that problem by adjusting your own operations. (Strategist)

4.2.4. Both flexible and less flexible features enablers for horizontal accountability

Our observations indicate that the design of PublicOrg's old database BIR did not offer much flexibility to its users. Mainly used for government reporting, it was rather described as rigorous, tightly controlled, and difficult to modify. The new system's

integrated database CIDD was, on the contrary, designed with what Adler and Borys (1996) label an enabling logic – functionalities could be added whenever needed and altered according to demand. A strategist at PublicOrg involved in the development of CIDD described the differences in flexibility:

> They've been designed according to two different logics. The old database is rigorous and difficult to make changes to. There's a highly structured and pre-defined process for how it should be developed, which is deliberately slow in order to maintain stability and prevent tinkering. The underlying logic of the design of the new database, on the other hand, is that it should be possible to quickly adapt it to emerging needs or use cases. It's much more agile in its development. Since there's a smaller number of people working with raw data in CIDD, changes can be made in as little as fifteen minutes if they agree on it in the team. In contrast, modifications to BIR can take several months.

The strategist continued to discuss how BIR entailed standardization whereas CIDD allowed for customization:

> The major limitation of BIR is that data is stored in a so-called universe, meaning that it has been pre-processed and pre-packaged according to specific assumptions of what types of analyses it will be used for. The problem with that is that some data will be left out. If the user then believes that what he or she sees is the whole truth, this becomes highly problematic, as there might be additional data that he or she is not even aware of exists. In CIDD, you basically have to build your own universe to do an analysis. You customize those universes according to evolving needs.

Another feature of the new information system that was perceived by its users to offer flexibility was PublicOrg's aforementioned dashboards. In line with Adler and Borys' (1996) account of an enabling approach to system design, functions were customized for intended users and the interface modified to meet individual needs:

> We call these apps, but they're actually dashboards that we've built for different purposes. As we've chosen to expose data according to specific user needs, we have a huge number of different dashboards. For example, process leads have their dashboards, which allow them to follow the development of their patient populations, whereas managers have other dashboards to monitor the development of their operations, including indicators regarding both finances, personnel, and quality [of care]. (Strategist)

Users themselves were further involved in the design of these dashboards, suggesting that both local knowledge and organizational fit were taken into consideration (Jordan & Messner, 2012). This is consistent with Goretzki et al.'s (2018) findings that information systems have the potential to foster productive collaboration that facilitate the migration of local knowledge into a global system. A process lead explained how:

> I've chosen to get data presented in a manner that I deem essential for carrying out my professional responsibilities. I informed developers that I need to know this and that and be able to monitor these trends, including how many patients have undergone ultrasound, how many are still waiting in line to do so, how many have been diagnosed with heart failure the last month, and so on. Based on this visualization of data [through dashboards], I have then been able to focus my efforts on issues that I've identified as more important than others.

As for the system's internal transparency, these observations also suggest that flexibility can be interpreted as a precondition for other design features to be perceived as enablers of horizontal accountability rather than as having direct implications for accountability

forms and conceptions itself. The possibility to customize the new database for different types of analysis allowed for repair, whereas the individualized dashboards seemed to enhance internal transparency.

However, our interviews revealed that there were also some less flexible aspects of the information system. Managers were for instance no longer allowed to bring forth data on their own results to management reviews. To ensure standardization, this was instead done by the business intelligence function. However, in contrast to what Adler and Borys (1996) argue, this was described as something positive in PublicOrg – the standardization perceived as an enabler of horizontal accountability as it helped managers agree on a common worldview:

> In the past, everyone used to bring their own data to report on their own unit's performance. Each manager presented their own report with their own data, saying things like "look, this is great – we're doing really well". Then the next manager would do the same until everyone had presented their own unit's data. But when calculating the sum of all the reports in the end, it often wouldn't add up. The boss sitting at the end of the table would say that "this isn't correct – the sum of your reports doesn't equal what we see on the last line". [...] Today, we have a business intelligence department that produces everyone's results because no one is allowed to do it themselves anymore, meaning that you no longer own your own narrative. Owing accountability for the delivery of care in healthcare system as a whole, we all have to agree on the map before discussing where we're going. We have to describe our operations consistently to ensure that we are interpreting the data uniformly and that the resulting analysis accurately reflects our collective performance. (Strategist)

4.3.   A user-focused design process perceived as a precondition for horizontal accountability

The process of designing the new, horizontal information system was according to interviewees characterized by an early and continual user-focus, an integrated view of various aspects of usability, ongoing user-testing, and iterative improvements, thus ticking all of Adler and Borys' (1996) boxes for an enabling rationale. Both the new database and dashboards, for instance, were continuously tailored to users' needs and progressively improved based on feedback:

