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Three partnership models

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Achieving voluntary data sharing in cross sector partnerships: Three partnership models

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ABSTRACT

The complex societal problems that we face today require unprecedented collaboration and evidence-based decisions. These collaboration processes are further propelled by the datafication of virtually all spheres of public life. To benefit from this, the data needs to be made available to allow for data analytics. Thus, data sharing becomes a crucial aspect of cross-sector collaborations that aim to create and capture value from information. Compared to collaborations where data sharing is not the main goal, data sharing partnerships face a number of novel challenges, such as mitigating data risks, complying with data protection legislation, and ensuring responsible data use. Navigating these waters and achieving data sharing can be challenging for both governments and businesses, as well as other actors. How do organizations from different sectors manage to achieve data sharing for addressing societal challenges? To address this research question, we apply a framework of three models of cross sector social partnerships developed in the field of organization studies to structure the analysis of six cases. Our analysis suggests that to a certain extent the partnership model determines the types of drivers and challenges to sharing data in a partnership. Leveraging the drivers and anticipating these challenges can help organizations be more aware of key terms of the collaboration and the mechanisms that can be used to succeed in their partnership goals.

1. Introduction

Complex societal problems that we face today require unprecedented collaboration and evidence-based decisions. Societal challenges in areas such as climate, energy, economic development, safety and security, poverty, and crime cannot be addressed by governments alone and require that other sectors – businesses, non-profits, academia – to join efforts. For the past several decades there has been a “rise of multi-stakeholder partnerships” due to several factors, among which is the growing realization of the complex nature of societal problems and technological advances (Gray & Purdy, 2018). In the public sector, entering in partnerships has

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become a common approach for addressing complex societal issues (Wastell, Kawalek, Langmead-Jones, & Ormerod, 2004). Along with cross-agency collaboration, government collaboration with private and not-for-profit parties can open new opportunities for creating public value (Gil-Garcia, 2012) and help narrow gaps in resources, learning, regulation, and stakeholder participation that exist in relation to societal challenges (Pinkse & Kolk, 2012).

These collaboration processes are further propelled by the *datafication* of virtually all spheres of public life, as more data are generated by organizations of various kinds that can be useful for addressing societal issues and creating public value. To benefit from these data and the different digital resources that different sectors possess (Henfridsson, Nandhakumar, Scarbrough, & Panourgias, 2018, p.90), data needs to be made available to allow for data analytics. Thus, data sharing becomes a crucial aspect of cross-sector collaborations that aim to create and capture value from information. For example, during the coronavirus outbreak in 2020 a data sharing partnership called Data Against Corona Taskforce¹ was set up by the Belgian Ministers of Health and Digital Agenda, whereby several telecommunication companies provided data to inform government actions during the pandemic. Another vivid example is California Data Collaborative² which is a multistakeholder partnership to automate the collection and analysis of metered water use in order to better inform water policy.

Although there is much research available on interorganizational information sharing (De Tuya, Cook, Sutherland, & Luna-Reyes, 2017; Gil-Garcia & Sayogo, 2016; Welch, Feeney, & Park, 2016) and on cross-sector collaboration (Bryson, Crosby, & Stone, 2006; Picazo-Vela, Gutierrez-Martinez, Duhamel, Luna, & Luna-Reyes, 2017; Vurro, Dacin, & Perrini, 2010), datafication trends add an extra layer of complexity to these partnerships (Susha, Gronlund, & Van Tulder, 2019). Cross-sector partnerships that are focused on data sharing between different sector for societal issues (henceforth, *data sharing partnerships*) face additional complexities when it comes to incentives for data sharing, defining the problem to be addressed, the required data capabilities, and the role of trust (Susha & Gil-Garcia, 2019). Moreover, compared to collaborations where data sharing is not the main goal, data sharing partnerships face a number of novel challenges, such as mitigating data risks, complying with data protection legislation, ensuring responsible data use, to name a few (Susha & Gil-Garcia, 2019). Sharing data voluntarily in partnerships can be problematic because data often tends to be overprotected (Susha et al., 2018) and organizations have to balance between openness and control over data (Klievink, Van Der Voort, & Veeneman, 2018).

Furthermore, actors from different sectors may have different goals for data sharing and addressing a societal issue (Susha et al., 2018) that may be a source of both value and conflict (Klievink et al., 2018). Different interests of the public, private, and non-profit sector organizations regarding data are becoming increasingly critical. On the one hand, the public sector advances the transparency and openness agenda, whereby data are seen as a public good entitled to be made accessible and used for the benefit of all (e.g. open government programs). On the other hand, the private sector (especially the tech- and data-rich companies) are taking the course towards 'data monetisation', whereby data are seen as a strategic asset and a source of new business models and competitive advantage (Parvinen, 2020). This creates tensions between opening up and protecting the data and the commercial goals and the societal/public value resulting from using the data.

Navigating these waters, aligning different interests, and achieving data sharing can be challenging for both governments and businesses, as well as other actors. At the same time, the growing urgency of societal challenges creates an impetus for different sectors to collaborate and use the power of data for the public good. While the literature on the formation of cross sector partnerships in general terms abounds, less is known about how organizations shape the terms of engagement in a data sharing partnership focused on societal issues. Our study therefore addresses the following research question: *How do organizations from different sectors manage to achieve data sharing to address societal challenges?* We are particularly interested in how the perspectives of public and private organizations on data sharing may be different or similar, when they share data with a party from another sector to address a challenge.

In this paper, we present six cases of data sharing partnerships and examine how the data sharing was achieved. To analyse the cases, we use a well-cited theoretical framework from partnerships research (Selsky & Parker, 2005; Selsky & Parker, 2010) and extend its applicability to the novel context of data and data sharing partnerships. Our work is thus grounded in two literature streams – partnerships literature and data sharing research; so far, few studies examined the intersection between these two streams. Insights about how data sharing can be achieved in various contexts can be helpful to practitioners in organizations dealing with or considering cross sector partnerships.

The remaining part of this paper is structured as follows. In Section 2, we review relevant research on the topic, followed by our research design discussed in Section 3. In Section 4, we present the findings of our case analysis, and we end the paper with discussion and implications as well as the Conclusions presented in Sections 5 and 6, respectively.

2. Literature review

2.1. Cross-sector data sharing

In general, data sharing between organizations is influenced by a number of driving and inhibiting factors (Wang, 2018), and achieving data sharing is essentially about leveraging the drivers and overcoming the challenges of data sharing. Various authors use different terms but in summary the driving forces include the *interests, motivations, and expected benefits* of the data sharing; while the inhibiting forces include *barriers and challenges* that the sharing of data poses. Different contextual factors, such as legislation,

¹ <https://press.telenet.be/covid-19-belgium-analyses-telecom-data-to-measure-the-impact-of-confinement>.

² <http://californiadatacollaborative.org>.

organizational readiness, political pressure, technical artefacts, etc., can play either role (driving or inhibiting) depending on the situation.

There is research that focuses on information sharing³ within one sector, for instance between government agencies or between companies (e.g. Madlberger, 2009; Sarathy & Muralidhar, 2006; Yang & Maxwell, 2011). Whereas this literature provides insights on some sector-specific issues, in this research we are focused on data sharing between different sectors which is arguably more complicated due to sectoral differences. The literature focusing on cross-sector data sharing is broad and includes data sharing between public, private, and/or non-profit organizations in various application contexts. For instance, Eden et al. (2016) discussed the factors that facilitate and impede cross-boundary healthcare information exchange. Devine et al. (2017) highlighted the challenge of achieving sustainability of healthcare information exchange initiatives once the public funding is ended.

Much is known about data sharing between scientific communities and the facilitating and constraining factors thereof (e.g. Faniel & Zimmerman, 2011). The open research data literature documented a wide variety of barriers and drivers for openly sharing scientific data. For instance, Kim and Stanton (2016) concluded that institutional pressures and technical aspects, such as the availability of data sharing repositories and metadata standards, were among the most significant drivers of research data sharing.

Public-private data sharing collaborations have also been investigated in the context of international trade, where businesses share data with the government. For instance, in a Living Lab setting, businesses can engage with governments and other stakeholders to explore joint benefits of voluntarily sharing trade information (Baida, Rukanova, Liu, & Tan, 2008; Fröbner et al., 2019; Henningsson, Björn-Andersen, Schmidt, Flügge, & Henriksen, 2011; Klein, Higgins, Kipp, & Mangan, 2011; Rukanova et al., 2011; Rukanova et al., 2020; Rukanova, Henriksen, Von Raesfeld, Van Stijn, & Tan, 2007). The main motivation for businesses to engage in such initiatives is to receive trade facilitation, while for governments it is to obtain better quality information earlier and more visibility to perform better control. Cost-benefit issues, legal issues, and public funding have been identified to play a role in these initiatives (Arsyida, van Delft, Rukanova, & Tan, 2017; Grainger, Huiden, Rukanova, & Tan, 2018; Ravulakollu, Urciuoli, Rukanova, Tan, & Hakvoort, 2018; Rukanova, Hendrikssen, Henningsson, & Tan, 2018; Rukanova, Henriksen, Heijmann, Arman, & Tan, 2018).

