The Private Sector to the Public Sector's Rescue:
Why Private Organisations Enter Crisis Response Data Collaboratives
BY
Jamie Holton

Abstract

This research looks at the emerging phenomenon of data collaboratives, specifically in the 'crisis response' sector, with which the private sector assists the public sector's data-driven efforts to prevent or respond to humanitarian emergencies. This research explores and explains why the private sector participates in crisis response data collaboratives. Through secondary literature analysis, and primary survey and interview analysis of three case studies, this research provides new insights into data collaborative objectives, the private sector's activities, the incentives and risks these collaboratives present for the private sector, and how it mitigates such risks. The research concludes that the private sector enters crisis response data collaboratives to help the public sector address one or more of its obstacles to creating data-driven solutions to societal problems, and occasionally to achieve additional objectives for the public good. Although the private sector is motivated by various incentives, sufficient mitigation of presented risks, especially risks to data subjects' privacy and security, is a precondition to joining a crisis response data collaborative.

Table of Contents

1. Introduction

The increased availability of new data sources, commonly referred to as 'big data', potentially presents significant opportunities for the public sector[1] to promote data-driven solutions to societal problems. For instance, big data can potentially improve humanitarian assistance (UN 2013, 25; Stauffacher, Hattotuwa, and Weekes 2012) by increasing preparedness, bringing in new insights, and helping public organisations make better informed decisions (Whipkey and Verity 2015, 9). Many governments worldwide have already started to make their big datasets publicly accessible. However, many valuable big datasets are owned by the private sector[2] and are inaccessible to the public sector (Noveck 2015). This realisation has led to the recent emergence of 'data collaboratives', defined by Susha, Janssen, and Verhulst as "cross-sector (and public-private) collaboration initiatives aimed at data collection, sharing, or processing for the purpose of addressing a societal challenge" (2017, 2961). Through such data collaboratives, the private sector is becoming an increasingly important actor for public good.

This research is particularly interested in private organisations' participation in data collaboratives in the 'crisis response' sector, which aim to prevent or respond to humanitarian emergencies.[3] The United Nations Global Pulse has tried to stimulate these types of collaboratives by convincing "corporations to make anonymised versions of their data available for use in crises and emergencies" (UN 2013, 29). However, crisis response data collaboratives only form around a tenth of the currently identified data collaboratives (Verhulst and Young 2017). Considering humanitarian emergencies are becoming more frequent and long-lasting (Whipkey and Verity 2015, 1), the private sector may need to play a larger role in addressing humanitarian challenges and participate in more crisis response data collaboratives.

Before this can be achieved, there needs to be a better understanding of the context and motivations that lead to the private sector entering crisis response data collaboratives. So far, no research has been done on crisis response data collaboratives' objectives, nor of the private sector's specific activities, incentives, risks, and risk mitigation techniques. In general, the private sector's incentives to partake in data collaboratives have been understudied in academia and remain unclear (Susha, Janssen, and Verhulst 2017, 2691). Moreover, the first and so far

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[1] This research will employ Dube and Danescu's definition of the public sector, which primarily refers to (inter)governmental bodies and agencies, and public enterprises where the government is the major shareholder (2011). Whenever this research uses the term 'public organisations', it refers to organisations in the public sector as defined here.

[2] This study will use Robin, Klein and Jütting's definition of the 'private' sector as a "set of non-state bodies (corporations, non-governmental organisations, academia)" (2016, 5). Whenever this research uses the term 'private organisations', it refers to organisations in the private sector as defined here.

[3] See Whipkey and Verity (2015) for an overview of types of humanitarian emergencies.

only attempt to identify incentives for the private sector to join data collaboratives by Klein and Verhulst (2017) did not draw from crisis response data collaboratives case studies. These authors argue that private organisations consent "to provide access to their data for different reasons, depending on the context in which the data is being requested or shared" (Ibid., 11). On this basis, it is reasonable to assume that the motivations for entering crisis response data collaboratives may differ from the motivations for entering data collaboratives in other sectors. Additionally, humanitarian assistance is believed to operate under different motives than the private sector (UN 2013, 10). Given this background, it is especially interesting to understand why private organisations decide to work with the public sector to prevent or address humanitarian emergencies in the form of crisis response data collaboratives.