> We receive input on what the intended users want to be able to do with the dashboard. Thereafter, we might develop an early mock-up and ask what they think about it. Then we come up with several proposals and adjust them based on the feedback they give us. (Business Analyst)

> The new database has been organically built to meet demand. It's continuously developed based on what people in the organization need to know and how they think it can be improved. [...] As such, this database has already from the beginning taken a user perspective and to a high degree also involved technically untrained users in the design process, which I believe has been a prerequisite for driving this initiative [information-driven healthcare] forward. The initial needs that influenced the structure of the new database came from top management who required a better overview of the entire healthcare system. But over time, the database has become increasingly useful and valuable also for others. (Strategist)

The importance of early user involvement was further emphasized by a professor in nursing:

> We have so many different managers on different levels in the organization and thousands of healthcare personnel spread across it. We can't engage them too late in the process; rather, they need to be involved and have a say in how the information system should be designed to ensure that it considers what their challenges are and what they seek to understand. If you allow them to be part of this process rather than to push out a solution no one asked for, it will likely lead to long-term positive attitudinal outcomes and a whole different motivation to accept horizontal accountability for the healthcare organization as a whole. If you don't, you can't be sure that the design of the new system will actually be perceived as helpful in doing so.

Drawing on Adler and Borys (1996), these observations seem to indicate that the user-focused iterative process of designing the new information system was an enabler for horizontal accountability in that it constituted a precondition for the design features to be perceived so. Had users not been involved in the design process, interviewees suggested that the resulting system might not have been designed in a way that they perceive effectively supports horizontal accountability; it both built a subjective sense of buy-in and ensured that the technical qualities of the system supported users in their work.

4.4. The system's enabling orientation discouraged by the implementation context

As argued by Adler and Borys (1996), whether a system is perceived as enabling or coercive also depends on the context in which it is implemented – although designed with an enabling intent and embodying enabling features, a system can still be implemented coercively. The implementation context thus encompasses characteristics that are likely to either enhance or diminish the enabling potential of the system. While our empirics suggest that both the features and design process of PublicOrg's new horizontal information system were perceived as enablers for horizontal, outward accountability, the implementation context was still strongly permeated by hierarchical, managerial accountability.

The most positive attitudes toward the new system were expressed by top management and process leads – that is, employees whose horizontal accountabilities were actually formalized in their managerial roles and job descriptions. While PublicOrg had made significant strides in harnessing its horizontal information system to implement information-driven healthcare as a means for fulfilling the organization's horizontal, outward accountability toward the public, this so far mostly had had implications for horizontal priorities on a strategic level. Primary care, for instance, had not until a few months ago started to use the new system for analyses. In the daily operations throughout the healthcare organization, data-driven insights had thus not yet necessarily translated into a change in behavior:

> It's one thing to be able to see it [the information] and take action on it at an overarching level, and another thing to see it and implement new ways of working in each and every unit. To change behaviors and practices at the ground level is more difficult, and progress in that area isn't as advanced. It has mostly been done on a structural, organizational level so far. (Professor in Health Innovation)

Drawing on Adler and Borys' (1996) discussion on the implementation context, our empirics suggest that what prevented PublicOrg from leveraging the perceived value of the horizontal information system across all levels of its organization was the hierarchical and individualizing forms of accountability that traditionally had permeated it. Still strongly concerned with the vertical performance of single units and formal, accounting-type information flows, interviewees at lower levels in the hierarchy expressed that information-driven healthcare and the use of the new horizontal information system to inform actions could become a burden, or an "add-on", to their formal, managerial accountability. This since it was perceived to steal time and energy from the production of individual results, thus indicating that the new system to some extent functioned as a means by which top management attempted to coerces employees' efforts and compliance (Adler & Borys, 1996):

> I would say that there's a two-sided attitude toward technology and its possibilities within healthcare professions. I feel that there's a fairly high acceptance of new solutions, new methods, and the possibilities of technology – perhaps to the point of having a naive attitude of being open to anything that sounds great. But as you get closer to actual implementation, there's greater resistance in terms how it will affect one's formal responsibilities. Often, it is about resources – "is this something I'll have to do in addition to what I am already doing?". Even if you can demonstrate that the new technology will create something useful and valuable for the user, if it doesn't fit into the limited resources in terms of time and staffing, it will be met with a lot of skepticism. Therefore, I experience that there's almost a technology hostility when it comes to its practical use. (Executive Director Division 2)

> Not too long ago, I received an angry message from a key person in primary care who wrote that they could not sit and register all this information because they needed to be out doing their job and take care of the patient. (Controller)

Although both the design features and the design process were perceived as enablers for horizontal, outward accountability, PublicOrg's new information system was thus still perceived by some employees to be implemented coercively – the formal, hierarchical accountabilities that characterized the context discouraging its enabling orientation.