Furthermore, a concept that can help understand some of the particularities of data sharing in the public-private context is 'smart disclosure'. Smart disclosure involves initiatives when data about consumer products, companies, services, and consumers themselves are opened up by businesses to foster innovation and enable better purchasing decisions by consumers (Sayogo & Pardo, 2013). Among driving factors are social pressure and the value of sharing data to the organizations that use transparency as a competitive strategy (Sayogo & Pardo, 2013). All in all, organizations in different sectors are driven to share data for a variety of benefits, such as for transparency and organizational competitiveness, or due to external pressures, in order to conform to institutional/organizational policies, to enable information exchange and innovation, to name a few. These drivers may be specific to a certain sector and application context.

The literature on the challenges of cross-sector data sharing is scattered and still emerging. In Table 1 we present a concise summary of the main categories of data sharing challenges discussed in previous research (Susha et al., 2019): regulatory, organizational, and data-related challenges. Several challenges were found to be significant across several disciplinary streams and in various contexts, such as: difficult data discovery, costly access to data, and conflicting or lack of appropriate legislative provisions (Susha et al., 2019). Additionally, privacy issues, incentivizing data providers, and resource constraints were among the most cited challenges, as concluded by these authors (Susha et al., 2019).

Regulatory challenges associated with cross-sector data sharing have to do with the lack of clear and consistent legal provisions and data sharing policies of organizations in different sectors. Sharing data across sectors thus may be complicated by a lack of clarity on what is and is not allowed by legislation (Edmunds, 2019; Schmit, Kelly, & Bernstein, 2019; Walker et al., 2022). For example, in a cross-sector partnership between the Ohio State University Wexner Medical Center and the Food Collective, there was a lack of clarity regarding what type of data sharing for the purpose of coordinating patient care is allowable under the Health Insurance Portability and Accountability Act in the U.S. (Walker et al., 2022). This led to reluctance of the Food Collective to enter into a business associate agreement to arrange for such data sharing arrangements (Walker et al., 2022).

Data-related challenges may include issues of interoperability (Edmunds, Johnson, & Kang, 2018; Schmit et al., 2019), data quality, data security and incompatible data infrastructure (O'Neil, Staatz, Hoe, Goyal, & Ward, 2019), and data governance (Edmunds, 2019; Edmunds et al., 2018; Walker et al., 2022). Although these issues are relevant for data sharing initiatives in general, they may manifest themselves more acutely in cross-sector data sharing projects since there is less coordination, the levels of data expertise may vary between sectors, the risks of data sharing may be higher, to name a few.

Organizational challenges which are relevant for cross-sector data sharing include balancing benefits with costs/risks (Edmunds, 2019; Petchel, Gelmon, & Goldberg, 2020), lack of incentives for data sharing (Edmunds et al., 2018), and coordination and alignment issues (Edmunds, 2019), to name a few. Although these issues pertain to data sharing initiatives in general, they may play an even more critical role in cross-sector data sharing projects. This is due to the fact that organizational cultures and norms differ across sectors and that different values may be attributed to data and information within an organization in different sectors.

This overview of the literature points to several research gaps. First is that, although research on cross-sector data sharing has been growing, it has only to a limited extent engaged with societal issues. Although some recent literature has made advances in this direction (e.g. research on data collaboratives), there is little theoretical basis for explaining how the societal issues drive and otherwise shape data sharing initiatives. Second, although the literature on data sharing recognizes that actors in different sectors may have

³ For the purpose of this review, we treat the terms 'data sharing' and 'information sharing' as synonyms.

Table 1
Challenges to data sharing partnerships (adapted from Susha et al., 2019).

Category	Challenges to data sharing	Sample references
Regulatory	<ul style="list-style-type: none"> ◇ Lack of consistent and comprehensive legal provisions on cross-sector data sharing ◇ Lack of clear data sharing policies in organizations on cross-sector data sharing 	Sayogo & Pardo, 2013; Rukanova, Hendrikssen, et al., 2018; Rukanova, Henriksen, et al., 2018; Edmunds, 2019; Schmit et al., 2019; Walker et al., 2022
Organizational	<ul style="list-style-type: none"> ◇ Costs of sharing data externally and resource constraints ◇ Lack of or misalignment of incentives ◇ Confidentiality and economic value of data ◇ Differences in organizational norms, cultures and practices ◇ Coordination challenges in terms of roles, resources, activities 	Sayogo & Pardo, 2013; Rukanova, Hendrikssen, et al., 2018; Rukanova, Henriksen, et al., 2018; Susha, 2020; Edmunds, 2019; Petchel et al., 2020; Edmunds et al., 2018
Data-related	<ul style="list-style-type: none"> ◇ Issues pertaining to data quality and accuracy ◇ Difficult interoperability and standardization ◇ Data risks such as privacy violation, security, data misuse ◇ Data governance and allocation of rights ◇ Lack of technology expertise and appropriate tools ◇ Issues of continued data supply 	Sayogo & Pardo, 2013; Devine et al., 2017; Kim & Stanton, 2016; Susha, 2020; Edmunds et al., 2018; Schmit et al., 2019; O'Neil et al., 2019; Edmunds, 2019; Walker et al., 2022

different and even conflicting goals and interests (Rukanova et al., 2020; Susha, 2020), little is known about how organizational goals interplay with the societal goals and how they drive or restrain data sharing partnerships. The following theoretical framework provides an analytic lens to consider these issues.

2.2. Cross-sector social partnerships framework

We draw on the cross-sector social partnerships literature (CCSP) to illuminate how different interests, goals, and contextual factors come into play and shape how organizations from different sectors define the terms of engagement in a partnership on a societal issue. A particularly relevant conceptualization is offered by Selsky and Parker (2005, 2010) who proposed three models of partnerships which are distinguished based on the goals and interest orientation of the partnership vis-a-vis the societal issue.

The *Resource Dependence model* is rooted in the assumption that organizations seek collaboration because they lack certain competences to fulfil their organizational needs. This model is aimed at getting access to needed resources and thereby fulfilling the organizations' self-interest, whereas the societal benefits are secondary (Selsky & Parker, 2005). This model largely is based on resource dependence theories and strategy literature dealing with access to needed resources and gaining competitive advantage (e.g. Andriof & Waddock, 2002; Faulkner & de Rond, 2000). An example of this model is a partnership between Boeing Corporation and the non-profit organization AtWork! whereby the latter enables people with disabilities to produce hazardous bags for Boeing and thereby earn a living (Selsky & Parker, 2005).

The *Social Issue model* is rooted in the realization that certain (social) issues exceed the scope of a single organization creating an imperative for collaboration among different organizations. Here the social issue is paramount, driving the partnership, whereas organizational gains are secondary. This model is based on the literature on social issues management and, more specifically, corporate social responsibility (e.g., Gray, 1989; Waddock & Post, 1995). Selsky and Parker (2010) give an example of the Community Voice Program, in which a company donated voicemail equipment to an NGO working to improve employment chances of the homeless.

The *Societal Sector model* emerges from the realization that "traditional sector solutions cannot effectively address certain challenges and must be enhanced by learning and borrowing from organizations in other sectors" (Selsky & Parker, 2005, p.853). While the first two models were borrowed by Selsky & Parker from previous organization studies literature, the third model was proposed by them as an additional one (Selsky & Parker, 2005). This model builds on the literature on intersectoral blurring and hybrid governance (Klitgaard & Treverton, 2003) and emphasizes the changing and blurred roles and functions between sectors. These changing roles can even manifest in traditional roles of one sector being replaced by another sector. An example of this partnership model is the long-term partnership between Starbucks and Conservation International whereby in a series of projects and incremental steps the parties made

Table 2
Interests and orientation in cross-sector social partnerships (excerpted from Selsky & Parker, 2010).

Dimensions	Partnership model		
	Resource-dependence	Social issue	Societal sector
Primary interest	Voluntary, based largely on self-interest with secondary interest in the social issue	Mandated or designed around a social problem	Mixed self- and social interest
Orientation	Transactional – each partner solves its problem with added benefit of addressing a social issue	Integrative – address the social issue with the added benefit of organizational "goods"	Integrative – explore and learn about the issue area, a social investment

progress towards more sustainable coffee production (Selsky & Parker, 2010).