This thesis aims to answer why the private sector enters crisis response data collaboratives with a comparative case study of three private organisations. This research will collect data through three qualitative research methods: a secondary literature review, and original in-depth surveys and interviews with the three case studies. These insights may also contribute more broadly to the current literature on data collaboratives. The long-term aim of this study is to further unlock the potential of the private sector to help the public sector regarding the prevention and response to humanitarian emergencies, which could potentially protect and save lives.

This research consists of a total of six chapters, including this introductory chapter. The second chapter outlines the methodological framework. The third chapter consists of the literature review, which illustrates the theoretical possibilities for the objectives and private sector's activities, incentives, and risks for a crisis response data collaborative. The fourth chapter confirms which of these possibilities exist in practice, by introducing the original data collected through the survey responses and interviews with the three case studies. The fifth chapter analyses the findings and answers this research's sub-questions and main question. The sixth and last chapter will contextualise this research's findings.

2. Methodology

Main Question & Sub-questions

To be able to answer the main question, why does the private sector enter crisis response data collaboratives, this research needs to answer several sub-questions. Firstly, what are the objectives of these collaboratives? Secondly, what are the different activities the private sector engages in? Thirdly, what are the incentives that motivate the private sector to enter these collaboratives? Fourthly, what are the risks the private sector faces, and, on a related note, to what extent does the private sector mitigate these risks?

All of the posed questions seek to understand what crisis response data collaboratives entail and why the private sector works together with the public sector through such collaboratives, specifically from the private sector's perspective. Since qualitative research seeks to explore and explain phenomena and is more open to subjective perspectives (CIRT 2017), this research is qualitative in nature and will employ qualitative research methods.

Comparative Case Study

This research has selected three data collaboratives from the online Data Collaboratives Explorer directory under the 'crisis response' sector (GovLab 2017) for a diverse comparative case study: the data collaboratives between Banco Bilbao Vizcaya Argentaria (hereafter BBVA) and UN Global Pulse, between Radiant.Earth (hereafter Radiant) and other private and public organisations, and between Digicel (hereafter Digicel), Flowminder, and public organisations. Due to this research's word limit, this research will focus on BBVA, Radiant, and Digicel as the three private organisations of analysis.

Because this thesis is explorative in nature, it employs a diverse case method to achieve "maximum variance along relevant dimensions" (Seawright and Gerring 2008, 300). The case studies are different in multiple respects. For one, the cases focus on different kinds of data: BBVA's collaborative focuses on disclosed personal data in the form of Point of Sale (POS) payments and ATM cash withdrawal data, Radiant focuses on observed non-personal data in the form of geospatial data, and Digicel's collaborative focuses on observed personal data in the form of the GPS position of mobile phone SIMS (GovLab 2017). The three cases have also engaged in different types of activities: Digicel provided Flowminder with anonymised data after the Haiti Earthquake in 2010 (Flowminder 2015; Lu, Bengtsson, and Holme 2012), BBVA analysed financial data prior to, during, and after Hurricane Odile hit the Mexican State of Baja California Sur late 2014 (BBVA 2016; UN Global Pulse 2016), and Radiant has provided both the private and public sector with a digital platform, albeit currently in a trial

phase, to share and access geospatial data for global impact more easily (Datta 2017; Kentish 2017; Totaro 2017; Radiant.Earth 2018). Lastly, the geographical focus of these data collaboratives varies from local (BBVA), to national (Digicel), to worldwide (Radiant).

Data Collection
This research will collect qualitative data through three types of research methods: a secondary literature review, and original surveys and interviews with the three cases. A sequential qualitative approach will be employed, meaning the initial qualitative literature analysis will inform and lead to the survey, which will in turn inform and lead to the interviews. Simons, Lathlean, and Squire argue that using more methods of analysis in a sequential manner can bring deeper understanding of a subject than through one method alone (2008, 128). However, when findings from more than one method diverge, the explanations are limited (Ibid., 130). Nevertheless, because the methods are employed in a sequential order, it may be possible for this research to pin-point why such findings would diverge. Moreover, different findings among the three methods would allow for the revision or expansion of the previous analysis step(s), and possibly data collaborative theory in general. Thus, the sequential analysis method is useful because it allows for this research to be deductive, with the potential of becoming inductive as well (Trochim 2006).

