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Data governance as a collective action problem

Olivia Benfeldt[1][0000-0002-1261-3272], John Stouby Persson[2], and Sabine Madsen[1]

[1] Aalborg University, Fibigerstræde 3, 9220 Aalborg, Denmark
{obn,sam}@dps.aau.dk
[2] Aalborg University, Selma Lagerlöfsvej 300, 9220 Aalborg, Denmark
john@cs.aau.dk

Abstract. While governing data as an organizational asset has clear benefits, mobilizing an organization to implement data governance remains elusive for practitioners. On that account, this paper examines why governing data is difficult in local government organizations. Based on a literature review and an empirical case study, we establish the inherent challenges and build on the notion of collective action to theorize the problem of data governance. Following an engaged scholarship approach, we collect empirical material through six group interviews with 34 representatives from 13 different Danish municipalities. We extend existing data governance research with our problem triangle that identifies and explicates the complex relations between six distinct challenges: value, collaboration, capabilities, overview, practices, and politics. We demonstrate the value in theorizing data governance as a collective action problem and argue for the necessity of ensuring researchers and practitioners achieve a common understanding of the inherent challenges, as a first step towards developing data governance solutions that are viable in practice.

Key words: data governance, collective action, local government, engaged scholarship

1 Introduction

Technological advancements have enabled the collection and storage of more data than ever before with the potential to make societies, cities, and especially organizations, smarter (Dwivedi et al. 2017; Pereira et al. 2017). Yet, to benefit from data-driven opportunities, organizations must rethink the way they organize (Porter and Heppelmann 2014, 2015), because as the volume of data increases, the complexity of managing it does as well (Vilminko-Heikkinen et al. 2016). This task can no longer be left to the traditional IT function (Lee et al. 2014; Marchand and Peppard 2013). Instead, the entire organization needs an overarching direction for organizing, analyzing, and deploying an organization's data assets (DalleMule and Davenport 2017). To realize value from data, robust data governance is needed (Ransbotham et al. 2016; Ransbotham and Kiron 2017). Data governance refers to the organization and implementation of rules and responsibilities, which enforce decision making and accountabilities regarding an organization's data assets (Benfeldt Nielsen 2017). Embedded is that data governance contributes to organizational goals by encouraging desirable behavior in the treatment of data as a resource.

Mobilizing an organization to adopt data governance has proven challenging in practice (Begg and Caira 2012; Ladley 2012; Vilminko-Heikkinen et al. 2016). Taking stock of data inventory remains tedious (Kiron 2016), the value creating potential appears abstract (Begg and Caira 2012), and the importance of investing in data governance is understood only if a company has already suffered from major regulatory pressure or data breach (DalleMule and Davenport 2017). Especially public-sector organizations, who routinely store large volumes of data (Klievink et al. 2017), often experience difficulties in establishing formal programs related to data (O. B. Nielsen et al. 2019; Vilminko-Heikkinen et al. 2016) and remain restrained by issues of data quality, availability, and accuracy (Thompson et al. 2015). Existing data governance literature is scarce on practical implementation, providing little actionable direction for organizations, and remains highly conceptual, with few studies engaged in theory development (Benfeldt Nielsen 2017). Additionally, no studies report explicitly on the particular challenges of governing data in public organizations (Vilminko-Heikkinen 2017).

On that account, this paper considers data governance in the context of the local government level of the public sector in Denmark. The public administration in Denmark was an early adopter of IT solutions (Rose et al. 2012) and remains the most digitally advanced society in Europe (European Commission 2017). As an example, the current strategy for public digitalization in Denmark proposes a number of ambitious national goals for realizing value with data in public administration, including quicker case processing, increased economic

growth, innovation, and balancing security and privacy issues (Danish Ministry of Finance 2016). However, due to the decentralized nature of the Danish public sector, local government organizations handle a diverse range of responsibilities, including primary education, day care for children, social welfare, care of the elderly, and many more (Local Government Denmark 2018). As a result, a wealth of different systems has accumulated within and across these organizations over the years and they are now faced with the complex task of collecting, storing and administering vast amounts of heterogeneous data; the volume and variety of which are only likely to increase (Agency for Digitisation 2018). Governing public data has only become more complex with the instatement of a new European Union directive, the General Data Protection Regulation (GDPR) valid from May 25, 2018 (European Union 2016). The directive contains a series of principles that fundamentally reshapes the way data is handled by any organization with the specific intent to protect individual rights to data privacy (European Commission 2018). In order to balance ambitious strategy with practical, everyday complexities of data handling and the new GDPR, data governance becomes imperative, but as suggested by existing literature; an intricate challenge. To examine the practicalities of introducing data governance into a complex, organizational reality, our research is motivated by the question *Why is it difficult to mobilize local government organizations to engage in data governance?*

To address this research question, we use a collaborative form of engaged scholarship (Van de Ven 2007) with specific emphasis on formulation of problems *with* (*not for*) practitioners (P. A. Nielsen and Persson 2016) and build on the notion of collective action problems (E. Ostrom 2010; Torfing and Ansell 2016). Collective action problems arise when "individuals take actions that maximizes short-term benefits to self [and] generate lower joint outcomes than could have been achieved" (E. Ostrom 2010, p. 155), while solving these dilemmas require "changing individual decisions through governance arrangements [to] alter individual payoffs and result in a joint outcome" (Torfing and Ansell 2016, p. 21). We adopt collective action theory to describe and explain why mobilizing organizations to adopt data governance is challenging. First, we draw on existing data governance literature to obtain a preliminary understanding of why regulating collective behavior related to data in an organizational context is difficult and use this conceptualization to investigate our empirical material. We identify six data governance challenges and theorize the relationship between them in a collective action problem triangle. Finally, we elaborate how our findings contribute to data governance literature and discuss implications for practice and suggestions for future research.

2 Data governance

The lack of a widely accepted definition of data governance (Pierce et al. 2008) continues to permeate the field (Al-Ruithe et al. 2018; Benfeldt Nielsen 2017; Brous et al. 2016). One stream of research argues that data governance should function as the means to resolve poor data quality, emerging from the field of data quality management (Alhassan et al. 2016, 2018; Al-Ruithe et al. 2018; Cheong and Chang 2007; Otto 2011a; Soares 2010; Weber et al. 2009). While little attention is paid to what is actually meant by resolving poor quality, Otto mentions ensuring availability of specific data sets to remain compliant with regulatory or legal provisions, effective reporting, and integrated customer management (2011b). Data governance is then supposed to help facilitate these, by "setting direction for the organization's data quality management" (Otto 2011b, p. 241). Although achieving better data quality is presented as unambiguous and objective (such as legislative compliance or effective reporting), Wang and Strong define data quality as "data that are fit for use by data consumers" (1996, p. 6) which underscores the subjectivity of the term. Defining data governance in relation to data quality ultimately involves deciding for what and by whom data is to be used, and then assigning accountabilities and rights accordingly.

Another stream takes its point of departure in Weill and Ross' notion of IT governance (2004) by arguing that data governance should work to increase the value of data as organizational assets (Brous et al. 2016; Coleman et al. 2009; Khatri and Brown 2010; Pierce et al. 2008; Thompson et al. 2015). A premise of IT governance is to maximize the value organizations gain from IT, such that decisions regarding its development and use must be "aligned with organizational goals" (Weill and Ross 2004, p. 6). For data governance, this means designing frameworks of decision-making domains and assigning accountability for decisions in these domains to specific roles in a way that relates to the organization's overall goals (Khatri and Brown 2010). The argument follows that if the treatment of data assets are aligned with the organization's goals, the value of the assets increase (Ladley 2012). Examples of such goals include efficiency improvement (e.g. integration, faster information delivery), business contributors increase, (e.g. revenue, customers, market share), and reduction in risk (e.g. compliance, improved information privacy, improved data quality) (Ladley 2012, p. 34). Defining data governance in relation to the value of data assets includes determining how data can be used to achieve broader organizational objectives and then assigning accountabilities and rights accordingly.