One concrete reason for the strong emphasis on hierarchical accountability was that the organization was still highly budget-driven – its balanced budget target adding to the importance of fiscal accountability while resulting in reduced emphasis on horizontal accountability among line managers:

> Many people are very skeptical about this technology. Because no matter what, you're still held accountable for the fact that money is spent according to budget. And this is where it clashes again. As a line manager, you're formally held accountable for three things – you should run the operation with high quality and good availability, you should have a good working environment for your employees, and you should meet the budget. And the thing you get most criticized for is when you don't meet the budget. So, it's always a challenge. (Executive Director Division 2)

> I experience that people now feel more accountable for the use of resources also in other parts of the healthcare chain when discussing specific, operational developments. But when it comes to the entire resource allocation process, the annual budget, and so on, they don't. This is due to the downward pressure from above to meet the target of a balanced budget. (Controller)

Another instance when the traditional, hierarchical forms of accountability in the implementation context seemed to be in conflict with the horizontal accountability associated with PublicOrg's new information system was in the collaboration between line managers and process leads:

> The problem is that, in theory, our [the process leads'] work should permeate the organization. If I create a PowerPoint or perform an analysis that identify specific improvement areas in the care process for my disease, the line managers should take this information and use it to change their organizations. But it doesn't always work that way. [...] The resource allocation, actual production, and other aspects are still a bit disconnected from the process itself, and we as process leads have little influence in that area. (Process Lead)

The same process lead further provided a specific example of such a conflict:

> We discovered that there was a patient group that were called to unnecessary extra appointments at the heart failure clinic. Then we were able to show that there were quite a few visitors – up to 200 – at a specific clinic who got these extra visits. According to the clinic, this was a tradition – "we always do this", they said. We then looked at another clinic that didn't have this tradition and observed that the patients there were doing just as well without the extra visits. In theory, one would expect that when presenting such information to the clinic, it would change their attitudes toward this tradition. But it didn't. So as process lead, you present data-driven insights to line managers and colleagues, hoping that it'll change their attitudes and encourage them to make a change in their operations that would benefit everyone, but then they don't always do it.

The hierarchical forms of accountability that characterized PublicOrg and to some extent seemed to discourage the enabling orientation of the new information system could thus potentially explain why increased horizontal accountability did not always lead to changes in actual behavior among interviewees at lower levels in the hierarchy, but rather was expressed as an informal sense of accountability that was more personal or professional in nature.

Well aware of the strong hierarchical forms of accountability that permeated the organization, PublicOrg tried to adapt the implementation process of its horizontal information system to this context. This to be able to harness it for an integrated healthcare. One such element was the introduction of "jam sessions". Meant to foster lateral communication aimed at achieving mutual benefits and thus also horizontal, dialogic accountability, these were formal meetings during which different competences from all across the organization gathered in the same room to answer a specific question by making sense of data from the information system together:

> We have a concept called jam sessions, which is based on the insight that (1) we have a lot of people who don't have access to information, and (2) to really understand something, it isn't enough with just one or two competencies. You might need 5-10 – be it physicians, top management, line managers, process leads, lawyers, controllers, or business analysts. [...] We start by defining the question, what is it we really want to know? What happened here? In order to understand this, who do we need to have in the room? Then we book half a day for the session, maybe a big room with a whiteboard, and make sure to invite a variety of competencies, including someone who can turn any database upside down. The discussions around the data that we bring to the table then inform collaborative improvement efforts. (Controller)

In addition to introducing this type of horizontal practices, PublicOrg tried to work around the strong hierarchical forms of accountability in the implementation process of its new

information system also through more vertical elements. For instance, PublicOrg's Healthcare Director was appointed direct line responsibility for all five divisions for the first time in 2019, thus also formally held accountable for the horizontal performance of the healthcare system as a whole. Previously, this role rather worked as a support function, without any mandate to exercise control over the divisions. Our empirics suggest that this combination of vertical top-down control and formalized horizontal accountability in the same role was perceived as an enabler for fostering horizontal accountability across the organization:

> It seems that if all the pressure were to be directed downwards, then this function [the Healthcare Director] would have no interest in these two divisions to quarrel. So, it's easier to execute decisions and to keep the whole healthcare system together. As horizontal accountability is formalized at the top, it can be pushed down vertically. Because of this, information-driven healthcare has been easier to implement. (Controller)

> If you look at how healthcare works in general, we're quite hierarchical organizations. And hierarchical organizations are good at producing predictable results, which is something you can really utilize when working with information-driven healthcare. You can decide at the top to invest in this broadly and use the line organizations to ensure that the job gets done. (Director 1)