Literature Analysis
To this researcher's knowledge, there has been no theoretical analysis yet of crisis response data collaboratives' objectives, and private sector's specific activities, incentives, risks, and mitigation techniques concerning these collaboratives. Therefore, while the work of Klein and Verhulst (2017) and Verhulst and Young (2017) forms a starting point for the incentives and risks for private organisations to enter data collaboratives, this review also draws from additional literature to contribute to the current (crisis response) data collaborative theory. This analysis forms the basis for the survey.

Survey
A qualitative survey (see Appendix) was designed and distributed as the first tool to collect primary data. The population of the survey included employees of BBVA, Radiant, and Digicel. The participants were selected through a snowball sampling method: the private organisations were contacted via e-mail, after which the private organisation determined which employee(s) would be suitable and available to help with the research. This sampling method

was useful, because it helped to find valuable participants that were otherwise not easily accessible to the researcher (Godwill 2015, 71). After the private organisations presented willing and available employees and their contact information, the researcher distributed the survey to the provided e-mail addresses and, in case the employees agreed to do a subsequent Skype interview, suggested a date and time.

The survey was designed in Microsoft Word. Distributing a survey as a Word attachment to an e-mail was beneficial for two reasons. First, this format did not require participants to have sophisticated software or technical expertise (Sue and Ritter 2007, 11). Secondly, having the survey as an attachment made it easy for respondents to return a filled-in survey by using the reply feature of their e-mail program (Ibid.).

Ethical issues are present in any type of research (Orb, Eisenhauer, and Wynaden 2001, 93; Plummer 2001), including this one. To ensure the volunteering respondents made an informed decision about filling out the survey, they were briefed on a number of issues as highlighted by Sue and Ritter (2007, 22). The introduction to the survey included the contact information of the researcher and the researcher's supervisor, explained the nature of the study, and the relevance of the respondents' contribution. The survey continued with a disclosure paragraph to reassure the respondents that their answers would be treated confidentially and for the purposes of education only. This introduction and disclosure should have encouraged participants to answer all questions completely and truthfully. To ensure larger autonomy of their data, the last question of the survey asked respondents whether they would like to receive a copy of the final results. A practical issue this research has tried to mitigate is 'survey fatigue', which is a general unwillingness of people to fill out surveys (Fryrear 2016). By including an estimation of how long the survey would take to complete, the relevance of the respondents' contribution, the ability to skip inapplicable parts of the survey, and by limiting the number of questions and answer options, this research has further tried to incentivise respondents to fill out the survey. Conveniently, filling out the survey helped interviewees prepare for the follow up interview. Their survey responses formed the basis for the interview questions.

Interviews
The interviews were conducted via Skype and recorded with Call Recorder software, which captured the video and audio of both parties. The interviews were semi-structured. This allowed for the exploration of the same central topics the survey covered, but also newly emerged issues, questions, or topics brought up by the interviewees (Wilson 2014, 24; Galletta, 2013, 24). While both the survey and interviews are qualitative are in nature, the data they

collect are different. Because the survey was based on the literature review, the survey responses are meant to determine "which of the predefined characteristics exist empirically in the population of study" (Jansen 2010). Interviews, however, are uniquely able to capture the subjective experiences and perspectives of subjects of interest (Brinkmann 2014, 278). The participants were asked open-ended questions, for instance about what data expertise they provided and why they believed their private organisation participated in the data collaborative. This enabled the participants to describe and explain the existing objectives, activities, incentives, risks, and mitigation techniques. Most importantly, interviews gave the researcher a chance to offer interpretations of the interviewees' answers, and for the interviewees to confirm or object such interpretations (Ibid., 288). This way, the meaning of the data was constructed in a dialogical process, rather than only by the researcher.

When it comes to interviews, there are specific ethical issues surrounding informed consent, as outlined by Orb, Eisenhauer, and Wynaden (2001), Sanjari et al. (2014), and Lo Iacono, Symonds, and Brown (2016). Since the interviewees indicated their willingness to be interviewed in the survey, they had already provided documented consent. To acquire verbal consent, before the start of the interview, the researcher clarified the researcher's identity, the nature of the study, the objective of the interview, how the data would be used and stored, how long the interview was expected to last, the participants' role in the research, and the participants' prerogative to withdraw at any time from the research without any negative consequences. Additionally, the researcher asked the interviewees for permission to record the interview and offered to send a copy of the recording to ensure greater autonomy of the data. Lastly, to meet confidentiality, the researcher informed the participants that their personal information and answers would only be accessible to the researcher, and that the collected data would be used for education purposes only. The interviews ensued only after the participants agreed to these conditions.