In this paper, we concur with the second stream (Khatri and Brown 2010; Ladley 2012). We define data governance as the organization and implementation principles which outline and enforce who holds the decision

rights and is held accountable for an organization's data assets. Embedded is the perception that data governance should contribute to organizational goals by encouraging desirable behavior in the treatment of data as an (organizational) resource. We define data as physical signs that carry no inherent meaning, because they reside outside of human cognition, while information emerges, when meaning is attributed to data through cognitive processing by an actor (Baškarada and Koronios 2013; Beynon-Davies 2011). Given these understandings of data and information, we tentatively place information systems as a collection of technology-supported processes that facilitate the use of information to (ideally) stimulate action in the social world (Mingers and Willcocks 2014). An information system uses records to represent, store, manipulate and transmit data (physical signs) to provide information and facilitate communication (meaningful signs) in support of human activity; information systems are not concerned with data, information, or technology as discrete entities, but rather how these are used to support purposeful action (Beynon-Davies 2009). Data governance then regulates the part of an information system that concerns production and use of physical signs to affect purposeful action (in the social world), whatever it may be in a given organization.

While previous research has contributed valuable insights on how to design and conceive of data governance as an organization-wide program (Alhassan et al. 2016; Brous et al. 2016; Otto 2011c, 2011a; Weber et al. 2009), studies that theorize how data governance is introduced into the complex reality of organizations by practitioners are hard to come by (Benfeldt Nielsen 2017). Findings from peripheral domains suggest that data governance is in fact challenging.

First, two studies that examined data governance in Small to Medium sized Enterprises (SMEs) saw in both cases that practitioners had difficulty understanding why they should do data governance in the first place (Begg & Caira, 2011, 2012). Practitioners did not recognize the inherent value of their data nor did they view it as having independent existence from the systems that supported their business processes (Begg and Caira 2011). Practitioners struggled to grasp the value-creating potential of data governance, perceiving the costs greater than the benefits, and as a result found it difficult to get started. Additionally, "the language and terminology used by published data governance frameworks were not appropriate for […] those with minimal technical expertise" (Begg and Caira 2012, p. 11). This leaves practitioners with a poor understanding of data governance in general, which remains problematic, since (lack of) awareness "has a major influence on an SME's ability to develop a data governance strategy" (p. 10). These findings underlines how practitioners find it difficult to understand the value of data and the value-creating potential of data governance (DalleMule and Davenport 2017; Kiron 2016).

Second, an aptly titled study "Government data does not mean data governance" found that while public sector agencies may collect and store extensive volumes of data as part of their regulatory function, it does in no way mean they are well-equipped to handle it (Thompson et al. 2015). In the case organization, officials had no confidence in the information used in a number of critical tasks, which ultimately affected the quality of the service provided to citizens. The authors suggest that resolving this issue "would be directly influenced, improved, and monitored by a sound data governance initiative" (Thompson et al. 2015, p. 321). Professionals with "sound understanding of data management in all its facets (governance, development, security, or operations)" (p. 321) are crucial to shaping the requirements for data governance in such a way that it becomes beneficial – not a hindrance – to the organization. Thus, a public organization may find it challenging to acquire and possess the appropriate capabilities (skills and competences to enable action) to compose data governance principles.

Third, Vilminko-Heikkinen et al. (2016) examined the complications of organization-wide data programs, by observing the process of establishing a central master data function in a local government organization. Master data are "those entities, relationships, and attributes that are critical for an organization and foundational to key business processes" (Vilminko-Heikkinen et al. 2016, p. 2), where the idea is to create a single source for essential data assets, that translate unambiguously across an organization (Ladley 2012, p. 14). Management of master data may be placed as the responsibility of a dedicated organizational function. Establishing a data-related program across the entire organization was characterized by tensions and conflicts, which resulted in downright paradoxes: "solutions that are both contradictory and interrelated, such that any choice between them will only remain temporary and cause tension" (Vilminko-Heikkinen et al. 2016, p. 2). Three paradoxes are particularly relevant. First, there was a need to identify data owners, but people remained committed to group specific functions, and not to organization-wide development. Second, although there was a recognized need for data governance, assigned tasks and responsibilities were avoided. Third, there was an acknowledged need for an organization-wide vision of master data, yet individual views remained the order of the day. These findings suggest that the mobilization of local government organizations to engage in data governance will be affected by similar issues of collaboration.

What emerges from existing literature on data governance in both private and public organizations is that mobilizing the organization remains complicated because the value of data governance is difficult to comprehend; organizational members remain committed to their individual or smaller group-specific functions;

and appropriate capabilities to successfully engage with data governance are limited. The complexity of governing data further increases in local governments, due to the sheer number of diverse responsibilities. Such diversity necessarily results in a fragmented IT architecture that is resistant to extensive standardization (Agency for Digitisation 2018) and thus complicates the task of collecting, storing, and administering vast amounts of heterogenous data. In addition, managing many, vastly different professional domains within one organization means managing a plethora of overall organizational objectives, which makes it difficult to meaningfully conceive any high-level data governance principles that covers the entire organization. To address these issues, we draw on the notion of collective action, which at its core theorizes how various actors with heterogeneous interests and resources can work together to achieve a common goal.

3 Collective action

There is no single theory of "governance" (Torfing 2012). Rather, there are several, overlapping theoretical debates; different analytical lenses through which to study governance and a tendency to add qualifiers, such as "corporate", "global" or even "data" to circumvent the issue (Torfing and Ansell 2016). More often than not, these strategies result in an understanding of governance that is too narrowly defined for substantive analysis. Therefore, we return to a broader literature on governance to theoretically explicate and expand the concept of governance in data governance. In this paper, we adopt a generic understanding of governance as "the process of steering society and the economy through collective action and in accordance with common goals" (Torfing 2012). While an abundance of analytical approaches to study governance exists, we choose to use a collective action theory lens (Holahan and Lubell 2016; E. Ostrom 2010). First, this aligns well with our generic understanding of governance defined above as the process of steering a group toward a common goal. Second, we gleaned from previous research that data governance apparently involves issues when it comes to steering a collective to specific actions. We are interested in eliciting why data governance is difficult, when we perceive it as a collective action problem, where a group of local government actors with heterogenous, potentially conflicting interests is compelled to act towards a common, but also obfuscated goal.

Early rational models of human behavior assumed collective action would naturally occur in a group where individuals shared a common objective (Holahan and Lubell 2016). Olson (1965) first challenged this proposition by conceiving the *free-rider problem*; any individual who benefit from a collective "good" (resources or outcome) once it has been produced, will not voluntarily contribute to its production (Olson 1965; E. Ostrom

1990). Additionally, Hardin (1968) conceived *The Tragedy of the Commons,* which posits that individuals with access to a common pool of resources will continue to unsustainably exploit the resources, until the system collapses, unless governing measures are implemented by a coercive, central "power" (Hardin 1968; Holahan and Lubell 2016; E. Ostrom 1990). These notions gave way to collective action *problems*; when individuals act to maximize short-term benefits to self, which in turn generate lower joint outcomes than could have been achieved for the whole, if they had cooperated (E. Ostrom 2010). A notable example of this is the *prisoner's dilemma,* applied to noncooperative situations, where incentives are such that, by trying to maximize individual benefits, each actor is worse off than all participants would have been if they had cooperated (Markus et al. 2006). Within collective action theory, solving collective dilemmas requires regulating group member decisions through governance arrangements that effectively alter individual payoffs and result in a beneficial, joint outcome (Holahan and Lubell 2016).

Previous research in information systems (IS) has employed the collective action perspective (Constantinides and Barrett 2015; Markus et al. 2006; Mindel et al. 2018; Monge et al. 1998). Unlike other types of collective goods, such as natural resources (forestry, water, land etc.), IS "goods" are not discrete entities. Rather, they consist of the interdependences, interests and resources of its distributed userbase; the good under scrutiny is not the IS itself, but the functionalities it affords as well as the willingness and capabilities of users to take advantage of these (Constantinides and Barrett 2015; Markus et al. 2006). The quality of the good at any given time thus depends on the sustained contributions of these collective resources (Monge et al. 1998). Mindel et al. (2018) use collective action as a foundation for examining the sustainability of distributed online information systems and offer a theory of *polycentric information commons*. Building on Hardin's idea of resource commons (1968) and Ostrom's idea of polycentricity (1972), they explain how to ensure long-term sustainability of open systems or "commons" like Wikipedia and TripAdvisor, without a central authority to enact governance. Here, heterogenous resource contributions from many, different individuals are collectively regulated through a number of polycentric governance practices, such as provider recognition, shared accountability and boundary regulation (Mindel et al. 2018). Their findings exemplify how governance of a collective should take into consideration the heterogeneity of resources contributed by its members, since this impacts the overall quality of the "good" produced.