This framework is particularly well suited for our study since (a) it differentiates between three partnership models based on the goals and interest orientation of the partnership and (b) it is specifically focused on the locus of social benefit in relation to organizations' self-interests in a partnership. The value of the three models, however, lies in the distinctive logic underlying the orientation of the data sharing in terms of social issues. This conceptualization was further detailed in Selsky and Parker (2010) by categorizing and describing the dimensions that distinguish the models from one another. In this study, the dimensions of primary interest of the collaborating actors and the orientation in terms of the societal issue will be used in the analysis (see Table 2).

Adopting this theoretical perspective, we contend that data sharing partnerships may differ based on the locus of societal benefit, interests, and the orientation of the partnership. Distinguishing the different orientations of data sharing partnerships can thus help us to understand the potentially different pathways towards achieving data sharing in different cases. Hence, our intended contribution is to shed light on *how data sharing for societal issues is achieved given the different interests (and arising challenges) of the organizations in different sectors vis-à-vis the societal issue.*

3. Research design and methods

We chose to conduct a multiple case study based on the interpretivist tradition (Walsham, 1995). Interpretivist case study research is focused on understanding the phenomenon in question through accessing the meanings that the subjects of study assign to them (Orlikowski & Gash, 1994, p. 5). We selected cases based on theoretical sampling (Eisenhardt, 1989). We chose to sample our cases based on the three partnership models discussed in Section 2: Resource-based model, Social Issue model, and Societal Sector model. Thereby, our cases were both similar and different and would enable us to not only replicate but also potentially extend (Eisenhardt, 1989) the original framework of partnership models. The following cases were included in the analysis (Table 3).

Table 3
Summaries of included cases.

Case	Timeline	Major actors	Intended goals	Summary
Resource dependence partnerships Flower import	2014–2018	Flower Coop, Dutch customs	Increased safety and security of international trade	A cooperative of flower growers (here we refer to it as FlowerCoop), voluntarily shared additional business data (e.g. packing list, pro-forma invoice) with the Dutch customs. This enabled the Customs to perform risk assessment for fiscal, as well as safety and security, purposes more efficiently, in return for trade facilitation for FlowerCoop.
Ruisdael Climate Science	2019-present	Energy provider, research institution	Improved accuracy of climate models	A renewable energy provider shared the data from their sun and wind parks with a Dutch university. The university will use these data to improve the accuracy of current climate models.
Social issue partnerships Flowminder Disaster Response	2015	Telecom company, NGO	Evidence-based disaster response efforts	NCell, a telecom operator in Nepal, shared call detail records of 12 million mobile phone users in Nepal with a Swedish NGO Flowminder. Flowminder analysed the data to map population flows after the disaster to provide insights to disaster responders and relief workers.
Election Data Belgium	2019	Government, non-profit	Enhanced government transparency	In 2019 the Belgian Federal Department for Policy and Support partnered with the NGO Open Knowledge Belgium and shared with them the voting data resulting from the federal elections in Belgium in May 2019. The NGO further manipulated the data to provide free access, analysis functionalities, and an API to the data for the public and thereby enhance the government transparency.
Societal sector partnerships Dutch Municipality Spending	2013-present	Local government, non-profit	Enhanced government transparency	In 2013 the municipality of Amsterdam partnered with a Dutch NGO Open State Foundation and shared their government spending data with them. The NGO further manipulated the data to present it in an integrated way to the public through an open data website and thereby enhance the government transparency.
Food Traceability	2014-present	Local farmers, public institutions, intermediary organizations	Informed food consumption	In 2014, New York State required public institutions to increase their use and purchase of local NYS food. In order to implement and monitor the purchase of more local food, particularly fresh produce, institutions need to have information from local farmers and intermediaries. This information could be used to trace the origin of the products and is expected to benefit not only the farmers, but also the institutions and the society as a whole.

Table 4 below provides a summary of the data collection in each of the cases included in our analysis. The data for this study consists of a combination of *primary and secondary data analyses*. This choice was driven by the fact that for some cases in our sample (first three cases in Table 4) data were already available due to the authors' prior research or involvement in those projects. We therefore re-analysed these data with our research question in mind, hence conducting secondary data analysis (Smith & Smith Jr, 2008). Sources of secondary data included transcripts of previous interviews, meetings minutes, documents, and project reports, as well as other published materials. Before using the secondary data, we ensured that it was relevant, credible, accurate, and timely (Goodwin, 2012) to fit the purpose of our study.

For the remaining three cases in our sample, primary data were collected (see Table 4). We carried out interviews, as well as the study of documents, news articles, and analyses of websites. For each of these three cases, we ensured that we achieved at least one in-depth interview with a key informant involved in the formation of the partnership. The interviews contained questions about how the collaboration emerged, the background and context of the initiative, main objectives, internal and external drivers, barriers and challenges faced, and how they were eventually overcome.

For every case one of the authors was the main source for accessing and analysing the case data. However, regular discussions were conducted for the researchers to get a better understanding of the different cases, as well as to have a common understanding of the steps in the analysis. During the data analysis, the research team discussed the findings; where gaps or discrepancies were identified, further analysis of the existing data was conducted.

The data analysis focused on developing an understanding of the driving and inhibiting factors of data sharing in each case. Our approach to data analysis was abductive, starting with a set of deductive theoretically-derived *categories* and subsequently generating inductive *codes* from the data (Vila-Henninger et al., 2022). The deductive categories (and sub-categories) were adopted from the Selsky & Parker's framework (primary interest and orientation) and from the review of information sharing literature in Section 2 (categories of data sharing challenges). These categories set parameters of what we were initially looking for, while the subsequent inductive coding revealed empirical findings that were not sufficiently explained by the theoretical categories (Thompson, 2022). The abductive approach was justified also because the CCSP framework, originating from partnerships research, was not developed for data sharing partnerships in particular; thus, we aimed to make a theoretical contribution in this respect. In the analysis of the data, new inductive (sub-)categories were identified, such as for instance 'mechanisms to overcome challenges' which was not part of the theoretical framework. Table 5 contains an excerpt from coding the data sources in one of the cases as an example (Food Traceability).

4. Findings

Below we present our case analysis by pairs of cases corresponding to each partnership model: Resource-dependence model, Social Issue model, and Societal Sector model. We discuss how data sharing was facilitated or challenged (and yet achieved) in each of the three partnership models.

4.1. Data sharing in partnerships of the resource dependence model

Two of the cases that represented this partnership model in our sample were: the Flower import case and the Ruisdael climate partnership case. Table 6 below summarizes the drivers and challenges encountered in these two cases.

Table 4
Overview of data sources.

Cases	Type of data	Data sources
Flower import case	Secondary data	The data used for the analysis consisted of project documentation, earlier scientific publications related to the Flower import case, press releases and published interviews with key stakeholders, and project presentations.
Flowminder case	Secondary data	The data used for the analysis was an interview transcript with the co-founder of the NGO, as well as the review of website documentation, including news, working papers, reports, and blog posts.
Food Traceability case	Secondary data	The data used for the analysis consisted of transcripts of nine semi-structured interviews with farm owners, institutional representatives, and New York State government officials and transcripts of six additional interviews with non-profits involved in the topic of food safety and food traceability and with intermediaries.
Dutch municipality spending case	Primary data	The data was primarily collected through an interview with a member of the board of the involved NGO who is also an open data researcher at a Belgian university. The interview transcript was checked and validated by the interviewee. Additional questions resulting from the interview were asked through e-mail correspondence with the interviewee and with other members of the NGO involved in this case (four e-mails) and one online meeting. In addition, one website and one news article were analysed as input for the case study. The initial case description was checked by the interviewee and corrected where needed.
Election data Belgium case	Primary data	The data was primarily collected through a phone interview with the general director of the involved NGO. The interview transcript was checked and validated by the interviewee. Additional questions resulting from the interview were asked through e-mail correspondence with the general director of the involved NGO (4 e-mails), who also cross-checked requested information with several other employees of the NGO. In addition, three websites and one blog post were analysed as input for the case study. The initial case description was checked by the interviewee and corrected where needed.
Ruisdael Climate Science partnership	Primary data	The data was primarily collected through two in-depth interviews with a partnership manager at the university and with the scientific director of the initiative. In addition, the website of the initiative was analysed. The initial case description was checked by the interviewees and corrected where needed.

Table 5
Excerpt from coding the data sources.