3. Literature Review

This literature review consists of four parts. The first part hypothesizes what the possible objectives are of (crisis response) data collaboratives, based on the three main overarching issues the public sector faces to create data-driven solutions to societal problems. The second part outlines the type of data collaborative activities the private sector can, theoretically, engage in. The third part discusses the potential incentives for the private sector to join (crisis response) data collaboratives. Lastly, this literature review describes the potential risks these collaboratives may bring for the private sector. The original survey responses and interviews with the three case studies will test the applicability of these findings in practice.

Objectives

The literature notes that the increased availability of big data brings three main obstacles for the public sector to create data-driven solutions to societal challenges. The first overarching problem is the public sector's inadequate access to relevant and high-quality data (Ballar 2014; Kirkpatrick 2016; Mitroff and Sharpe 2017; Raymond and Al Achkar 2016; Verhulst, Young, and Srinivasan 2017). The second main problem faced by the public sector is its lack of data science expertise (Ballard 2014; Berfelo et al. 2017; Kirkpatrick 2016; Pisani et al. 2016). Lastly, the third main obstacle for the public sector is its lack of technical or financial resources to create data-driven solutions (Berfelo et al. 2017; Li et al. 2013; van Panhuis et al. 2014, 4; Patton 2005; Pisani et al. 2016; Wolski, Howard, and Richardson 2017, 247). Based on these overarching data-related issues, this research hypothesises that data collaboratives aim to address at least one or more of these obstacles. Specifically regarding this research's three case studies, this research expects that the aim of these data collaboratives is to achieve at least one of these objectives: increasing the public sector's access to valuable privately-owned data, increasing the public sector's access to data expertise, and/or increasing the public sector's access to technical or monetary resources.

Activities

This literature review identifies three types of possible data collaborative activities: data sharing, data expertise, and resource support. Consequently, these findings counter the current literature's dominant focus of understanding data collaboratives almost exclusively as data sharing activities. While it generally supports Susha, Janssen, and Verhulst's argument that data collaboratives go *beyond* data sharing (2017), it goes a step further by suggesting that data collaboratives may not necessarily involve data sharing activities at all. Therefore, by outlining

a larger range of possible data collaborative activities, this literature review expands the current scope of data collaborative theory.

Data Sharing
The most well-known data collaborative activity is the private-public exchange of data, also commonly referred to as 'data philanthropy' (Pawelke and Tatevossian 2013; Kirkpatrick 2013; Kirkpatrick 2016; Stempeck 2014) or 'corporate data sharing' (Verhulst and Sangokoya 2015). There are currently two classification systems of data collaboratives. The first is the six types of essentially 'data sharing arrangements' (Verhulst and Young 2017) identified by Verhulst, Young, and Srinivasan (2017). These sharing arrangements are a useful starting point for indicating whether the private sector gives the public sector direct or indirect access to its datasets. There is also a more elaborate taxonomy model developed by Susha, Janssen, and Verhulst that identifies fourteen dimensions to differentiate data collaboratives (2017, 2697). However, the main problem with both classification models is that they exclusively understand data collaboratives as the private-public exchange of data. As will be demonstrated below, the literature suggests that the private sector can help the public sector through other types of data-related activities too. Thus, this literature review suggests that data collaboratives may not be synonymous with data sharing activities; data sharing activities may be only one type of data collaborative activities the private sector can engage in.

Data Expertise
The literature suggests that the private sector can also employ data expertise activities. Data expertise is required throughout all stages of a data value lifecycle. Chronologically, data is first collected (and stored), then processed or analysed, and finally used (Klein and Verhulst 2017, 15; Verhulst and Young 2017; UN 2016). To give an example of data expertise activities in a data collaborative, Gliklich, Dreyer, and Leavy highlight that successful cross-sector partnerships in the health sector have combined data expertise that no single entity possessed (2014). Furthermore, the private sector seems to be able to provide data expertise activities in the crisis response sector. Raymond and Al Achkar state that experts may be brought into humanitarian organisations to "train key staff about how to use certain data-related tools and techniques, for example, how to conduct surveys, make maps, analyse datasets, use imagery from satellites and store data appropriately" (2016, 14). Additionally, Kirkpatrick argues that some companies may use their own data scientists to analyse information on trends "that can be used to gain intelligence to solve development and humanitarian problems" (2016). These

examples highlight that the private sector may offer the public sector its data science expertise at various stages of the data lifecycle.