Markus et al. (2006) examine standardization of industry-wide information systems as a collective action problem, involving both development and diffusion as distinct dilemmas. They find that standards

development may be characterized as the prisoner's dilemma; no one has the incentive to contribute to the initial development of standards, because others who have not contributed cannot be excluded from using the standard, once it has been implemented. On the other hand, standards diffusion is seen as the assurance game or "stag hunt", detailing the conflict between safety and social cooperation. Two actors have the opportunity to hunt a stag or a hare; hares can be hunted alone, but are worth less than a stag, while choosing the stag will require individuals to cooperate to succeed. Each player must choose an action without knowing the choice of the other. Because standards are only useful when they are generally adopted and potential adopters are uncertain about the costs, benefits, and risks of standards implementation, each participant is motivated to delay adopting until convinced that others will also adopt (Markus et al. 2006). Their findings illustrate how a collective action lens can reveal more complex dynamics behind the (ir)rationale and (un)willingness of actors to collaborate on IS development.

Constantinides and Barrett (2015) build on this notion of collective action to study the development and governance of information infrastructures. They examine how different actors, such as users, developers and government employees frame a regional health information infrastructure as a "good", what ideological positions underpin these frames and how they are sustained or challenged through relations of power and legitimacy. From these findings, they propose a bottom-up, polycentric governance approach. Here, governance is not defined centrally from the beginning, but rather progressively nested; stakeholder groups self-organize to the point it causes spillover effects on other group interests and only then is governance "nested to a higher level". The authors propose gradually defining more detailed governance rules, while ensuring the diversity of framing and ideologies of the collective action are taken into account in a manner where all individuals with "substantive interest" are adequately represented (Constantinides and Barrett 2015, p. 15). Their findings emphasize the importance of ideology and meaning within and between subgroups and how these, if not taken into account, will undermine centralized governance efforts of a large-scale information infrastructure; a perspective which contrasts how data governance literature tend to focus on defining an organization-wide approach (Khatri and Brown 2010; Otto 2011a).

By drawing parallels between existing literature on data governance and collective action in IS, we may now present our preliminary conception of why mobilizing an organization to adopt data governance is problematic, centering on three challenges (summarized in Table I). First, we consider how actors find it difficult to perceive the value of data governance as related to how participants in collective action attribute different

meanings to the collective good produced. Second, we associate how actors remain committed to their individual functions rather than the organization-wide responsibilities with how participants in collective action will compromise joint outcomes to protect individual interests. Last, we relate how actors are constrained by their capabilities in handling data to how the overall quality of a produced good depends on the heterogenous resources contributed by participants.

Table I. Preliminary challenges

#	Challenge	Data governance	Collective action in IS
1	Perceiving value	Actors struggle to perceive the value creating potential of data or data governance (Begg & Caira 2012)	Participants attribute different meanings to collective good produced based on their ideological positions (Constantinides & Barrett 2015)
2	Enabling collaboration	Actors remain committed to group-specific or individual functions rather than organization-wide development (Vilminkko-Heikkinen et al 2016)	Participants compromise or obscure greater, collective outcomes to protect or realize individual, short-term interests (Markus et al 2006)
3	Fostering capabilities	Actors are constrained by lack of skills or competences in handling data as a resource (Thompson et al 2015)	Quality of good produced depends on the sustained contribution of (heterogenous) resources by participants (Mindel et al 2018; Monge et al 1998)

4 Research approach

To empirically examine data governance as a collective action problem, we followed a collaborative form of engaged scholarship (Elbanna et al. 2019; Van de Ven 2007) with a particular focus on the formulation of problems *with* (*not for*) practitioners (P. A. Nielsen and Persson 2016). We collaborated with participants in a Danish network for local government IT practitioners and researchers. The network was founded in 2009 as part of a joint IS research project with a number of local government organizations, seeking to increase the degree of public digitalisation and municipalities' ability to innovate with IT (Rose et al. 2012). In 2017, the network consisted of 13 local government organizations and a dozen IS researchers, who collaborate on a set number of workshops and theme days. The participating members have previous experiences with engaging in academic IS scholarship, which helped the researchers gain access to the setting, create trust with informants, facilitate cultural understanding, and establish rapport (Fontana and Frey 1994; Harvey and Myers 1995). Our point of departure for this study was the people working with data in local government and not the citizens' perspective, unless the practitioners bring it up.

4.1 Research setting

Denmark is a consensual and technologically advanced society. In the Digital Economy and Society Index (2017) that summarizes indicators on Europe's digital performance and competitiveness, Denmark holds the first place

and is described as a world leader in digitization (European Commission 2017). The national strategy for public digitalization through 2016-2020 (Danish Ministry of Finance 2016) aims to further enhance the use of IT in the public sector in order to deliver good, efficient, and coherent services to citizens and businesses. More importantly, the strategy contains three highly ambitious goals that aim to incorporate data to enable better and quicker case processing, to exploit data assets as a driver for economic growth, and to protect citizens' individual data privacy rights. While interpreting the national digital strategy entails complexities of prioritization, it is highly influential on local government practice (Persson et al. 2017). Danish government is somewhat decentralized, and local government organizations commission and manage their own data repositories in addition to the central registers. They are not merely the executive wing of central government but have a great deal of autonomy in how their managers and elected officials choose to organize the delivery of public services. Local government organizations are responsible for a large part of the Danish welfare state, such as primary education, day care for children, social welfare, and care of the elderly as important examples.

Historically, the governance of IT acquisition and development has been decentralized, focusing on highly specialized solutions to fit individual domain needs. This has led to a current landscape of hundreds of different, fragmented systems across departments (Agency for Digitisation 2018). As a result, a single local government organization is tasked with storing, collecting, and administering vast amounts of heterogeneous, and at times redundant, data across its many different systems. Ensuring that these data are not only used to achieve strategic objectives but also managed responsibly has only become more urgent with the instatement of a new EU directive, the General Data Protection Regulation (GDPR) (European Union 2016). Valid from May 25, 2018, the directive contains a series of principles that fundamentally reshapes the way data is handled by any organization in order to protect individual rights to data privacy (European Commission 2018). A core difference from previous legislation on the topic of data protection is that organizations are now required to obtain explicit consent from users and in doing so, need to clearly state how and why they intend to use data. As a technologically advanced society, the Danish government provides a wealth of digital public services, with the result that local government organizations inadvertently collect and store massive amounts of personally sensitive data on citizens, just to perform their duties. Whether their role as a public institution provides statutory basis for collecting these data or if there is a need to procure explicit consent from citizens is a fundamental question that depends on the intended use, and as such a key issue to be addressed through data governance.

4.2 Data collection and analysis

The first author collected empirical data over a period of four months using semi-structured group interviews that has the advantages of being inexpensive, data rich, flexible, stimulating to respondents, recall aiding, cumulative and elaborative, over and above individual responses (Fontana and Frey 1994). Since the preliminary understanding of why governing data is difficult was gleaned from existing literature that did not necessarily focus explicitly on challenges, the semi-structured group interview allowed us to examine whether these were indeed viable challenges for practitioners, while still allowing participants to bring forth other key points. The participants were members of the abovementioned network and came from several different layers of the local government organizations (in Danish termed "municipalities"), ranging from managers, to consultants, project managers and technical experts (see Appendix A for a list of participants). The group interviews were used in this study to gain empirical data from several hierarchical levels in order to cover a "variety of voices" (Myers and Newman 2007). Municipalities differ across many characteristics, including size and digital maturity. Group interviews across (and among) practitioners in municipalities therefore allowed for nuances of practice to be brought forth, as the participants could discuss and reflect amongst themselves (Fontana and Frey 1994).

The data was collected through six sessions (see Table II), with the first session on May 5, 2017 and the last on August 24, 2017, which was a year prior to GDPR was instated but without it figuring as a prominent issue in the sessions. Two sessions were of a general character including participants from different municipalities, and three sessions involved participants from the same municipality. One session only had one participant, and therefore functioned as a classic semi-structured interview (Myers and Newman 2007).