However, many interviewees indicated that the implementation of PublicOrg's new horizontal information system so far still mainly had been concerned with the advancement of technological capabilities; going forward, emphasis would thus rather be on how to effectively harness this aggregated data across all levels of the organization to better understand and optimize operations, thus helping to uphold the horizontal accountability to the public:

> Initially, [PublicOrg] engaged in very intense technology-driven work to build up its data infrastructure and analytical capacity. [...] All these questions around implementation and using data-driven insights to inform actions within healthcare organizations didn't exist at all then. [...] It's only now that the technological capabilities are in place that other issues related to implementation and improvement can be addressed. (Professor in Health Innovation)

5. Discussion

In this section, we will discuss the main insights our thesis brings to the existing literature reviewed in Section 2. Section 5.1 summarizes our empirical findings. Section 5.2 discusses our insights with regard to whether and how public sector digitalization enhances horizontal forms of accountability. Finally, Section 5.3 considers the implications of our findings related to the implementation context and its influence on digitalization's enabling potential.

5.1. Summary of main findings

The case of PublicOrg illuminates how public sector accountability forms and conceptions are affected by the implementation of a horizontal information system. More specifically, it demonstrates that the shift from siloed to integrated production and consumption of data and information can enhance horizontal accountability within a fragmented healthcare organization and thus help healthcare providers uphold their outward accountability toward the public. Drawing on Adler and Borys' (1996) framework of enabling and coercive control, we interpret this as being enabled by a horizontal information system's ability to foster an environment in which multiple interests and perspectives are considered. In PublicOrg, the introduction of such a system seemed to do so in two ways. First, the new system embodied enabling *design features*. It was designed to *repair* information by incorporating multiple data sources and allowing for new types of analysis; as such, it was perceived by employees as an enabler for pluralistic, outward accountability. Enhancing *global transparency* through less restrictive access to data, process mapping, and increased interaction between previously distant individuals, the new system also seemed to allow for less individualizing and more horizontal forms of accountability – both sensed and formalized. The low *internal transparency* in turn promoted cross-professional collaboration and translation of data through dashboards, while the *flexibility* of the system allowed for customization to individual user needs. Concerned with the usability of the new system, these two features were rather interpreted as preconditions for the other design features to be perceived enabling. Second, the *process of designing* the new system was highly user focused and done with an enabling intent. By ensuring that the technical qualities of the system incorporated multiple interests to support individual users in their work, this process thus also seemed to constitute a precondition for the design features to be perceived as enablers for horizontal accountability.

However, although both the features and the design process were agreed to enable horizontal accountability, PublicOrg's new information system was still perceived by some employees to be *implemented* coercively – the formal, hierarchical accountabilities that characterized the context discouraging its enabling orientation. As such, horizontal

accountability did not always translate into formal changes in actual behavior but was in some instances rather expressed as an informal sense of shared accountability. In the following, we discuss the theoretical implications of these findings.

5.2.   Digitalization's ability to enhance horizontal accountability in public sector organizations

Several scholars have discussed the implications for public sector accountability of the evolutions in production and consumption of data that digitalization has brought about (e.g., Bertot et al., 2012; Cerrillo I Martínez, 2019; Lino et al., 2022; Petrakaki, 2018). However, empirical evidence for *whether* and, if so, *how* digital transformation is actually changing our forms and conceptions of accountability has hitherto been lacking (Agostino et al., 2022). Our case study of PublicOrg thus extend the literature on public sector digitalization and accountability by demonstrating empirically possible consequences of digital transformation for public sector accountability forms and conceptions. More specifically, we suggest that the implementation of a horizontal information system in a public healthcare organization *does* enhance horizontal accountability – both formal and sensed. In PublicOrg, this horizontal accountability was, for instance, illustrated by the introduction of process leads held accountable for the optimization of processes across entire care pathways and employees' increased concern for the use of resources in the healthcare system as a whole. As such, we also add to the discussion on the shift toward accountability forms that consider a range of stakeholders other than hierarchical superiors (e.g., Almquist et al., 2013; Bovens, 2007; Cordery et al., 2010).

In terms of *how* digital data and technologies are changing accountability forms and conceptions in the public sector we find that they, in line with Agostino et al.'s (2022) reasoning, enhance horizontal accountability by fostering an environment in which multiple interests and perspectives are considered – the design features and the design process of the new information system perceived as enablers for this in PublicOrg. While some studies describe the mere availability of data as evidence of increased accountability (e.g., Manes Rossi et al., 2018; Murillo, 2014), we rather suggest that digitalization's enabling potential for horizontal accountability depends on its implications for the ways that data and information are being produced and consumed.