Granted, data expertise activities seem inherent to many data sharing activities. Pisani et al. refer to the importance of the collection and processing of data before sharing it and state that "data from different sources […] must be quality controlled and standardised" (2016, 2). Conversely, however, the private sector could employ data expertise activities without employing data sharing activities.

Resource Support

Another possible data collaborative activity for the private sector seems to be providing resource support in the form of technological or financial resources (Gliklich, Dreyer, and Leavy 2014; Mitroff and Sharpe 2017). To give an example of providing technological resources, Mitroff and Sharpe argue that public organisations lacking certain programming skills could rely on an appropriate private partner for its software skills (2017, 94). Referring in a general sense to humanitarian assistance, Stoddard argues the private sector can provide technical or operational resources, including the recruitment and placement of specialist personnel, IT, logistics, procurement, and operational security (2009, 249). Furthermore, the literature provides a number of examples of the private sector providing the public sector with monetary resources to create data-driven solutions to societal problems. For one, Mitroff and Sharpe argue that the private sector can fund big data research to find answers to certain questions (2017, 95). Similarly, Gliklich, Dreyer, and Leavy illustrate an example of a pharmaceutical company funding a public organisation in their endeavour to analyse data and register findings about a certain illness (2014). Considering the private sector often donates funds to help the public sector's disaster relief efforts (Rieth 2009, 298), it seems likely that the private sector could donate funds to the public sector to enable data-driven humanitarian assistance. Therefore, the literature suggests that the private sector can also employ resource support activities within crisis response data collaboratives.

Incentives

This research defines private sector incentives as potential positive results that motivate the private sector to engage in data collaboratives. This research will primarily build on Klein and Verhulst's 'six Rs of motivation' as to why private organisations may engage in data collaboratives (2017; Verhulst and Young 2017). However, given that Klein and Verhulst did not draw from crisis response data collaboratives and their focus is only on data sharing

activities, this review draws from additional literature on the motivations for private organisations to improve humanitarian assistance in general and through crisis response data collaboratives. This has led to the identification of a total of seven incentive categories: reciprocity, improved reputation, revenue, regulation, corporate social responsibility, partnerships, and protecting or saving human life. These findings broaden the current theory on the possible incentives for the private sector to enter (crisis response) data collaboratives.

Reciprocity
This incentive category entails that the private sector may be motivated to enter data collaboratives to gain access to the public sector's datasets, data expertise, technological resources, or as a way to give back data supplied by individuals or society.

Firstly, Klein and Verhulst perceive reciprocity as sharing data with others for mutual benefit (2017, 12). They understand this to mean gaining access to other valuable datasets, "especially where gaining access to other data sources may be important to their own business decisions" (Ibid). Alternatively, they understand this to mean 'giving back' data to the individuals and society from which the data had been collected (Ibid).

The literature also suggests that private organisations may want to enter data collaboratives as a way to access public organisations' data expertise (Verhulst and Young 2017; Klein and Verhulst 2017; Robin, Klein, and Jütting 2016; Hammet and Mixter 2017). For instance, Robin, Klein and Jütting explain that "external users may examine the [shared] data in new ways, and use the skills and methodologies not readily available internally" (2016, 12). Furthermore, Verhulst and Young stress that data collaboratives may allow private organisations to "get insights from their own data that they can use for their own purposes" (2017). This newly derived data expertise can help private organisations to identify new niches for activities, to develop new business models, as well as to retain, identify, or hire valuable data science talent (Klein and Verhulst 2017, 12). Hammet and Mixter mention the potential benefits for private organisations to help the public with data-related initiatives is that "by offering products and services after disasters and by developing pilot products that embrace innovation and the idea of flexibility, firms can develop knowledge, know-how, and information that can provide a competitive advantage over peer firms" (2017, 16). Considering developing pilot products may involve technical skills, like software skills, this research leaves the possibility open for the private sector to want to gain or improve technical resources too.