Table II. Activities for data collection

#	Activity	Participants	Hours
1	General group session	13 representatives from 9 municipalities	3
2	Individual session	1 representative from 1 municipality	1,5
3	Individual group session	4 representatives from 1 municipality	1,5
4	Individual group session	2 representatives from 1 municipality	1
5	Individual group session	2 representatives from 1 municipality	1
6	General group session	20 representatives from 12 municipalities	6
	Total	34 representatives from 13 municipalities	14

The first session introduced data governance as a viable practice (Khatri and Brown 2010) and we received feedback from practitioners regarding the necessity for and utility of such an approach in local government settings. Between session #1 and #6, the first author conducted four interviews, which had the purpose of unfolding specific barriers, challenges, or difficulties related to working with data. As these sessions had fewer

participants from the same organization, more time was available for each of the participants to express their views and it was possible to touch upon topics of more sensitive character. The last session focused on presenting, discussing and validating findings, and encouraging further dialogue on how to work with data governance going forward.

The collected data was coded by the first author following the conventional approach to qualitative content analysis (Hsieh and Shannon 2005). First by reading transcripts and field notes, highlighting interesting or relevant parts, and collecting them in a separate document. Upon completion, the extracted quotes were arranged as challenges and named. The material was then coded again, using the newly constructed challenges to collapse any duplicates and reduce potential internal contradictions. The process was repeated until challenges could no longer be created, collapsed or split. In order to reduce potential bias, the last general group session functioned as a site to test the validity of the identified challenges. The last group session had the highest turn out, and thus allowed for valuable refinement of the findings from a variety of perspectives.

5 Findings

In this section, we present our findings, which comprise six challenges (see Table III). Challenges #1-#3 were conceived from the existing literature (c.f. table I), but further substantiated empirically. Challenges #4-#6 emerged distinctly from the iterative coding of the empirical material.

Table III. Six challenges with data governance

#	Challenge
1	Perceiving value
2	Enabling collaboration
3	Fostering capabilities
4	Data overview
5	Local practices
6	Political ambience

5.1 Perceiving value

Local government organizations struggle to perceive and express the value-creating potential of data and data governance. Short-term perspectives on usage and a poor understanding of what value data may create, when considered an organizational asset, complicates the efforts to govern data. A lack of understanding of what data

can be used for beyond the context of its immediate practice either presents it as a by-product of working in a digital environment or binds its utility to performing a specific workflow: *"Many of those who work with data are not used to thinking of data as an asset […] It's usually very convenient if [they] can see a citizen in both systems because it's updated... but that's it"* (Development consultant). Another participant describes municipalities as 'sober', when it comes to collecting and using data, and frames it as a mindset that needs to be changed, rather than specific processes to be implemented: *"A municipality is sober: it looks at what we can use data for right now. We have to reverse the approach and acknowledge we have to collect [non-personal[1]] data, even though we do not quite know what we need them for yet, and it's a mental change of dimensions"* (Head of IT). What needs to happen is a change of the mindset in going from a reactionary to a proactive view on data. However, this will not happen by itself. The employees have to be introduced to the somewhat abstract idea of seeing data as an asset: *"People need to be told this story that you can see data as either something you depend on in being reactive, or where you consider it an asset [and] become a little more proactive"* (Development consultant).

Although participants show enthusiasm and see potential in working more structured with data, they find it challenging to express the potential value to stakeholders in the rest of the organization. Especially framing the value of data initiatives to ensure economic resources for data related projects is difficult: *"Our BI (Business Intelligence) system has been three years on the way, and it has taken us long to convince our management to spend just minimal resources on this. It's hard to sell the idea of infrastructure and data as [infrastructure] upward in the organization"* (IT architect)

Some participants clearly perceive the benefits and potential value of data initiatives, but find it challenging to communicate to executive levels. Others question the value, but hear from other local governments it is 'the best thing' to do: *"We find it hard to spot the value ourselves, but we know (…) that someone says it's just the best thing you can do. It's also a good foundation [to invest in data governance] and our gut feeling tells us it's a good idea, but we just want this specific use case that illustrates 'this is what we're going to create the foundation for'"* (Financial consultant).

What follows is an amalgamation of issues. On one hand, local government practitioners attempt to secure resources to build an appropriate infrastructure for the future use of data, but lack a persuasive, illustrative use

[1] Collecting personal data without a consented purpose is illegal according to GDPR but local government organizations also have vast amounts of non-personal data.

case to convince management that investing in data as an asset is relevant. Yet, these organizations find it difficult to perceive any long-term, value-creating opportunities with data, which could lead to the 'good use case', because local government employees remain narrowly focused on data in the context of day-to-day operations and welfare services. As a result, the overarching goal remains too elusive, intangible, and even confusing for practitioners to mobilize the collective action of data governance.

5.2 Enabling collaboration

Local government organizations struggle to foster cross-organizational collaboration between different, departmental functions, when it comes to treating data as an organizational asset. If the different departments avoid cooperation, the organizations cannot devise and implement effective data governance principles that actually enable valuable data sharing across. One of the opportunities many local government organizations are very keen to pursue, is combining all available data about a citizen from several systems across departments within one place. The idea is to gain a '360 view of the individual'. According to the participants, this will have transformative impact on a wide variety of elements, from the way they monitor the effects of specific initiatives to the way they deliver public services to citizens. Yet, to do so, the different departments have to establish tight collaboration with each other, but this is difficult: "*You can have a siloed organisation, and then work together across, with good processes. But we don't have that. We try to facilitate data-sharing across* [Departments] *with a BI-project, but those are just the terms. The departments simply don't collaborate.*" (Financial consultant). To enable data to flow across departments with these processes, organizational members have to change behavior to ensure data governance processes and principles are adhered to. The wider the distance between what purpose a data governance process or principle serves and the person, who has to adhere to it, the less meaningful it might appear: "*The closer you move towards, where we meet the citizens and run everyday operations, the less meaningful [a data governance principle] can be experienced by the employees"* (Head of Digitalization). As such, cross-organizational collaboration and deconstructing siloes become pivotal. Yet, the collaborative work required may appear the least meaningful to the employees who are closest to the data, which in turn comprises potential effort made and the joint greater outcome.

5.3 Fostering capabilities

Inconsistent capabilities across departments and hierarchal levels make it difficult to envision an overall, strategic direction for the use of data across a local government organization. Data governance entails implementing

processes and principles that are supposed to be enterprise-wide. However, it is not necessarily possible to design such an all-encompassing data governance program for a local government organization, because the different departments have varying levels of data management maturity. One important aspect of this maturity is the professional domain. Several local government organizations point to the employment sector as very experienced in working with data: *"The field of employment is extremely data-driven and guided by managing information, which it has been for many years and I think it's easy to notice how the employees have this experience and focus on data quality and data usage"* (Head of Digitalization). On the other hand, the elderly sector is not experienced at all. In one case, they lack basic understanding of IT for their profession: "*We have just reached out to the elder area, because we have to create a digitization strategy. They do not have it in their consciousness, and we would like to help them. The first meeting we had, they thought we were there to discuss which PCs they should have and what phones they should buy. And that was probably the last thing we came to discuss"* (Head of IT)**.** The design and implementation of data governance for the organization as a whole depends on the maturity of individual departments. Departments' professional experience and heterogeneous resources, in either building new or developing existing data capabilities, impacts the quality of data governance as the "good" produced.

5.4 Data overview

Local government organizations struggle to acquire an overview of existing data sources. While there is a desire to build appropriate data infrastructure, the current enterprise architecture is fragmented and fraught with legacy systems. In many cases, organizations do not have access to some of their own data, as it is stored on servers placed with the vendors, who delivered the original system. Often, these vendors demand high costs for providing access. This contributes a problem, where it is expensive and complicated to gain an overview of what data actually exists, where it is, who else has access to it, and how it may generate value: *"One thing is the complexity of many different solutions, but it is something else to have 40 years of legacy systems that have been implemented at random. There was no consideration of infrastructure at that time […] we are sitting on a gold mine of data and knowledge that we do not even know about"* (Head of IT)**.** At the forefront is a very concrete obstacle where any intent to make use of data assets is obstructed by the fact, they are downright difficult to access. When no overview exists, it makes exploring potential value-generation for these assets complicated. Without awareness of how data assets should contribute to organizational goals, conceiving data governance principles becomes impossible.