Categories	Sub-categories	Codes	Illustrative quotes
Primary interest	Societal	Supporting local economy and agriculture	“The benefits. Well, it’s an opportunity to do something good, to demonstrate us as a sustainable campus when it comes to food. ... There are benefits to the region that we are supporting local economy and the economic development and growth of the agriculture industry. One of our campuses strategic plan is to foster strong regional connection, part of that includes fostering regional connection to the agriculture industry and food production.”
Orientation	Integrative	Investment in infrastructure	“I mean it (food traceability) is valuable. ... But I think the infrastructure for appropriate traceability should be there at all levels, whether you are raising four pigs a year or four sheep a year or one animal a year, all the way”
Challenge to data sharing	Organizational challenge	Lack of incentives due to cost	“Yeah. If it didn’t add a lot of labor or cost for farm to adopt technology to support better traceability. But they don’t have the incentive to do that since their market don’t require that”
Challenge to data sharing	Mechanism to overcome	Technology enablers	“So I think that bar-coding technology will be great and it may involve more infrastructure at farm level. Where you have farms do it, you would have distributors do it”

Resource-Dependence partnerships are largely driven by self-interest of the parties with secondary interest in the social issue. The partnerships are thus seen as a tool to gain or sustain the core advantages of the organization. In the two cases representing this partnership model, we observe that data sharing was largely driven by organizational self-interest of the parties. In the Flower import case, for example, the main driver for businesses to share business data with the government was to receive trade facilitation in terms of faster clearance time and lower costs due to better predictability in logistics. A respondent from the flower import case elaborated on this as follows: *“As soon as we further set up the dashboard and Customs has access to these documents, you will have all the elements in-house to set up a clearance at landing - whereby the various formalities are completed as much as possible at the same time before a flight has landed. And the flowers can then go on to the final destination without delay. Then we really made a big difference”*. The main driver for the customs, on the other hand, was being able to obtain additional business data early in advance to be able to conduct better and more efficient risk analysis. As explained by an interviewee, *“when a container enters the EU via the Netherlands, we are aware on a high level about the content of the container, but we do not know which parties have been responsible for it. [...] For the import of flowers from Kenya it was possible to identify who are the parties that have been involved in the processes from the grower to the airplane or the container ship and what is their role in this”*.

Such availability of additional data provided by companies early in advance allowed customs to execute risk assessment processes that customs usually performs sequential to processes of other authorities (plant protection authorities) in parallel. Benefits of such parallel procedure include that customs can process declarations earlier and take decisions faster which leads to less delay and increased predictability. This led to the development of a new concept of compliance of reliable companies (the so-called clearance at landing). This concept can potentially be applied on a broader scale to other similar companies addressing the broader issue of trade facilitation which stimulates economic growth and economic development in a country or region. While at the beginning of the project the value proposition for the customs as the recipient of the business data were straightforward, it was initially not that clear why businesses should share data with customs on voluntary basis and invest in IT systems to enable that sharing. It was only after a series of workshops and brainstorming sessions that the idea was born to look for gains by taking the broader view of procedures (including other government agencies such as plant health into account) and to examine the possibility for switching to a parallel process due to the early availability of additional business data for customs use. Therefore, the initial barrier of unclear benefits for businesses that appeared at the beginning of the project was overcome by the leadership of the business and customs partners involved and their willingness to jointly search for win-win solutions.

Similarly, in the Ruisdael case, the data sharing partnership with a university was driven by the prospect of accumulating the competitive advantage. Weather forecasts have tremendous importance for renewable energy providers. Renewable energy companies have to fulfil their contractual agreements to their clients regarding how much energy they supply. Up to half an hour in advance they

Table 6
Driving and inhibiting factors of data sharing partnerships of Resource Dependence model (O – organizational, D – data-related, R - regulatory).

	Flower import case	Ruisdael climate case
Factors driving data sharing	◇ Prospect of trade facilitation for the company, prospect of better control and efficiency gains for the government	◇ Accessing the right resources, data in exchange for modelling ◇ Increase competitiveness on the (renewable energy) market
Factors inhibiting data sharing	● Identifying benefits in terms of trade facilitation for the company and the related cost-benefits (O) ● Costs of aligning business-government IT systems and capabilities (O, D)	● Confidentiality of the company’s data not to compromise the competitive advantage (O, D) ● Different expectations regarding funding and costs and the contribution of the company (O)
Mechanisms to achieve data sharing	→ Search for win-wins → Making the business case explicit	→ Search for win-wins → Making the business case explicit → Leadership

can sell or buy energy to fulfil their agreements. Therefore, they are extremely interested in more accurate weather forecasts that would help them plan their supply more accurately. The company participating in the partnership was motivated by the prospects of accumulating their competitive advantage before its competitors can make use of the detailed forecast. This factor, however, not only facilitated but also posed a challenge for achieving data sharing in this case. As explained by an interviewee, the energy company was concerned about the confidentiality of their data and their competitive advantage. Hence, the university partners had to maintain that the data would be used only for research purposes and was not to be shared outside the partnership.

A further observation from the case studies is that, considering the self-interest orientation of the partnership, the issue of cost-benefit becomes a particularly critical one. To see the benefits of the data sharing partnership, often investments in IT systems and capabilities are needed. Key issues of concern therefore are about who will cover the costs and are the drivers and motivations strong enough to take the next steps. In the Flower import case, for both the business and the government side, some challenges related to heterogeneous IT systems and capabilities and investment needed for aligning the IT infrastructures to support the information sharing, which included business-government alignment challenges nationally and internationally. The willingness for businesses to share additional information earlier in advance and the related IT investment in systems was dependent on the trade facilitation incentives and rewards achieved in return. To overcome the challenges, the search for win-wins played a major role in driving the will power for data sharing and collaboration in this kind of partnerships. In this process, leadership on both business and the government sides acted as a key enabler for searching for the win-wins and initiating the necessary alignment processes to overcome challenges related to fragmentation of IT systems, procedures, and policies.

In a similar vein, the parties in the Ruisdael case had different expectations about the extent to which the initiative could be funded by the private sector or from governmental subsidies and how much could be contributed by the private sector partners in kind. This was considered as one of the main challenges to the partnership. According to an interviewee, the academic partner was hoping to get much more without subsidy money and that the company pays for everything. This challenge was addressed by searching for a win-win arrangement and making the business case explicit to the data provider.

In summary, these data sharing partnerships in the Resource Dependence model were driven mostly by prospective organizational gains (and addressing the social issue comes secondary). This interest orientation brings with itself particular data sharing challenges, as shown in our case studies, such as protecting data confidentiality and minimizing risks to competitive advantage and negotiating benefits relative to costs. As a result, to achieve data sharing in this model of partnership the search for win-wins and finding a good business case are most prominent.

4.2. Data sharing partnerships of the social issue model

Partnerships of the Social Issue model are formed around an externally defined social problem (often a crisis or series of events). For instance, the partnership between Flowminder and the Nepali telecom operator NCell was formed as a response to the 7.8 magnitude earthquake which hit Nepal on 25 April 2015 and left 9000 people killed and 23,000 injured. The goal of the partnership was to make it possible to map population flows based on the telecom call detail records and thereby support decisions on relief aid distribution. In the election data case, the partnership between the Belgian Federal Department for Policy and Support and the non-profit organization Open Knowledge Belgium was formed as a response to public criticism on the data previously being behind a paywall of a company that had received the election data for free (see Table 7).

In contrast with the Resource Dependence model and the domination of self-interest drivers, Social Issue partnerships are driven by a normative orientation that organizations have a social responsibility towards societal problems which is seen as an influential driving factor in this type of partnership. For instance, in the disaster response case, the company NCell was expected to contribute through corporate social responsibility and data donation. Similarly, in the election data case the Belgian federal government was under pressure to openly share its data to address the public outcry about having to pay for election information. Citizens also put pressure on the government by referring to legislation, which could be interpreted in such a way that it prescribed the government to openly share the data for free. As stated by one interviewee: “[the] main reason to open up to the public was societal pressure and legal constraints; they had to open up”.

Another influential driver in both cases was that the partners addressed the social problem in question with an added benefit of achieving possible organizational gains. Such organizational gains can be enhanced reputation and a positive image (as in the

Table 7
Driving and inhibiting factors of data sharing partnerships of Societal Issue model (O – organizational, D – data-related, R - regulatory).

	Flowminder case	Election data Belgium case
Factors driving data sharing	<ul style="list-style-type: none"> ◇ Public and community pressure to share data to mitigate the disaster ◇ Potential reputational gains for the company ◇ Urgency to share data at the time of the disaster 	<ul style="list-style-type: none"> ◇ Need to comply with the open government vision ◇ Pressure to restore trust and government image during elections
Factors inhibiting data sharing	<ul style="list-style-type: none"> ● Persuading the company to share proprietary data with an NGO (O) ● Lack of prior agreements on data sharing (O, R, D) 	<ul style="list-style-type: none"> ● Finding the right partner to share the data with ● Government lacking capacity, data processing skills, and legal knowledge about opening data (O, R, D)
Mechanisms to achieve data sharing	→ Network effect of pressure to share data	<ul style="list-style-type: none"> → Societal pressure → Raising awareness of the duty to share

Flowminder case) and increasing society's trust in government (as in the election data case).