Agostino et al. (2022) claim that the *production* of data can be affected along five dimensions: *who*, *where*, *what*, *when*, and *how*. The case of PublicOrg demonstrates shifts in all dimensions except who, but further nuances Agostino et al.'s (2022) findings by detailing the particular importance of where and when data are generated for enabling horizontal and outward accountability specifically. In terms of *where*, the introduction of a horizontal information system meant that data went from being generated in a fragmented manner according to vertical interest groups to being integrated in a single database, thus suggesting a shift toward a more horizontal model identified also in prior

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literature (e.g., Agostino et al., 2022; Kum et al., 2015). Allowing for global transparency and the incorporation of multiple perspectives in decision-making processes thanks to the repair of information (Adler & Borys, 1996), this change seemed to be perceived by employees as a key enabler for horizontal accountability. As such, it encouraged them to hold both themselves and others accountable for the efficient use of resources and the horizontal performance of the organization at large. Moreover, we found that PublicOrg's shift from past data collection to real-time and even predictive data generation (*when*) allowed for better identification of patient needs. As such we also contribute to the stream of research suggesting that digitalization brings about improvements in public services (e.g., Asaro, 2019; Sa & Grieco, 2016) but further extend it by demonstrating that these new ways of elaborating data are also perceived as an enabler for healthcare providers to deliver good care and thus uphold their outward accountability to the public. However, in contrast to Agostino et al. (2022), our findings did not suggest that changes in what data are produced and how that data are analyzed had a direct effect on accountability; rather, we interpreted them as preconditions for the information system to be perceived as enabling, along with the system's high flexibility and user-focused design process. The shift toward co-produced visual and textual data in dashboards (*what*) allowed for translation of data into a language familiar to the user and thus offset the low internal transparency of the system, while the move toward cross-professional sense-making of data in "jam sessions" (*how*) in turn helped improve the outcome of analyses – both changes key to ensure that an information system actually supports its users in performing their tasks in the first place.

Regarding the *consumption* of digital data and use of new technologies, prior research in the domain of public sector digitalization and accountability suggests that it allows for increased interaction between previously distant categories of users and organizations (e.g., Agostino et al., 2022; Bryer, 2013; Dimitrievska-Markoski, 2018). The case of PublicOrg thus adds to these findings by illustrating how the implementation of a horizontal information system in a public organization helps break down organizational silos by opening up possibilities for increased bi- and multidirectional exchange between a broad range of stakeholders. Being able to understand where one's actions fit into the organization as a whole thanks to the use of new and more integrated data seemed to encourage lateral communication meant to agree on mutual values and priorities with regard to resource utilization. As such, our case suggests that digitalization's effects on the consumption of data can be perceived as an enabler for the horizontal, dialogic, and coproduced forms of accountability that according to prior literature are starting to emerge in public sector (e.g., Almquist et al., 2013; Cordery et al., 2010). The increased dialogue, collaboration, and trust that the new system encouraged further seemed to foster more of Robert's (1991) socializing forms of accountability within the organization. Prior to the introduction of the horizontal information system, data was structured to facilitate vertical accounting-type information flow. Accordingly, it was mainly used for reporting work, strongly focused on individual budget results, and expressed by employees to

encourage internal competition for resources. These findings thus resonate with the more critical strand of accountability literature arguing that the use of accounting information can promote a form of accountability that fails to recognize our mutual responsibilities (e.g., Messner, 2009; Roberts, 1991). The case of PublicOrg however also allows us to further extend this stream of research by demonstrating digitalization's potential to enhance accountability forms and conceptions that rather emphasize the interdependence of self and others, being characterized by a quest for mutual understanding that go beyond the formal exchange of accounts stipulated by accounting (Messner, 2009).

5.3. The implementation context's influence on digitalization's enabling potential

Drawing on Alder and Borys' (1996) framework of enabling and coercive control to guide our empirical analysis, we further extend the literature on public sector digitalization and accountability (e.g., Agostino et al., 2022; Otia & Bracci, 2022; Petrakaki, 2018) by shedding light on how the *implementation context* influence digitalization's ability to enhance horizontal accountability forms and conceptions in the public sector. More specifically, we found that although both the design features and the process of designing the horizontal information system were perceived as enablers for horizontal accountability, the implementation context in PublicOrg to some extent still diminished the system's enabling potential due to employees' prevailing, contrasting forms of accountability. While not previously discussed specifically in the domain of public sector digitalization and accountability, these findings do correspond with prior accountability literature that suggest that the concept of accountability exists in many forms and is contextually bound as the form it takes depends on the environment in which it is constructed (e.g., Cordery et al., 2010; Roberts & Scapens, 1985; Sinclair, 1995).