5.5 Local practices

Diverse, local practices make it difficult for local government organizations to design and implement shared data governance principles. Individual departments are highly autonomous in solving their local government responsibilities, which results in practices that are highly appropriate for the local tasks, but difficult to expand beyond the individual department. To ensure that data treatment adheres to the principles set forth by the data governance program, some degree of standardization is necessary. Enforcing standardized principles for data treatment in highly specialized and autonomous departments is a central challenge; one which is also pointed to as a distinct feature of the public versus the private sector: *"This is the way you implement decisions, and it is very different [from the private sector], because here, there is a lot of room for interpretation that makes things less straightforward"* (Head of IT). Different departments usually implement a local adaption of a decision that fits their existing practice, rather than follow the standardized directions, an outcome likely to occur with data governance as well. It is not only the practices that are diverse, but also relationships with existing IT professionals: *"Ideally, it should be of value, but there is a big difference between speaking to a technical department full of engineers, or [speaking to] nurses, pedagogues and teachers, because [then] you should really know your visiting hours and how to communicate"* (Development consultant)**.** As such, adopting data governance principles in departments that are used to and comfortable with working with data do not require the same effort as in departments, where exploiting data is not common practice.

5.6 Political ambience

Mobilization of data governance is a political endeavor. This either manifests as limited attention from politicians and top-level managers, or as skepticism and fear regarding data governance's infringement upon existing autonomy. Some participants state that data governance should be on the political agenda because the strategic use of data goes beyond improving administrative processes and is part of shaping the future development of the public sector. To engage political support is a challenge, as there is no established linkage between improving public services and data*: "No politicians can comment on this meaningfully. It is not a political issue in the municipality and when I say that, I mean something like 'data is important because it can make us a better municipality' ... But it's not there, it's only administrative"* (IT architect). According to the participants, it is because they need the compelling use-case that shows how working structured and systematically with data translates to value in the local government context. They agree that right now, most data initiatives are powered

by passionate individuals: *"The passionate cannot drive this alone, because at one point there will be no more passion left. There must be top management support"* (Project manager).

While this challenge relates to the difficulty of engaging the political agenda in data matters, achieving this type of top-level support also has other objectives and consequences. Some professionals remain highly skeptical towards data governance and the role of data in their particular domain. Especially departments within social fields remain distrustful, as their profession is about making individual, subjective judgements regarding sensitive cases: "*Here …, it is more feeling for the individual case and [they are asking the question] what is it even data is. Here, the anxiety [regarding data] is more pronounced"* (Financial consultant). Some professionals see data governance and the increased focus on data-driven decision-making lead to an unwanted scrutiny of their cases. They fear exposure of their work to other parts of the organization, which may result in someone higher up making decisions regarding their domain, based on this data, without consulting them. A fear that others might downright misinterpret data is apparent: *"People fear you interpret the data incorrectly, so just trusting that data is being treated and analyzed correctly is a huge change-oriented project in itself*" (Financial consultant). Specialists do not trust that data will be used appropriately or adequately, and therefore remain skeptical about following data governance principles.

Consequently, attempting to govern data assets in a local government context is a politically infused endeavor, in that it may either bring great improvements or disturb some fundamental values. Bringing data usage on the political agenda is thus both an issue of enabling data opportunities and raising awareness regarding its applicability in the public sector, but also constrained by the idea that powerful interests may influence its strategic direction.

6 Discussion

In this section, we summarize our research findings into a "problem triangle" (see Figure 1) and based on this, theorize the relationships between the six challenges. We consider how results from this study contribute to existing research and we deliberate the findings' implications for practice and point to directions for future research.

6.1 The problem triangle

So far, we have focused on identifying and describing the distinct challenges of data governance. In this section, we submit that these six constituent challenges contribute in mutually reinforcing ways to form a problem triangle as illustrated in Figure 1.

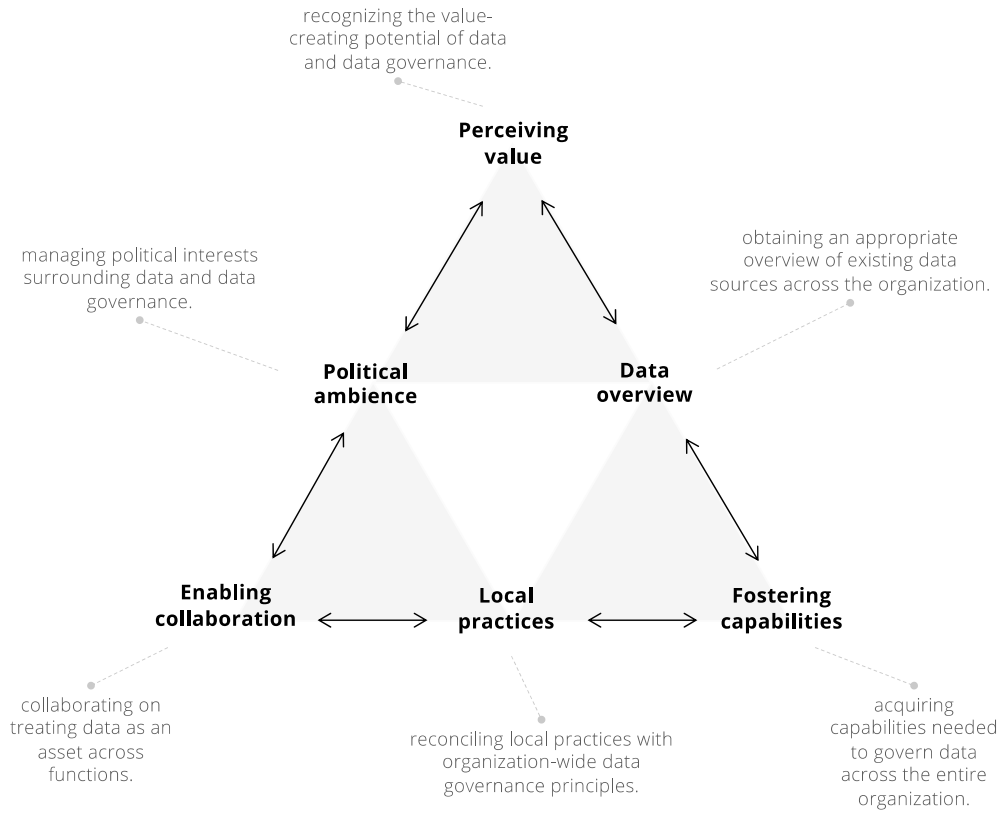

Figure 1. The problem triangle of data governance

The problem triangle demonstrates that mobilizing an organization to engage in data governance is difficult, not only as a result of the individual challenges, but also because these are interdependent and only adequately addressed together. Consequently, we theorize the relationship between challenges #1-3 through their interdependencies with challenges #4-6, as the first three cannot be resolved in isolation, without considering the last three:

- *Perceiving value* (#1) requires a fertile political ambience (#6) to position data governance initiatives as desirable within the organizational context, but also an appropriate overview (#4) of which data sources exist to determine their value-creating potential.
- *Enabling collaboration* (#2) requires for diverging, local practices (#5) across collaborating functions to make mutual adjustments, but also that political ambience (#6) offer unified, collective interests to encourage such adjustments.

- *Fostering capabilities* (#3) requires a suitable overview (#4) of what specific types of data resources to account for, while paying attention to how various local practices (#5) currently foster certain specific capabilities.

In parallel, challenges #1-3 in some way also reinforce challenges #4-6, indicating that the last three cannot be independently addressed because they are constituted by the first three:

- *Data overview* (#4) remains inadequate due to a lack of the right capabilities (#3) across departments to actually establish an accurate overview and further exacerbated by fundamental difficulties in perceiving the value (#1) of having such an overview of data assets.
- *Local practices* (#5) remain difficult to consolidate due to lack of cross-functional collaboration (#2) on data initiatives and further restrained by the varying maturities of data capabilities (#3) across the collaborating functions.
- *Political ambience* (#6) remains influenced by the limited ability to perceive the value (#1) of data as meaningful and enabling in a political context and further affected by the lack of cross-functional collaboration (#3) needed to envision the potential of using data to transform public services.