It is also important to notice that in both cases the collaboration was time-sensitive, as it was triggered by or focused on a (pressing) societal problem. These partnerships can change over time and their timeframe depends on the social problem. In the Flowminder case, in particular the urgency of the problem (disaster relief) was a powerful driver for achieving the data sharing. As an interviewee from Flowminder explained, *"we were quite fortunate in the timing that we had already been there [...] presenting our previous work and meeting with all the relevant stakeholders"*. NCell was approached by Flowminder on several occasions with a proposal to share data and collaborate but it is not until the earthquake hit that NCell agreed to do so. At the same time, the lack of prior agreements posed a challenge forcing the parties to work with a very tight timeline. In the election data case, the society's need for the election data to be shared was highest around the period of the Belgian federal elections. However, these data sharing initiatives laid a foundation for possible future projects of similar kind. For example, election data could be interesting for comparisons with other types of elections that take place in the future.

In both cases another sector contributed to addressing an issue traditionally seen as a public sector problem (a company facilitating more informed disaster relief efforts; an NGO facilitating government information transparency). This was a source of both drivers and challenges in the two partnerships. In the Flowminder case, the most important challenge was persuading the telecom provider to share the data with a non-profit. As an interviewee explained, *"Flowminder met with NCell one week before the earthquake, at that time they didn't make a decision. But when the earthquake happened, the decision was made very fast"*. In fact, many different organizations in the humanitarian sector had approached NCell on a regular basis with requests to share call detail records prior to their partnership with Flowminder. In the words of an interviewee, *"when approaching NCell, we already had almost 5-6 years of track record and cases, [...] we had endorsements by the UN agencies and the mobile industry association and, most importantly, we had thumbs up from the owner"* (Telia Sonera group). This pressure created a network effect and conveyed a message that in the public eye the company ought to act and it also created an atmosphere of competition among the different organizations to access the data.

In the election data case, the main challenges for data sharing related to the governments' lack of capacity to openly share the data, lack of data processing skills, and lack of knowledge on legal requirements for sharing government data openly. These issues, however, can also be seen as drivers for partnering with an NGO possessing this knowledge and expertise. First, due to a lack of capacity, the government was unable to openly share the election data itself. For this reason, they first approached a company, and thereafter an NGO. Second, the lack of data processing skills of the civil servants involved in the case led to the initial decision not to share the data openly. A company had convinced the involved civil servants that the expertise of this company was essential in successfully opening up the data. To quote from an interviewee: *"Civadis [the company] had positioned itself, a sales argument, in such a way that the publication [of the data] is an extremely complex process"*. Third, the involved civil servants were insufficiently aware of the legislative requirements for openly sharing government data, such as those resulting from the European Public Sector Information (PSI) Directives.

These three challenges led to difficulties for the public to gain access to the election data. Anyone who wanted to have access to real time election results on election day had to pay a company 25,000 euro. The challenges mentioned above were overcome by putting the government under societal pressure and by informing the involved civil servants about the legal requirements for data sharing. Various stakeholders (e.g. NGOs, representatives of the cabinets of the Prime Minister and the Minister responsible for the Digital Agenda) informed the involved civil servants about the possibilities and value of the election data, and about the legal requirements for sharing the data. As stated by one interviewee: *"only after a meeting with Open Knowledge Belgium, the representatives of the cabinets of the Prime Minister and the Minister responsible for the Digital Agenda, and the civil servants responsible for translating the PSI Directives and Legislation on openness of government, one also shared the data with Open Knowledge Belgium."* The involved civil servants then became aware of the legal requirements, which put even more pressure on the government to openly share the data with the public (by asking Open Knowledge Belgium to do so). As a result, the data became publicly available for free after all.

In sum, the data sharing partnerships illustrative of the Social Issue model were triggered by a societal issue articulated externally (e.g. emergency, external community pressure) and data sharing activities were seen as socially responsible by the organizations under the circumstances. In these initiatives, timing played an important role, therefore many data sharing challenges concerned (a) identifying the right data recipient that has the right expertise, level of trustworthiness, and reputation to process the data and (b)

Table 8

Driving and inhibiting factors of data sharing partnerships of Societal Sector model (O – organizational, D – data-related).

	Food traceability case	Dutch municipality spending case
Factors driving data sharing	◇ Government leadership to tackle the local food issue	◇ Need to comply with the open government vision ◇ Lack of data sharing skills among municipalities (access NGO expertise)
Factors inhibiting data sharing	● Misaligned expectations about data sharing and its costs for both local farmers and institutions (O) ● Having intermediaries as gatekeepers defining what data needs to be shared (O) ● Lack of knowledge and skills on how to share data among local farmers (D) ● Sustaining data sharing and learning from data (O, D)	● Convincing multiple data providers and coordinating data sharing (O) ● Ensuring interoperability of shared data (D)
Mechanisms to achieve data sharing	→ Training individual data providers (farmers) in the culture of information sharing and in the use of technology tools → Using technology lowering the barrier for data collection and sharing (e.g. bar codes)	→ Involving a national player to maximize data collection efforts → Developing a standard for data

orchestrating data sharing from a legal, organizational, and technical points of view in a limited timeframe.

4.3. Data sharing partnerships of the societal sector model

The cases that represent this partnership model in our sample are the Dutch municipality spending case and the Food Traceability case. The identified driving and inhibiting factors in these cases are summarized in Table 8 below.

Collaborations in the Societal Sector model are formed around an externally defined social problem but also as a result of self-interest drivers, that is, a mix of the previous two models in this aspect. In the municipality spending case, the externally defined social problem was the lack of government transparency, and more specifically the lack of insight that citizens, companies, governments and other actors could gain in the spending behaviour of the municipalities. As stated by one interviewee: *“many large government organizations are looking for ways to share their data in a useful way. The downtown district wanted this too.”* The self-interest driver of municipalities was the ability to learn how to openly share their spending data with the public and overcome the lack of expertise and skills in this area. Furthermore, the high reputation of the NGO and the support the NGO receives from citizens, journalists and other stakeholders were important drivers in the municipality’s decision to work with the NGO. In the case of Food Traceability, there were three important externally defined social problems: local economic development in New York State, public health, and food security through the availability of high-quality nutritious food for consumers in public institutions, such as correctional facilities, schools, and universities.

In the two cases an influential driving factor was pressure from various stakeholders to take action on important policy matters, such as food quality and government transparency, respectively. For instance, in the partnership between Amsterdam municipality and the Open State Foundation, the emerging public issue concerned the pressure citizens and other actors were increasingly putting on governments to share their data. There was also pressure coming from open data benchmarks to open up financial data, and there was a need from various stakeholders to enable more standardized financial data reporting, including local government organizations themselves. Similar to the election data case, the government did not have the required knowledge and data sharing skills to open up the data themselves. In contrast, for the case of Food Traceability, the emerging public issue was related to the lack of wide availability of nutritious food for many people including individuals in public institutions. Concerns over food safety and outbreaks of foodborne illness continued to grow and, in response, the governor was particularly interested in creating a healthy food environment and prevent foodborne illness outbreaks. Further, he tried to capitalize on its market power as a large institutional buyer to create demands for food quality systems by endorsing procurement policies that focused on local producers such as the New York Food Metric system and Farm to Institution New York State (FINYS). This was expected to push both local farmers and intermediaries to share information for them to be able to sell to certain institutions. There was also pressure to institutions to be more transparent about the origin of the food they were providing to their constituencies.

Partnerships of this model were aimed at exploring and learning about the issue and could be seen as a social investment. In both the municipality spending case and the Food Traceability case, the data sharing partnerships started in an explorative manner. Involved actors aimed to learn more about how governments spend money (municipality spending case) or how food, particularly fresh produce, can be traced back to their origin (Food Traceability). This, however, also posed challenges to the collaboration and data sharing. For example, in the Food Traceability case, the self-interest driver for local farmers was expected to be the increase in sales of their products by having a bigger market and more options in terms of big customers. But in fact, small farmers had other motivations and many times they did not even have enough production to significantly increase their sales, so they preferred to take advantage of local farmers’ markets. In the case of institutions, buying from local farms is not cheap for they are not able to always guarantee a sustainable supply, which adds administrative burden to the process and therefore to data sharing. Therefore, if institutions wanted to buy directly from small farmers, they would need to organize a large number of farmers in order to always have all the local products they need. So, for institutions, not only local products are more expensive, but dealing with many small farmers, instead of with a few intermediaries, has also additional costs.