While the introduction of a horizontal information system in Region Hallan did seem to foster horizontal accountability within the organization, the implementation context was still strongly permeated by the hierarchical and individualizing forms of accountability traditionally associated with NPM (Almquist et al., 2013). *"Because actors have different resources and these cause inequalities in the relations through asymmetrical resource dependencies, while formal contracts between various layers of government levels, for instance, create some vertical relationships"*, our findings thus seem to agree with Klijn's (2012, p. 207) reasoning that there will always be some vertical elements in all organizations. We further expand on this reasoning by suggesting that these vertical elements in the implementation context (in our case hierarchical forms of accountability) can constitute a barrier to digitalization's ability to foster horizontal accountability in public sector organizations, thus extending the literature on public sector digitalization and accountability (e.g., Agostino et al., 2022; Lino et al., 2022).

More specifically, we found that the most positive attitudes toward the digitalization in PublicOrg's healthcare organization were expressed by employees whose horizontal accountabilities were formalized in their roles and job descriptions and thus aligned with their managerial accountability. Process leads, for example, were formally responsible for overseeing processes across the healthcare continuum, while top management were held accountable for the horizontal performance of the organization as a whole. Those employees whose managerial accountability instead was misaligned with the horizontal accountability that the new information system's design aimed to foster, and rather concerned the vertical performance of single units and accounting-type information flows (e.g., budget results), did not perceive the system to be as enabling. Although the increased availability of and access to integrated data in some instances seemed to instill an informal *sense* of shared horizontal accountability, it did not always translate into changes in actual behavior. As such, we also add to the accountability domain by illustrating that accountability is not limited only to formal forms; it can also be driven by adherence to one's internalized professional or personal moral obligations (Mulgan, 2000; Sinclair, 1995) – in the context of our study to provide good care to the public. In some instances, the implementation of the new horizontal information system was even expressed as coercive, as employees perceived it as requiring compromises on the delivery of their managerial accountability in order to enact horizontal accountability. These findings thus resonate with Sinclair's (1995, p.231) notion that *"being accountable in one form often requires compromises of other sorts of accountability"* and further extend the public sector digitalization and accountability literature (e.g., Agostino et al., 2022; Birchall, 2015) by suggesting that when data is provided in lieu of actual responses to users' needs, it may even have a negative, or at least neutral, impact on horizontal accountability. However, our findings also contrast Sinclair's (1995) claim about compromises in accountability forms by suggesting that when contrasting accountabilities are formalized in the *same* professional role, they do seem to be able to coexist. In the case of PublicOrg, this was illustrated by the healthcare director's line responsibility for all divisions. Both held accountable for the horizontal performance of the healthcare system at large and the vertical performance of line managers, this combination of horizontal and hierarchical accountability was perceived by employees as an enabler for fostering horizontal accountability throughout the organization.

Furthermore, our study expands on Adler and Borys' (1996) theory of enabling and coercive control by suggesting that when a control system (e.g., an information system) is implemented in an organization, it can be perceived as both enabling and coercive depending on people's contrasting forms of accountability. While Adler and Borys (1996) conclude that technologies can *either* be designed to help users perform their tasks *or* to force compliance, we suggest that this is a simplified picture of enabling and coercive control and propose that it is dependent on the type of tasks that the user is held accountable for. Our study, which is set in a public sector context where multiple logics coexist, highlights that although the system is designed (and to some extent implemented)

in an enabling way according to Adler and Borys' (1996) reasoning, it is not perceived as enabling by all categories of users. Rather, when a system is used by different categories of users (such as, for instance, executive directors or clinicians in the context of healthcare) they will likely have different logics for using it, thus making it difficult for a system to accommodate all needs. Connecting back to accountability, we suggest that if there is alignment between the managerial tasks one is held accountable and the accountability that the system has been designed to enable, it seems that the system will be perceived as enabling for employees to perform their tasks; however, if there instead is misalignment between these accountability forms it seems that the system rather will be perceived as coercive. Thus, we expand Adler and Borys' (1996) theory by suggesting that the type of tasks that one is held accountable for and the (mis)alignment with the forms of accountability that the system aims to foster bear implications for whether a system is perceived as enabling or coercive.

6. Conclusion

This section concludes the thesis. Section 6.1 offers a synthesis of our work; Section 6.2 discusses the study's limitations and some avenues for future research.