We suggest that the problem triangle, with the delineated relationships between the six challenges, represents data governance as a collective action problem, where local government actors with heterogenous, potentially conflicting, interests struggle to find value in and act together towards a common goal:

- Perceiving value of data governance is challenging because actors in a collective tend to ascribe different meanings to the purpose or outcome of the collective action.
- Enabling collaboration between functions on data governance is complicated because actors tend to take actions that protect their individual interests at the expense of achieving a greater joint outcome.
- Fostering capabilities for governing data is difficult because doing so requires effectively managing heterogeneous resources contributed by different actors to the common "good" produced in a collective.

When we adopt a collective action lens to consider the governance aspect of data governance, it brings underlying issues, such as data overview, local practices and political ambience to the forefront. Recognizing data governance as a collective action problem rather than an exercise in assigning accountabilities also encourages markedly different avenues for improvement. Solving such dilemmas often requires altering payoffs through governance arrangements to realign individual decisions that together result in the desired joint outcome (Torfing and Ansell 2016).

6.2 Contribution to existing research

Previous research offers valuable input on how to design and conceive of data governance as an organization-wide program (Alhassan et al. 2016; Brous et al. 2016; Otto 2011c, 2011a; Weber et al. 2009), but few studies describe and explain why it is difficult for practitioners to introduce data governance into a complex organizational reality. Our research contributes to the data governance literature with a theory-informed empirical account of the intricacies involved in mobilizing an organization to engage in data governance. This reveals a complexity that go well beyond existing, seminal work within the field (Begg and Caira 2012; Thompson et al. 2015; Vilminko-Heikkinen et al. 2016).

On the other hand, our findings also resonate with research on broader issues in e-government and indicate that data governance is difficult, because the inherent challenges are tied to the core of what it means to do public administration in a digital society. More importantly, the similarities between our challenges and known e-government issues, such as competing value positions (Rose, Persson, Heeager, et al. 2015), interorganizational modes of collaboration (Juell-Skielse et al. 2017) and varying capability maturity (Kim and Grant 2010), demonstrate the utility in perceiving data governance in local governments as a collective action problem. Elaborately designed data governance policies are likely to fall short, when introduced into complex, organizational realities, if data governance research continues to retain its narrow focus on how to define principles and assign accountabilities, without considering how value, capabilities, collaboration, overview, practices, and politics factor in and constitute an interrelated problem.

6.3 Implications and suggestions for future research

In the words of American, pragmatist philosopher John Dewey, "…a problem well put is half solved. To mistake the problem involved is to cause subsequent inquiry to be irrelevant. Without a problem, there is blind groping in the dark" (Dewey 1938, p. 3). The prevailing lack of a common direction of inquiry (Al-Ruithe et al. 2018; Benfeldt Nielsen 2017; Brous et al. 2016) could indicate there is still some groping in the dark, when it comes to data governance. Yet, if formulation of research problems is taken for granted or not made explicit, it is likely that essential characteristics remain overlooked, resulting in inadequate or misdirected solutions (Volkema 1995). As such, previous IS literature have argued for the particular advantage of formulating research problems *with* (not for) practitioners (Mathiassen 2002; P. A. Nielsen and Persson 2016). While engagement with practice by scholars is necessary because most real world problems are too complex to be captured by any one perspective

(Van de Ven 2007, p. 18), these problems are also not given or existing objectively 'out there'. Defining them therefore necessarily requires deliberate framing with relevant stakeholders. By engaging with practitioners in determining why governing data is difficult, this paper has several implications, both for practice and future research.

Our findings demonstrate that data governance in local government is a large-scale change effort that requires more than just the designation of roles and responsibilities. Data governance requires attention to a complex, organizational reality, where six intricate challenges form a collective action problem and implicate even broader issues, known in existing e-government literature. In previous research, "paradoxes" (Vilminko-Heikkinen et al. 2016) have been employed to examine problems, but ultimately denote that they are unsolvable because any solution "will only remain temporary and cause tension" (p. 2). Although we argue data governance is a collective action problem, our conception of "challenges" constitutes a more useful frame for local government practitioners by breaking the grander problem down into manageable issues. The notion of challenges brings attention to the practical details of why data governance is difficult, which can help practitioners shape the urgency and prioritization of various initiatives but also aid them in developing data governance programs that mitigate issues of value, collaboration, capabilities, overview, practices, and politics. In any case, creative, breakthrough ideas often come from spending time understanding the problem and exploring its boundaries (Volkema 1995).

While practitioners are keen to pursue data related opportunities, they struggle with mobilizing their *entire* organization to adopt data governance, according to the findings of this study. The heterogeneity and lack of collaboration between subgroups in the form of departments and professional domains pose a great challenge to a fundamental tenet of data governance, namely that it should be approached from the top-down as an organization wide approach (Begg and Caira 2012; Vilminko-Heikkinen et al. 2016). Here, the analytical value of employing a collective action perspective on data governance also emerges. Previous research has focused on isolated aspects, such as determining general principles (Brous et al. 2016) or defining activities (Alhassan et al. 2016, 2018) for effectively governing data. Our study suggests that mobilizing an organization to actually adhere to these aspects is a matter of enabling collective action between heterogeneous actors with different motivations and resources. A central implication for practice is thus to address the significant governance challenge, which consists of realigning these individual interests to achieve a greater joint outcome. Returning to Constantinides and Barrett's study on governing information infrastructures (Constantinides and Barrett 2015), they propose

"progressive nesting" as a solution. Here, governance is not initially defined from a centralized, top-down perspective as proposed in some data governance approaches (Khatri and Brown 2010), but rather progressively nested. For example, groups of local government actors self-organize on principles regarding their own data assets, but as soon as it leads to spill over into other domains, an overarching principle must be established. As such, data governance is "nested to a higher level". Practitioners can employ this bottom-up process to progressively define more detailed governance rules, which may eventually cover the entire organization, while to a large extent still accommodating the heterogeneity of individual departmental responsibilities.

If engaging in IS research is viewed as a problem-solving process, where any theory developed or solution conceived is directly predicated on the nature of the research problem (Gregor 2006), there is significant value in theorizing an IS problem *with* practitioners before attempting further theory building, research design or solution creation (Van de Ven 2007). Our proposition that data governance may be understood as a collective action problem thus opens up a plethora of new avenues for IS research on the topic of data governance. We propose that future research delves into mitigating the constituent issues of the problem triangle (Figure 1), when designing and initiating data governance programs. Also, studies that explore how to achieve aforementioned form of bottom-up governance for data assets as a way to address the challenges are encouraged. Understanding value in the context of governing data appears to be a particularly wicked and pervasive challenge, where studies that specifically examine how to define and convey data value could benefit both practitioners and researchers.

Finally, we must emphasize that our investigation of challenges with data governance is limited to the views within local government organizations. Involving citizens is a very important direction for future data governance research, and also a well-known problem in the e-government literature (Medaglia 2012; Medaglia et al. 2017; Olphert and Damodaran 2007; Rose, Persson, and Heeager 2015). With the instatement of GDPR, where individual data privacy rights move to the forefront, engaging citizens to determine how to best govern sensitive, personal data will only become more important (Winter and Davidson 2018). We urge data governance researchers to explore this avenue in further detail.

7 Conclusion

Data governance research has focused on isolated aspects, with little attention paid to how practitioners introduce data governance into a complex, organizational reality. Our investigation of Danish local government contributes fresh insights into why governing data is difficult, namely due to six interrelated challenges: perceiving value,

enabling collaboration, fostering capabilities, data overview, local practices and political ambience. We explicate the relationship between these challenges in a problem triangle and demonstrate both theoretical and practical implications of viewing data governance as a collective action problem, where local government actors with heterogenous, potentially conflicting, interests struggle to find value in and act together towards a common goal. We suggest our problem triangle may assist practitioners in local government organizations to better understand the complexity they face, when attempting to mobilize their organizations and formally govern their data assets. Moreover, our findings can inspire researchers to study data governance beyond large-scale, company-wide programs that primarily focus on the assignment of accountabilities.