In both cases, there was a high level of dependence among the involved organizations. In the Dutch municipality spending case, both organizations were dependent on each other in terms of exchange of information, knowledge, and skills to make the data sharing partnership successful. In the case of Food Traceability, there was also a clear interdependency between the public institutions, the local farmers, and the intermediaries in terms of the information shared. Interestingly, intermediaries played a key role in this respect for they are the ones who mainly collect the data requested by the institutions from the farmers. This limited data sharing because, on the one hand, farms and institutions did not always share the data directly and, on the other, data sharing was limited to intermediaries’ perceptions of what data needed to be shared. In addition, some small farmers preferred not to sell to institutions if the only way to do it was going through intermediaries. Furthermore, in the case of farms, although they collected data on costs, sales, and food safety plans, learning, understanding, and actually using technology to enable data sharing was a great challenge for these organizations. One respondent mentioned: *“If it didn’t add a lot of labor or cost for farms to adopt technology to support better traceability... But they don’t have the incentive to do that since their market don’t require that”*. Furthermore, another respondent elaborated on this challenge as follows: *“Yeah, the other thing too is like how many products are you growing, because if you are diversified farm which ecological speaking, we would like to see, then it makes data collection much more complex, because now you have hundreds of crops you are collecting for”*.

In the Dutch municipality spending case, we also found challenges that related to the dependencies among the actors. The main challenges in the Dutch municipality spending case were convincing other data providers to join the initiative and a lack of interoperability of the collected data. Regarding the former, as the initiative progressed Open State Foundation started requesting other municipalities to join this Amsterdam initiative and share their spending data with the NGO on a voluntary basis. This would lead to

more value creation, because it would allow citizens to compare the spending patterns of municipality A with those of municipality B and C. While some municipalities were self-motivated to join, it was a challenge to involve many other municipalities. This challenge was overcome by another collaboration with Statistics Netherlands, the Dutch national statistical office, which also collected spending data from decentral government organizations. Statistics Netherlands shared the spending data of all Dutch municipalities with the Open State Foundation. To quote from an interviewee: “*this resulted in the collaboration that we now have with Statistics Netherlands, and since 2015, our platform covers the whole country thanks to this link.*” When more municipalities joined the initiative, this led to a third challenge: the collected data was available in many different formats and presented using various standards, and it had to be presented in a consistent way. This lack of interoperability was overcome by developing a standard for Dutch municipal spending data used by the Open State Foundation.

Because these partnerships are focused on the future, much of the innovation was centered on learning about the issue and on continuous improvement. Therefore, sustaining data sharing and learning from data was of importance. Furthermore, in the Societal Sector cases the investment required for sharing the data, in terms of money, effort, and time, was potentially very large, hindering the implementation of a data sharing initiative, despite the self-interest incentive. However, if/when data sharing started to take place, the actors involved in the process considered it inevitable and did not oppose it.

To summarize, data sharing partnerships illustrative of the Societal Sector model were driven by a mix of societal and organizational interests towards a long-term goal and were seen as a social investment. As our case studies suggested, data sharing of this model is not aimed at immediate direct gains for the parties, therefore it is often challenging to align and sustain the actors’ motivations, expectations, and to ensure the investments (of time, effort, skills) required on all sides. As these initiatives are conceived as potentially more transformational, there is often a need to scale up and involve more data providers/users, which brings with itself coordination/alignment challenges (as was the case with data intermediaries in the Food Traceability case) and technical challenges (e.g. interoperability issues as observed in the Dutch municipality spending case).

5. Discussion and implications

Our analysis of these six cases illustrates that to address societal issues with data, organizations from different sectors can form data sharing partnerships that vary depending on their interest orientation and the locus of societal benefit. Resource dependence partnerships have a transactional interest orientation and are driven by self-interest and promise of organizational gains (and societal value comes as a by-product). Social issue partnerships are triggered externally due to societal pressure and are aimed at societal benefits (and organizational gains as a by-product). Societal Sector partnerships are driven by a mix of interests and focused on learning, transformation, and potential gains in the long run. The key difference between the models is to what extent the actors are willing to engage with the broader societal issues without clear prospects of immediate direct gains. This discussion is very important at the moment as we observe the growing data monetization trend on the business arena and businesses often making a case that data is a strategic proprietary resource in which they have invested and which should serve their business interests. At the same time, other sectors like government and non-profit are following a different discourse of data as a common good and have developed transparency and openness programs as a result.

Given these different interest orientations and drivers in the three models, our analysis suggests that the challenges of data sharing in cross-sector partnerships vary with the partnership model, and that certain data sharing challenges are more likely to manifest in certain partnership models. For example, since Societal Sector partnerships are characterized by long term goals and an exploratory nature of the partners’ engagement, the issues of sustaining the collaborative efforts and keeping up the data sharing are of critical importance. We observed that organizational challenges were prominent in all partnership models. This highlights the complexity of aligning multiple stakeholder interests, expectations, capabilities in order to achieve voluntary data sharing, but the extent of this complexity increases in partnerships that have a long-term goal, such as the Societal sector model.

Table 9 below gives an overview of findings in which we synthesized the drivers and challenges identified in the pairs of cases per each of the three partnership models and which, we suggest, may be applicable in other instances of cross-sectoral data sharing partnerships.

Table 9
Overview of driving and inhibiting factors in achieving data sharing across the three partnership models.

Partnership model	Drivers of data sharing	Data sharing challenges	Mechanisms to overcome challenges
Resource Dependence model	<ul style="list-style-type: none"> ◇ Organizational gains ◇ Pressure from industry developments 	<ul style="list-style-type: none"> ● Data confidentiality ● Costs/ investments needed for achieving data sharing 	<ul style="list-style-type: none"> - Search for win-wins - Leadership - Making the business case explicit
Social Issue model	<ul style="list-style-type: none"> ◇ Urgency to share data ◇ Societal pressure 	<ul style="list-style-type: none"> ● Finding the right partner to share the data with ● Tight timeline and lack of prior agreements 	<ul style="list-style-type: none"> - Network effect of stakeholder pressure - Raising awareness of the duty to share
Societal Sector model	<ul style="list-style-type: none"> ◇ Government vision and leadership 	<ul style="list-style-type: none"> ● Cost-benefit in the long term ● Data interoperability ● Lack of data sharing skills ● Recruiting more data providers ● Defining roles of intermediaries ● Sustaining data sharing efforts 	<ul style="list-style-type: none"> - Partnering with a data provider at the national level - Data standardization - Use of enabling technologies - Training users in the use of technology and in a culture of information sharing

Building on this analysis, we propose that the mechanisms to overcome data sharing challenges and eventually achieve data sharing differ across the three partnership models. In the cases of the Resource Dependence model, we found that articulating a value proposition and searching for win-wins was critical for achieving data sharing between the parties. In contrast, in Social Issue cases, the pivotal influence was the pressure from different stakeholders, including societal pressure, to share the data and fulfil the duty to share, be it in the framework of corporate social responsibility or open government laws and regulations. Finally, in the cases of the Societal Sector partnerships, the issue of scaling up data sharing was of importance and mechanisms such as data standardization, partnering with a data provider at the national level, training users, and developing a culture of information sharing played a critical role.

Our analysis is consistent with the findings of previous research on information sharing, for instance, about the role of social and institutional pressure to share data (Sayogo et al., 2014; Kim et al., 2016), the importance of cost-benefit elaboration in public-private partnerships (Arsyida et al., 2017), and the value of data standardization in improving data sharing (Klievink et al., 2015). Our analysis also supports the most cited data sharing challenges (Sussha et al., 2019), such as costs, incentives, resource constraints, legislation, and data-related challenges (such as data interoperability, data skills). However, our analysis suggests that these driving and inhibiting forces of data sharing can be better understood and addressed by considering the cross-sectoral partnership model and the particular interests and motivations of the players. Hence, the identified mechanisms to address the challenges (Table 9) reflect these specific characteristics of the different partnership models.

More specifically, according to Selsky & Parker, the three platforms differ in terms of how much value they can create for society: Resource-dependence partnerships typically deliver low, Social Issue partnerships – low to moderate, and Societal Sector – moderate to high societal benefits. Thus, one may conclude that Societal Sector partnerships are more desirable from the point of view of resultant societal gains. These partnerships aim to reimagine the processes, structures, and roles that the parties play in the business as usual. Our work extends this argument to the case of data sharing and how it contributes to the creation of societal value. Our analysis suggests that the extent to which data sharing enables the creation of value in a partnership seems to be related to the scale, timing, and sustainability of data sharing in specific initiatives. For instance, we observe that in cases that fall under the Societal Sector platform (particularly in the Dutch municipality spending case), it is important to sustain the data sharing efforts over a period of time. This is because the value and societal gains are accumulated from consistent and systematic information flows that enable other partnership activities. In contrast to this, our results show that in Social Issue partnerships (Flowminder, election data case) the data sharing had a one-off nature and had to occur as soon as possible, thus generating data insights for a particular situation or event in time. As concerns the Resource-dependence type of partnerships, in our cases the information was perceived as an asset that can be given away on pragmatic, mutually beneficial terms. The sharing of data thus produced organizational benefits first and foremost, which could subsequently be transformed into public value. Overall, data sharing has important impacts on the creation of value in all types of partnerships, but, as explained before, its role seems to be different in each of them. Furthermore, data sharing alone is not sufficient for the generation of transformative impacts – data should be put to use to inform decisions, policies, actions.