6.1. Summary of contributions

Healthcare organizations are confronted with multifaced challenges stemming from demographic trends such as an aging population, underscoring the need to enhance the overall effectiveness of the healthcare system by focusing on efforts to maximize patient benefits in relation to allocated resources (e.g., Enthoven, 2009; Lingman et al., 2021). In order to address these challenges, information-driven healthcare assumes a crucial role. By integrating data from a diverse array of sources, healthcare organizations now have the opportunity to effectively leverage vast amounts of information and consequently make informed decisions that optimize resource allocation across the system (Lingman et al., 2021). Scholars have argued that the increased use of digital data and technologies in public sector organizations bear salient implications for accountability (e.g., Agostino et al., 2022; Bertot et al., 2012; Cerrillo I Martínez, 2019; Lino et al., 2022), yet few studies to date have empirically demonstrated these effects. Drawing on a single case study of a Swedish region's public healthcare organization, the aim of this thesis was thus to explore *how accountability forms and conceptions are affected by the implementation of a horizontal information system in a public healthcare organization.*

Our findings suggest that the introduction of a new horizontal information system can enhance horizontal forms of accountability by creating an environment in which multiple interests and perspectives are considered. Using Adler and Borys' (1996) framework of coercive and enabling control to guide our empirical analysis, we identified two design features of the new system that enabled this and two that supported it. First, it repaired information by incorporating multiple data sources and facilitating new types of analyses. Second, it enhanced global transparency by allowing for less restrictive access to data, process mapping, and increased interaction between previously distant individuals. In terms of supporting characteristics, we interpret the internal transparency and flexibility of the system as preconditions for the other features to be perceived enabling by promoting collaborative translation of data and customization to individual needs. Our findings further illustrate that the enhanced forms of horizontal accountability supported by a user-focused design process can lead to improvements in healthcare services and as such also support healthcare providers in upholding their outward accountability toward the public. We also shed light on how the implementation context influence digitalization's ability to enhance horizontal accountability forms and conceptions in a public healthcare organization by suggesting that prevailing accountability forms can constitute a barrier to this. In these instances, we acknowledge that the horizontal

accountability may be limited to an informal sense of shared accountability that does not necessarily translate into actions.

Our thesis contributes to the literature on public sector digitalization and accountability (e.g., Agostino et al., 2022; e.g., Bertot et al., 2012; Bryer, 2013; Plesner et al., 2018) in three main ways. First, we empirically demonstrate that digital transformation enhances horizontal forms and conceptions of accountability in a public healthcare organization. Second, we suggest that it does so by fostering an environment in which multiple interests and perspectives are considered because of changes in how data and information are being produced and consumed. Third, we shed light on how the implementation context influence digitalization's ability to enhance such forms and conceptions of accountability in the public sector. In addition, we also contribute to the literature on coercive and enabling control (e.g., Adler and Borys, 1996; Chapman & Kin, 2009; Jordan & Messner, 2012; Junne, 2018) by demonstrating how the theory can (1) prove useful in a public sector context, and (2) be employed to analyze how accountability forms and conceptions are affected by the introduction of a horizontal information system. Furthermore, we add to the extant literature by suggesting that the type of tasks that one is held accountable for and the (mis)alignment with the forms of accountability that the system aims to foster bear implications for whether a system is perceived as enabling or not.

Moreover, this thesis also bears practical implications. First, our findings can be helpful for public sector organizations in the design and implementation of a new horizontal information system, whilst also highlighting some potential challenges to be addressed. Second, it can provide guidance for how public sector organizations can facilitate the use of data across different hierarchical levels and professional groups – our thesis further providing interesting insights for how workarounds can help such organizations manage the context in which they operate. Third, our study is of interest for public sector managers since it illustrates how the increased utilization of integrated data can promote a sense of holistic accountability that spans over one's formal role, thus bearing implications for collaboration, decision-making, resource allocation, and ultimately organizational performance. Lastly, given that healthcare is a highly regulated sector, the thesis can be of interest to regulators responsible for the development of policies and guidelines related to data production and usage (e.g., GDPR) within such organizations as it can provide them with a better understanding of the challenges and opportunities associated with this.

6.2. Limitations and suggestions for future research

Finally, we acknowledge that our study is not without limitations. The choice of conducting a single case study (discussed in Section 3.1.1) was deemed appropriate to generate an in-depth understanding of the case organization's specific context but limited the potential to gain comparable insights and may thus have impacted our findings and their generalizability. Further, we recognize that healthcare organizations are structured

differently across geographies; as such, the Swedish setting may also have a negative effect on the generalizability of our findings. Next, the data collection and choice of interviewees was partly convenience-driven, where accessibility and willingness to participate influenced who participated in the study. This may have skewed the findings, as most interviewees were very positive toward the new information system and how it helped them perform their work. We also mostly spoke to managers, which was driven by the fact that the information system so far mainly has been used for organizational planning and strategy work. However, broadening our sample to include more clinicians may have provided a less positive view of the implementation of the system and thus may have altered some of our findings. Altogether, the limited number of participants, choice of sample, and subjectivity of participants may affect the findings and therefore the replicability of the study (Bryman & Bell, 2011). Lastly, due to time constraints, we were unable to conduct a longitudinal study which could have offered a more in-depth understanding of how employees' attitudes and accountability forms are affected by the introduction of a horizontal information system over time and through different phases of implementation.