8 References

Agency for Digitisation. (2018). IT Architecture. *Danish Agency for Digitisation*. https://digst.dk/data/it-arkitektur/. Accessed 27 September 2018

Alhassan, I., Sammon, D., & Daly, M. (2016). Data governance activities: an analysis of the literature. *Journal of Decision Systems*, *25*(February), 64–75. doi:10.1080/12460125.2016.1187397

Alhassan, I., Sammon, D., & Daly, M. (2018). Data governance activities: a comparison between scientific and practice-oriented literature. *Journal of Enterprise Information Management*, *31*(2), 300–316. doi:10.1108/JEIM-01-2017-0007

Al-Ruithe, M., Benkhelifa, E., & Hameed, K. (2018). A systematic literature review of data governance and cloud data governance. *Personal and Ubiquitous Computing*, 1–21. doi:10.1007/s00779-017-1104-3

Baškarada, S., & Koronios, A. (2013). Data, information, knowledge, wisdom (DIKW): A semiotic theoretical and empirical exploration of the hierarchy and its quality dimension. *Australasian Journal of Information Systems*, *18*(1), 5–24. doi:10.3127/ajis.v18i1.748

Begg, C., & Caira, T. (2011). Data Governance in Practice: The SME Quandary Reflections on the Reality of Data Governance in the Small to Medium Enterprise (SME) Sector. *5th European Conference on Information Management and Evaluation (ECIME)*, 75–83.

Begg, C., & Caira, T. (2012). Exploring the SME Quandary : Data Governance in Practise in the Small to Medium-Sized Enterprise Sector. *The Electronic Journal Information Systems Evaluation*, *15*(1), 3–13.

Benfeldt Nielsen, O. (2017). A Comprehensive Review of Data Governance Literature. In *Selected Papers of the IRIS* (Vol. 8).

Beynon-Davies, P. (2009). The "language" of informatics: The nature of information systems. *International Journal of Information Management*, *29*(2), 92–103. doi:10.1016/j.ijinfomgt.2008.11.002

Beynon-Davies, P. (2011). In-formation on the prairie: Signs, patterns, systems and prairie dogs. *International Journal of Information Management*, *31*(4), 307–316. doi:10.1016/j.ijinfomgt.2010.12.001

Brous, P., Janssen, M., & Vilminko-Heikkinen, R. (2016). Coordinating decision-making in data management activities: A systematic review of data governance principles. doi:10.1007/978-3-319-44421-5_9

Cheong, L., & Chang, V. (2007). The Need for Data Governance: A Case Study. *ACIS 2007 Proceedings*, 99–1008.

Coleman, D. W., Hughes, A. A., & Perry, W. D. (2009). The role of data governance to relieve information sharing impairments in the federal government. *2009 WRI World Congress on Computer Science and Information Engineering, CSIE 2009*, *4*, 267–271. doi:10.1109/CSIE.2009.630

Constantinides, P., & Barrett, M. (2015). Information Infrastructure Development and Governance as Collective Action. *Information Systems Research*, *26*(1), 40–56. doi:10.1287/isre.2014.0542

DalleMule, L., & Davenport, T. H. (2017). What's Your Data Strategy? *Harvard Business Review*, 11.

Danish Ministry of Finance. (2016). *A Stronger and More Secure Denmark: Digital Strategy 2016-2020*. Danish Government.

Dewey, J. (1938). *Logic: The Theory of Inquiry*. New York: H. Holt and Company.

Dwivedi, Y. K., Janssen, M., Slade, E. L., Rana, N. P., Weerakkody, V., Millard, J., et al. (2017). Driving innovation through big open linked data (BOLD): Exploring antecedents using interpretive structural modelling. *Information Systems Frontiers*, *19*(2), 197–212. doi:10.1007/s10796-016-9675-5

Elbanna, A., Bunker, D., Levine, L., & Sleigh, A. (2019). Emergency management in the changing world of social media: Framing the research agenda with the stakeholders through engaged scholarship. *International Journal of Information Management*, *47*, 112–120.

European Commission. (2017). Europe's Digital Progress Report - The Digital Economy and Society Index.

European Commission. (2018). 2018 reform of EU data protection rules. https://ec.europa.eu/commission/priorities/justice-and-fundamental-rights/data-protection/2018-reform-eu-data-protection-rules_en. Accessed 7 January 2019

European Union. (2016). General Data Protection Regulation. *Official Journal of the European Union*, *L119*, 1–88.

Fontana, A., & Frey, J. H. (1994). Interviewing: The Arts of Science. *Handbook of Qualitative Research*, *i*, 361–376. doi:10.1016/j.jconhyd.2010.08.009

Gregor, S. (2006). The nature of theory in information systems. *MIS Quarterly*, *30, 3 (September*, *30*(3), 611–642.

Hardin, G. (1968). The Tragedy of the Commons. *Science*, *162*(3859), 1243–1248. doi:10.1126/science.162.3859.1243

Harvey, L. J., & Myers, M. D. (1995). Scholarship and practice: the contribution of ethnographic research methods to bridging the gap. *Information Technology & People*, *8*(3), 13–27. doi:10.1108/09593849510098244

Holahan, R., & Lubell, M. (2016). Collective Action Theory. In J. Torfing & C. K. Ansell (Eds.), *Handbook on theories of governance* (pp. 21–31). Cheltenham, UK ; Northampton, MA: Edward Elgar Publishing.

Hsieh, H.-F., & Shannon, S. E. (2005). Three Approaches to Qualitative Content Analysis. *Qualitative Health Research*, *15*(9), 1277–1288. doi:10.1177/1049732305276687

Juell-Skielse, G., Lönn, C.-M., & Päivärinta, T. (2017). Modes of collaboration and expected benefits of inter-organizational E-government initiatives: A multi-case study. *Government Information Quarterly*, *34*(4), 578–590. doi:10.1016/j.giq.2017.10.008

Khatri, V., & Brown, C. V. (2010). Designing data governance. *Communications of the ACM*, *53*(1), 148. doi:10.1145/1629175.1629210

Kim, D., & Grant, G. (2010). E-government maturity model using the capability maturity model integration. *Journal of Systems and Information Technology*, *12*(3), 230–244. doi:10.1108/13287261011070858

Kiron, D. (2016). Lessons from becoming a data-driven organization. *MIT Sloan Management Review*, *58*(2).

Klievink, B., Romijn, B.-J., Cunningham, S., & de Bruijn, H. (2017). Big data in the public sector: Uncertainties and readiness. *Information Systems Frontiers*, *19*(2), 267–283. doi:10.1007/s10796-016-9686-2

Ladley, J. (2012). *Data governance: how to design, deploy, and sustain an effective data governance program*. Waltham, MA: Morgan Kaufmann.

Lee, Y. W., Madnick, S. E., Wang, R. Y., Wang, F. L., & Zhang, H. (2014). A cubic framework for the chief data officer: Succeeding in a world of big data. *MIS Quarterly Executive*, *13*(1), 1–13.

Local Government Denmark. (2018). Municipal Responsibilities. *Local Government Denmark*. http://www.kl.dk/English/Municipal-Responsibilities/. Accessed 27 September 2018

Marchand, D. A., & Peppard, J. (2013). Why IT fumbles analytics. *Harvard Business Review*, *91*(1), 104–112.

Markus, Steinfield, & Wigand. (2006). Industry-Wide Information Systems Standardization as Collective Action: The Case of the U.S. Residential Mortgage Industry. *MIS Quarterly*, *30*, 439. doi:10.2307/25148768

Mathiassen, L. (2002). Collaborative practice research. *Information Technology & People*, *15*(4), 321–345. doi:10.1108/09593841111182250

Medaglia, R. (2012). eParticipation research: Moving characterization forward (2006–2011). *Government Information Quarterly*, *29*(3), 346–360.

Medaglia, R., Hedman, J., & Eaton, B. (2017). Public-Private Collaboration in the Emergence of a National Electronic Identification Policy: The Case of NemID in Denmark. *Proceedings of the 50th Hawaii International Conference on System Sciences*, 2782–2791.