6. Conclusions

The starting point of our research was that contemporary societal challenges require that different sectors collaborate and share data. This is, however, challenging due a number of barriers that impede cross-sector data sharing: such as ambiguous or fragmented regulatory landscape, different and potentially conflicting interests of organizations, varying levels of data-related capabilities, to name a few. In our research, we zoomed in on cross-sector data sharing for societal issues to explore how data sharing is shaped by organizations' interests vis-à-vis the societal goals. This focus is particularly useful as we observe different data logics taking shape in different sectors. These logics may view data as common good and a tool for transparency and collaborative innovation or as a strategic resource and a source of competitive advantage and new business models. Data (and related data capabilities) that might be valuable for addressing societal issues are no longer concentrated just in the public sector but also in other sectors. This creates a collaboration imperative (at least for governments traditionally tasked with addressing societal challenges) but may also become an opportunity for commercial gains. Navigating these waters is challenging but it can be done. Hence, in our research we asked the question: *How do organizations from different sectors manage to achieve data sharing for addressing societal challenges?*

From our study, it became apparent that organizations can engage in data sharing for societal issues based on different underlying interest orientations: these are the Resource dependence, Social issue, and Societal sector models. We found that these partnership models are coupled more tightly to certain challenges of data sharing. Leveraging the drivers and anticipating these challenges in advance can help organizations be more aware about their terms of collaboration and the mechanisms that can be used to succeed in their data sharing partnership goals.

The contribution of our research to knowledge is as follows. *First*, in our research we applied the cross-sector social partnerships framework to the context of data sharing partnerships, thereby introducing it to the Information Systems community. Our research thus bridges between organizational theory and information sharing research, theoretically and empirically, on the topic of data sharing partnerships. With this we addressed the previously articulated research gap that data sharing literature has only to a limited extent engaged with societal issues and how these issues shape data sharing possibilities.

Second, our findings further triggered a broader discussion on the desirability and transformative potential of the three models of data sharing partnerships. While the three models may not be so easily boxed and may evolve from one into another, the value of this framework lies in clearly emphasizing the dichotomy between organizational and societal goals in data sharing and how it can be a source of value but also conflict. In order to achieve transformational changes on societal issues, the Societal Sector model offers much potential, yet it is also the one where organizational gains may be unclear and where a more substantial investment and commitment to data sharing infrastructure, practices, and incentives are required at the outset. We thus call on for more research attention to this form

of data sharing partnerships, empirically and theoretically, studying the evolution of data sharing partnerships towards more sustained forms and adopting a broader perspective on data sharing. Here, we propose that the literature on mission-oriented innovation policy (Mazzucato, 2018; Wanzenböck, Wesseling, Frenken, Hekkert, & Weber, 2020) can be fruitful in providing the needed theoretical context for studying these forms of data sharing with a societal purpose and the role of government leadership therein.

Data sharing can take many directions, and we recommend future research to focus on the specific characteristics of data sharing in particular sectors (e.g. public-private, private-non-profit etc.). In our research we were not able to embrace all this complexity. Another limitation of our research is that we were not able to follow the evolution of the cases over an extended timeframe. Thus, we do not have sufficient empirical basis to draw conclusions regarding the level of success or continuation of any of the data sharing initiatives. We recommend that future research investigates these issues in more depth, particularly from the perspective of how the interest orientations and the respective data sharing challenges may evolve as the collaboration between sectors continues.

Finally, our findings also pose implications for governments who are searching for ways to tackle complex societal problems through better use of data. Our case studies show the different routes that stakeholders can take in configuring their data sharing partnerships in terms of its goals and interests. However, many of the grand challenges of today require radical change and transformative innovations, therefore we emphasize the potential of the Societal sector model for maximizing the societal value of cross-sector collaboration and data exchange.

CRedit authorship contribution statement

Iryna Sussha: Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, Project administration. **Boriana Rukanova:** Conceptualization, Methodology, Investigation, Formal analysis, Writing – review & editing. **Anneke Zuiderwijk:** Investigation, Formal analysis, Writing – review & editing. **J. Ramon Gil-Garcia:** Investigation, Formal analysis, Writing – review & editing. **Mila Gasco Hernandez:** Investigation, Formal analysis, Writing – review & editing.

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References

- Andriof, J., & Waddock, S. (2002). Unfolding stakeholder engagement. In J. Andriof, S. Waddock, B. Husted, & S. Rahman (Eds.), *Unfolding stakeholder thinking: Theory, responsibility and engagement* (pp. 19–42). Sheffield, UK: Greenleaf.
- Arsyida, T., van Delft, S., Rukanova, B., & Tan, Y. H. (2017). Trade and compliance cost model. In *12th annual WCO PICARD conference, Hammamet, Tunisia, 26–28 September 2017*.
- Baida, Z., Rukanova, B., Liu, J., & Tan, Y. H. (2008). Rethinking EU trade procedures- the beer living lab. *Electronic Markets*, 18(1).
- Bryson, J. M., Crosby, B. C., & Stone, M. M. (2006). The design and implementation of cross sector collaborations: Propositions from the literature. *Public Administration Review*, 66, 44–55. <https://doi.org/10.1111/j.1540-6210.2006.00665.x>
- De Tuya, M., Cook, M., Sutherland, M. K., & Luna-Reyes, L. F. (2017). Information requirements to create public value: Sharing and opening data to address urban blight. *Transforming Government: People, Process and Policy*, 11(1), 79–98.
- Devine, E. B., Totten, A. M., Gorman, P., Eden, K. B., Kassakian, S., Woods, S., ... Hersh, W. R. (2017). Health information exchange use (1990-2015): a systematic review. *eGEMS*, 5(1).
- Eden, K. B., Totten, A. M., Kassakian, S. Z., Gorman, P. N., McDonagh, M. S., Devine, B., ... Hersh, W. R. (2016). Barriers and facilitators to exchanging health information: a systematic review. *International Journal of Medical Informatics*, 88, 44–51.
- Edmunds, M. (2019). *National interoperability collaborative. Partnerships, programs, and platforms: Addressing social determinants of health through multi-sector data sharing*. Academy Health Accessed October 27, 2022 https://academyhealth.org/sites/default/files/partnerships_programs_platforms_april2019.pdf.
- Edmunds, M., Johnson, B., & Kang, K. (2018). National interoperability collaborative. In *From siloes to solutions. Getting to interoperability in health and human services*. https://academyhealth.org/sites/default/files/siloes_to_solutions_july2018_2.pdf.
- Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532–550.
- Faniel, I. M., & Zimmerman, A. (2011). Beyond the data deluge: a research agenda for large-scale data sharing and reuse. *International Journal of Digital Curation*, 6(1), 58–69.
- Faulkner, D., & de Rond, M. (2000). Perspectives on cooperative strategy. In D. Faulkner, & M. de Rond (Eds.), *Cooperative strategy: Economic, business and organizational issues* (pp. 3–39). Oxford, UK: Oxford University Press.
- Fröbber, F., Rukanova, B., Klein, S., Higgins, A., Tan, Y. H., & Kelly, S. (2019). The first (beer) living lab: Learning to sustain network collaboration for digital innovation. In *Collaboration in the digital age* (pp. 227–247). Springer-Verlag. https://doi.org/10.1007/978-3-319-94487-6_11.
- Gil-Garcia, J. R. (2012). Towards a smart state? Inter-agency collaboration, information integration, and beyond. *Information Policy*, 17(3, 4), 269–280.
- Gil-Garcia, J. R., & Sayogo, D. S. (2016). Government inter-organizational data sharing initiatives: Understanding the main determinants of success. *Government Information Quarterly*, 33(3), 572–582.
- Goodwin, J. (Ed.). (2012). *SAGE secondary data analysis*. Sage.
- Grainger, A., Huiden, R., Rukanova, B., & Tan, Y. H. (2018). What is the cost of customs and borders across the supply chain? ... and how to mitigate the cost through better coordination and data sharing? *World Customs Journal*, 12(2), 3–30.
- Gray, B. (1989). *Collaborating*. San Francisco: Jossey-Bass.
- Gray, B., & Purdy, J. (2018). *Collaborating for our future: Multistakeholder partnerships for solving complex problems*. Oxford University Press.