While our study contributes to the rather scare literature on public sector digitalization and accountability, further research is warranted to better understand and manage the complexity of public sector organizations. For instance, similar studies could be conducted in other types of public administrations to explore if similar patterns emerge. Furthermore, as the public sector is driven by multiple logics, it is also of interest to better understand how digitalization and data can help integrate and leverage different competences, as well as how public sector organizations can promote more holistic forms of accountability as a means to drive efficient resource allocation, without losing control. Additionally, conducting a multiple case study could further be of interest as it allows for comparative insights, thus potentially offering alternative explanations for what drives changes in accountability and how the organizational context in turn influence these changes. To enhance the understanding of how accountability forms change over time following increased usage of integrated data, it would also be fruitful to conduct a longitudinal study which investigates differences across hierarchical levels more in depth. Lastly, further research investigating how different types of digital tools and technologies other than horizontal information systems affect accountability is encouraged. For example, new technologies such as artificial intelligence provide great opportunities to increase accuracy in decision-making and consequently improve the effectiveness of operations in public sector organizations. However, uncertainties prevail with regard to who should be held accountable for what the artificial intelligence produce, thus emphasizing the need for further investigation. This would be of particular relevance to explore in a healthcare setting since it could bear implications for diagnose setting and patient treatment.

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8. Appendix

Appendix A. Interview details

Interviewee	No.	No. of interviews	Context	Date	Time
Director 1	1	1	In-person	2023-02-27	63 min
BI & Data Scientist	2	1	Online	2023-02-27	48 min
Professor in Nursing	3	1	In-person	2023-02-28	60 min
Strategist	4	2	In-person	2023-02-28	60 min
			Online	2023-04-14	30 min
Executive Director Division 1	5	1	Online	2023-02-28	58 min
Business Analyst	6	1	Online	2023-03-01	54 min
R&D Manager	7	1	Online	2023-03-01	57 min
Professor in Health Innovation	8	1	Online	2023-03-01	50 min
Controller	9	2	In-person	2023-03-02	80 min
			Online	2023-04-14	40 min
Director 2	10	2	In-person	2023-03-03	56 min
			Online	2023-04-04	30 min
Executive Director Division 2	11	1	Online	2023-03-08	43 min
Digitalization Lead Division 2	12	1	Online	2023-03-20	43 min
Process Lead	13	1	Online	2023-03-29	56 min
Doctor Division 1	14	1	Online	2023-04-24	45 min
Board Member Health Data Centre	15	1	Online	2023-05-04	35 min
Total	15	18			

Appendix B. Interview guide

Theme	Example question(s)
Background	- Please describe your background and career
Role, responsibility & accountability	- Describe your current area of responsibility in PublicOrg - What are your main tasks and responsibilities? - What are you held accountable for? - What are your and your function's key performance indicators? - What do you report and to whom? - How would you define your role in relation to information-driven healthcare?
Implementation of information-driven healthcare	- Describe the implementation of information-driven healthcare from your perspective - Can you describe the process? Has it occurred in different phases? - Why do you think PublicOrg has implemented information-driven healthcare? - What is the value for you/the organization/the patient? - How have your responsibilities changed? - Has it affected what you are held accountable for and how? In what ways? - Have reporting, budgeting, and resource allocation changed? How?
Data and information	- How, and for what, do you use data? How has this changed? - What kind of data do you use? How has this changed? - How does it affect you/the organization/the patient? - Where do you get the data from? How has this changed? - How is data presented? How has that changed? - If decisions made are based on data, what are the consequences? - Can you describe any barriers that prevent you from working more information-driven?
Organizational effects	- Has the implementation of information-driven healthcare resulted in any organizational effects and/or improvements (e.g., resource allocation)? Describe - Has it affected the way you interact in the organization? How? - How do you perceive that the implementation has affected accountability, transparency, and collaboration within the organization? - Can you describe the implications it has had for your sense of accountability? - Has information-driven care impacted how you work with patients?

Appendix C. Coding tree

Horizontal informaton system

- Design features
  - Repair
    - Different data sources in same database → Horizontal accountability
    - New types of analyses → Outward accountability
  - Internal transparency
    - Limited to data professionals
    - Workarounds: Collaboration/ dashboards → Precondition
  - Global transparency
    - Less restrictive data distribution
    - Process mapping → Sensed/formal horizontal accountability
    - Increased interaction → Less individualizing/ more socializing accountability
  - Flexibility
    - Customization and user involvement → Precondition
    - Standardized reports of results → Horizontal accountability
- Design process
  - Continual user-focus and improvements → Precondition
- Implementation
  - Context of hierarchical accountability
    - Budget-driven → Discouraging enabling orientation
    - Conflict line/process organizations
    - Workarounds: Jam sessions/ Director → Horizontal accountability