Mindel, V., Mathiassen, L., & Rai, A. (2018). The Sustainability of Polycentric Information Commons. *MIS Quarterly*, *42*(2), 607–631. doi:10.25300/MISQ/2018/14015

Mingers, J., & Willcocks, L. (2014). An integrative semiotic framework for information systems: The social, personal and material worlds. *Information and Organization*, *24*(1), 48–70. doi:10.1016/j.infoandorg.2014.01.002

Monge, P. R., Fulk, J., Kalman, M. E., Flanagin, A. J., Parnassa, C., & Rumsey, S. (1998). Production of Collective Action in Alliance-Based Interorganizational Communication and Information Systems. *Organization Science*, *9*(3), 411–433.

Myers, M. D., & Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and Organization*, *17*(1), 2–26. doi:10.1016/j.infoandorg.2006.11.001

Nielsen, O. B., Persson, J. S., & Madsen, S. (2019). Why Governing Data is Difficult: Findings from Danish Local Government. In A. Elbanna, Y. K. Dwivedi, D. Bunker, & D. Wastell (Eds.), *Smart Working, Living and Organising: IFIP WG 8.6 International Conference on Transfer and Diffusion of IT, TDIT 2018, Portsmouth, UK, June 25, 2018, Proceedings* (Vol. 533, pp. 15–29). Springer International Publishing. doi:10.1007/978-3-030-04315-5

Nielsen, P. A., & Persson, J. S. (2016). Engaged problem formulation in IS research. *Communications of the Association for Information Systems*, *38*(1), 720–737.

Olphert, W., & Damodaran, L. (2007). Citizen participation and engagement in the design of e-government services: The missing link in effective ICT design and delivery. *Journal of the Association for Information Systems*, *8*(9), 27.

Olson, M. (1965). *The logic of collective action: public goods and the theory of groups* (21. printing.). Cambridge, Mass.: Harvard Univ. Press.

Ostrom, E. (1990). *Governing the commons: the evolution of institutions for collective action*. Cambridge ; New York: Cambridge University Press.

Ostrom, E. (2010). Analyzing collective action. *Agricultural Economics*, *41*, 155–166. doi:10.1111/j.1574-0862.2010.00497.x

Ostrom, V. (1972). Polycentricity. Presented at the 1972 Annual Meeting of the American Political Science Association, Washington, DC.

Otto, B. (2011a). Organizing Data Governance: Findings from the telecommunications industry and consequences for large service providers. *Communications of the Association for Information Systems*, *29*(1), 45–66.

Otto, B. (2011b). Data governance. *Business and Information Systems Engineering*, *3*(4), 241–244. doi:10.1007/s12599-011-0162-8

Otto, B. (2011c). A Morphology of the Organisation of Data Governance. *ECIS 2011 Proceedings*, 272. doi:10.1007/978-3-8348-9953-8

Pereira, G. V., Macadar, M. A., Luciano, E. M., & Testa, M. G. (2017). Delivering public value through open government data initiatives in a Smart City context. *Information Systems Frontiers*, *19*(2), 213–229. doi:10.1007/s10796-016-9673-7

Persson, J. S., Kaldahl, A., Skorve, E., & Nielsen, P. A. (2017). Value Positions in E-Government Strategies : Something Is (Not) Changing in the State of Denmark. *Proceedings of the 25th European Conference on Information Systems*, 904–917.

Pierce, E., Dismute, W. S., & Yonke, C. L. (2008). *The State of Information and Data Governance - Understanding How Organizations Govern Their Information and Data Assets*.

Porter, M. E., & Heppelmann, J. E. (2014). How smart, connected products are transforming competition. *Harvard business review*, *92*(11), 64–88.

Porter, M. E., & Heppelmann, J. E. (2015). How smart, connected products are transforming companies. *Harvard Business Review*, *93*(10), 96–114.

Ransbotham, S., & Kiron, D. (2017). Analytics as a Source of Business Innovation. *MIT Sloan Management Review*, 19.

Ransbotham, S., Kiron, D., & Prentice, P. K. (2016). Beyond the Hype:The Hard Work Behind Analytics Success. *MIT Sloan Management Review*, 19.

Rose, J., Persson, J. S., & Heeager, L. T. (2015). How e-Government managers prioritise rival value positions: The efficiency imperative. *Information polity*, *20*(1), 35–59.

Rose, J., Persson, J. S., Heeager, L. T., & Irani, Z. (2015). Managing e-Government: value positions and relationships. *Information Systems Journal*, *25*(5), 531–571. doi:10.1111/isj.12052

Rose, J., Persson, J. S., Kræmmergaard, P., & Nielsen, P. A. (2012). *IT Management in Local Government: The DISIMIT Project*.

Soares, S. (2010). *The IBM Data Governance Unified Process*. *USA: IBM Corporation*.

Thompson, N., Ravindran, R., & Nicosia, S. (2015). Government data does not mean data governance: Lessons learned from a public sector application audit. *Government Information Quarterly*, *32*(3), 316–322. doi:10.1016/j.giq.2015.05.001

Torfing, J. (Ed.). (2012). *Interactive governance: advancing the paradigm*. Oxford ; New York: Oxford University Press.

Torfing, J., & Ansell, C. K. (Eds.). (2016). *Handbook on theories of governance*. Cheltenham, UK ; Northampton, MA: Edward Elgar Publishing.

Van de Ven, A. H. (2007). *Engaged scholarship: A guide for organizational and social research*. Oxford University Press on Demand.

Vilminko-Heikkinen, R. (2017). *Data, Technology, and People*. *Demystifying Master Data Management*. Tampere University of Technology.

Vilminko-Heikkinen, R., Brous, P., & Pekkola, S. (2016). Paradoxes, conflicts and tensions in establishing master data management function. In *24th European Conference on Information Systems, ECIS 2016*.

Volkema, R. J. (1995). Creativity in MS/OR: Managing the Process of Formulating the Problem. *Interfaces*, *25*(3), 81–87. doi:10.1287/inte.25.3.81

Wang, R. Y., & Strong, D. M. (1996). Beyond Accuracy: What Data Quality Means to Data Consumers. *Journal of Management Information Systems*, *12*(4), 5–33. doi:10.1080/07421222.1996.11518099

Weber, K., Otto, B., & Osterle, H. (2009). One Size Does Not Fit All — A Contingency Approach to Data Governance. *ACM Journal of Data and Information Quality*, *1*(1), 4:1-4:27. doi:10.1145/1515693.1515696.http

Weill, P., & Ross, J. W. (2004). IT Governance on One Page. *CISR Working Paper*, (349).

Winter, J. S., & Davidson, E. (2018). The Healthcare AI Juggernaut: Is PHI Data Governance Possible? In *Living with Monsters? Social Implications of Algorithmic Phenomena, Hybrid Agency and the Performativity of Technology*. Presented at the IFIP WG 8.2 Working Conference 2018, San Francisco State University.

Appendix A

Municipality	Title	Workshop 1	Interview	Workshop 2
A	Head of IT & Digitalization		X	
A	Head of IT, City and Landscape Management		X	
A	Project Manager, IT & Digitalization	X	X	
A	Programmer			
A	Project Manager, IT & Digitalization		X	
A	BI Consultant			X
Z	Manager of Citizen service and Digital Innovation (former)			X
Y	Head of IT (former)			X
B	Head of IT	X		
B	Deputy head of IT & Digitalization	X		X
B	Head of Educational IT	X		
B	Digitalization Consultant	X		
B	Digitalization Consultant	X		
C	Head of IT Operations and Support			X
C	Head of IT & Digitalization			X
D	Digitalization Consultant			X
D	GIS staff			X
E	Head of IT			X
E	Implementation Consultant			X
E	Manager of Data and IT			X
F	Head of Data Lab, IT & Digitalization	X		X
G	Development Consultant	X	X	X
G	Development Consultant			X
H	Financial Consultant	X	X	
H	IT Architect	X	X	
I	Head of Digitalization and Communication			X
I	Coordinator of GIS and Geodata			X
J	Head of Digitalization	X	X	
J	Head of IT	X	X	
K	IT Developer			X
K	Head of Financial department			X
K	Coordinator of GIS			X
L	IT Architect	X		
L	Project Manager			X
Total	**34**	**13**	**9**	**20**