- Henfridsson, O., Nandhakumar, J., Scarbrough, H., & Panourgias, N. (2018). Recombination in the open-ended value landscape of digital innovation. *Information and Organization*, 28(2), 89–100.
- Henningson, S., Björn-Andersen, N., Schmidt, A., Flüge, B., & Henriksen, H. Z. (2011). Food living lab – Complexity of export trade. In Y. H. Tan, N. Björn-Andersen, S. Klein, & B. Rukanova (Eds.), *Accelerating global supply chains with IT-innovation*. Berlin, Heidelberg: Springer.
- Kim, Y., & Stanton, J. M. (2016). Institutional and individual factors affecting scientists' data-sharing behaviors: A multilevel analysis. *Journal of the Association for Information Science and Technology*, 67(4), 776–799.
- Klein, S., Higgins, A., Kipp, A., & Mangan, A. (2011). Drug living lab – Supply chain security and control. In Y. H. Tan, N. Björn-Andersen, S. Klein, & B. Rukanova (Eds.), *Accelerating global supply chains with IT-innovation*. Berlin, Heidelberg: Springer.
- Klievink, B., Van Der Voort, H., & Veeneman, W. (2018). Creating value through data collaboratives. *Information Policy*, 23(4), 379–397.
- Klitgaard, R., & Treverton, G. F. (2003, March). *Assessing partnerships: New forms of collaboration*. Washington, DC: IBM Endowment for the Business of Government: New Ways to Manage Series.
- Madlberger, M. (2009). What drives firms to engage in interorganizational data sharing in supply chain management? *International Journal of e-Collaboration (IJEC)*, 5(2), 18–42.
- Mazzucato, M. (2018). Mission-oriented innovation policies: challenges and opportunities. *Industrial and Corporate Change*, 27(5), 803–815.
- O'Neil, S., Staatz, C., Hoe, E., Goyal, R., & Ward, E. (2019). Data across sectors for health initiative: Formative evaluation report. *Mathematica* Accessed October 27, 2022 <https://www.mathematica.org/publications/data-across-sectors-for-health-initiative-formative-evaluation-report>.
- Orlikowski, W. J., & Gash, D. C. (1994). Technological frames: Making sense of information technology in organizations. *ACM Transactions on Information Systems*, 12(2), 174–201.
- Parvinen, P. (2020). Advancing data monetization and the creation of data-based business models. *Communications of the Association for Information Systems*, 47(1), 2.
- Petchel, S., Gelmon, S., & Goldberg, B. (2020). The organizational risks of cross-sector partnerships: A comparison of health and human services perspectives. *Health Affairs (Millwood)*, 39(4), 574–581. <https://doi.org/10.1377/hlthaff.2019.01553>
- Picazo-Vela, S., Gutierrez-Martinez, I., Duhamel, F., Luna, D. E., & Luna-Reyes, L. F. (2017). Value of inter-organizational collaboration in digital government projects. *Public Management Review*, 1–18.
- Pinkse, J., & Kolk, A. (2012). Addressing the climate change—Sustainable development nexus: The role of multistakeholder partnerships. *Business & Society*, 51(1), 176–210.
- Ravulakollu, A., Urciuoli, L., Rukanova, B., Tan, Y., & Hakvoort, R. (2018). Risk based framework for assessing resilience in a complex multi-actor supply chain domain. *Supply Chain Forum*, 1–16.
- Rukanova, B., Hendrikssen, H. Z., Henningson, S., & Tan, Y. H. (2018). *Digital trade infrastructures: A framework for analysis*. *Complex systems informatics and modeling quarterly*. <https://doi.org/10.7250/csinq.2018-14.01>
- Rukanova, B., Henriksen, H. Z., Heijmann, F., Arman, S., & Tan, Y. H. (2018). Public funding in collective innovations for public–private activities. In P. Parycek, et al. (Eds.), *Vol. 11020. Electronic government. EGOV 2018. Lecture notes in computer science*. Cham: Springer. https://doi.org/10.1007/978-3-319-98690-6_12.
- Rukanova, B., Henriksen, H. Z., Von Raesfeld, A., Van Stijn, E., & Tan, Y. H. (2007). A collective action perspective on technological innovation in business/government networks. In *Proceedings of the European conference on information systems*, 2007.
- Rukanova, B., Tan, Y. H., Huiden, R., Ravulakollu, A., Grainger, A., & Heijmann, F. (2020). A framework for voluntary business-government information sharing. *Government Information Quarterly*, 37(4), Article 101501.
- Rukanova, B., et al. (2011). Beer living lab – Intelligent data sharing. In Y. H. Tan, N. Björn-Andersen, S. Klein, & B. Rukanova (Eds.), *Accelerating global supply chains with IT-innovation*. Berlin, Heidelberg: Springer.
- Sarathy, R., & Muralidhar, K. (2006). Secure and useful data sharing. *Decision Support Systems*, 42(1), 204–220.
- Sayogo, D., Zhang, J., Pardo, T. A., Tayi, G. K., Hrdinova, J., Andersen, D. F., & Luna-Reyes, L. F. (2014). Going beyond open data: Challenges and motivations for smart disclosure in ethical consumption. *Journal of Theoretical and Applied Electronic Commerce Research*, 9(2), 1–16.
- Sayogo, D. S., & Pardo, T. A. (2013). Understanding smart data disclosure policy success: The case of green button. In *Proceedings of the 14th annual international conference on digital government research* (pp. 72–81). ACM.
- Schmit, C., Kelly, K., & Bernstein, J. (2019). Cross sector data sharing: Necessity, challenge, and hope. *The Journal of Law, Medicine & Ethics*, 47(2 suppl), 83–86. <https://doi.org/10.1177/1073110519857325>
- Selsky, J., & Parker, B. (2005). Cross-sector partnerships to address social issues: Challenges to theory and practice. *Journal of Management*, 31(6), 849–873.
- Selsky, J. W., & Parker, B. (2010). Platforms for cross-sector social partnerships: Prospective sensemaking devices for social benefit. *Journal of Business Ethics*, 94(1), 21–37.
- Smith, E., & Smith, J., Jr. (2008). *Using secondary data in educational and social research*. McGraw-Hill Education (UK).
- Susha, I. (2020). Establishing and implementing data collaborations for public good: A critical factor analysis to scale up the practice. *Information Policy*, 1–22.
- Susha, I., & Gil-Garcia, J. R. (2019). A collaborative governance approach to partnerships addressing public problems with private data. In *Proceedings of the 52nd Hawaii international conference on system sciences*.
- Susha, I., Gronlund, A., & Van Tulder, R. (2019). Data driven social partnerships: Exploring an emergent trend in search of research challenges and questions. *Government Information Quarterly*, 36(1), 112–128.
- Susha, I., Pardo, T. A., Janssen, M., Adler, N., Verhulst, S. G., & Harbour, T. (2018). A research roadmap to advance data collaboratives practice as a novel research direction. *International Journal of Electronic Government Research (IJEGR)*, 14(3), 1–11.
- Thompson, J. (2022). A guide to abductive thematic analysis. *The Qualitative Report*, 27(5), 1410–1421.
- Vila-Henninger, I., Dupuy, C., Van Ingelgom, V., Caprioli, M., Teuber, F., Pennetreau, D., ... Le Gall, C. (2022). Abductive coding: Theory building and qualitative (re) analysis. *Sociological Methods & Research*, 1–34, 00491241211067508.
- Vurro, C., Dacin, M. T., & Perrini, F. (2010). Institutional antecedents of partnering for social change: How institutional logics shape cross-sector social partnerships. *Journal of Business Ethics*, 94(1), 39–53. <https://doi.org/10.1007/s10551-011-0778-0>
- Waddock, S., & Post, J. (1995). Catalytic alliances for social problem solving. *Human Relations*, 48(8), 951–973.
- Walker, D. M., Hefner, J. L., DePuccio, M. J., Garner, J. A., Headings, A., Joseph, J. J., & Clark, A. (2022). Approaches for overcoming barriers to cross-sector data sharing. *American Journal of Managed Care*, 28(1), 11–16. <https://glenn.osu.edu/sites/default/files/2022-04/Overcoming-Barriers-Cross-Sector-Data-Sharing.pdf>.
- Walsham, G. (1995). Interpretive case studies in IS research: Nature and method. *European Journal of Information Systems*, 4(2), 74–81.
- Wang, F. (2018). Understanding the dynamic mechanism of interagency government data sharing. *Government Information Quarterly*, 35(4), 536–546.
- Wanzenböck, I., Wesseling, J. H., Frenken, K., Hekkert, M. P., & Weber, K. M. (2020). A framework for mission-oriented innovation policy: Alternative pathways through the problem–solution space. *Science and Public Policy*, 47(4), 474–489.
- Wastell, D., Kawalek, P., Langmead-Jones, P., & Ormerod, R. (2004). Information systems and partnership in multi-agency networks: An action research project in crime reduction. *Information and Organization*, 14(3), 189–210.
- Welch, E. W., Feeney, M. K., & Park, C. H. (2016). Determinants of data sharing in U.S. city governments. *Government Information Quarterly*, 33, 393–403.
- Yang, T. M., & Maxwell, T. A. (2011). Information-sharing in public organizations: A literature review of interpersonal, intra-organizational and inter-organizational success factors. *Government Information Quarterly*, 28(2), 164–175.