As Klein and Verhulst only consider data collaboratives to mean data sharing activities, they present gaining access to the public sector's data expertise as part of a separate 'research,

recruitment, and insights' incentive (2017, 13). However, given this research adopts a broader scope of data collaboratives, wanting to gain access to the public sector's data expertise or technical resources seems to fit best under this broader 'reciprocity' incentive category.

Improved Reputation
Many authors argue private organisations enter data collaboratives to strengthen and embrace a certain beneficial reputation (Verhulst and Young 2017; Klein and Verhulst 2017; Hammet and Mixter 2017). However, 'reputation' is a broad concept (Jones 1996; Olmedo-Cifuentes, Martinez-Leon, and Davies 2014). To avoid confusion, this research will refer to two different concepts of reputation: corporate reputation, defined as the estimate of the global perception that different stakeholders have about an organisation (Olmedo-Cifuentes and Martinez-Leon 2011), and internal reputation, meaning the organisation's reputation among employees (Olmedo-Cifuentes and Martinez-Leon 2011), also known as human resources reputation (Jones 1996).

Firstly, it is argued that private organisations enter data collaboratives to improve their corporate reputation (Klein and Verhulst 2017, 13), as engaging in data collaboratives can "offer an opportunity to gain (free) media attention and increase visibility among certain decision makers and other audiences" (Ibid., 16). Similarly, improving a private organisation's corporate reputation is often cited to be an incentive for private organisations to help humanitarian relief efforts (Fontainha, de Melo, and Leiras 2016; Rieth 2009; Johnson 2009), and private organisation participating in the disaster and humanitarian operations can attract positive media attention (Fontainha, de Melo, and Leiras 2016, 78). Thus, just like Hammet and Mixter argue (2017), private organisations may choose to join crisis response data collaboratives to improve their corporate reputation.

When it comes to internal reputation, some argue that working for the public good can boost private organisations' employee morale and motivation (Klein and Verhulst 2017; Rieth 2009, 305; Johnson 2009, 228), keeping them satisfied and causing them to perceive their employer more positively (Verhulst and Young 2017). As crisis response data collaboratives would similarly require private organisations' employees to work for the public good, data collaboratives in the crisis response sector could also be a way for private organisations to boost their internal reputation.

Revenue

Another identified incentive for the private sector to engage in data collaboratives is generating revenue (Klein and Verhulst 2017, 14; Verhulst and Young 2017). Private organisations generating revenue while addressing societal or humanitarian issues does not necessarily entail bad intentions (Verhulst and Young 2017; Johnson 2009). For instance, Johnson argues that private organisations that assist in humanitarian disasters may be, on the surface, profit motivated, but also, on a deeper level, motivated by a desire to do good (2009, 229). In the context of humanitarian emergencies, private organisations providing resources or expertise could benefit from continued sales with both public organisations and/or the affected community (Hammet and Mixter 2017; Rieth 2009).

Alternatively, the Groupe Speciale Mobile Association (GSMA) has a Humanitarian Connectivity Charter that formulates that its signatories, private organisations in the mobile or telecom industry, aim to improve humanitarian assistance to prevent any further financial losses for their own organisation (2015). Thus, while the previous revenue incentive seems to be more focused on generating profit, this revenue incentive is more focused on reducing financial losses. Both may be applicable incentives to join crisis response data collaboratives.

Regulation

A less frequently cited incentive for private organisations to enter data collaboratives is to meet regulatory compliance. Klein and Verhulst provide the example of the Employer Information Report regulation in the US, which requires companies to collect employment data on race/ethnicity, gender, and job category (2017, 14). By sharing this corporate-owned information with the public, organisations allow themselves to be more scrutinized and encourage greater diversity in their workplaces (Ibid., 15). Therefore, sharing private-owned data with the public may act as a motivator for organisations to meet regulatory compliance. Additional literature does not suggest this is an incentive to participate in other types of data collaborative activities, or to specifically enter crisis response data collaboratives. Nevertheless, it will be included in the survey to test its applicability to the three case studies.

Corporate Social Responsibility

Fulfilling one's corporate social responsibility (CSR) is understood as helping wider society while simultaneously supporting the eco-system in which a private organisation operates (Klein and Verhulst 2017, 4; Porter and Kramer 2002). Fulfilling one's CSR is a frequently cited incentive for private organisations to offer datasets to the public sector (Stempeck 2014;

Susha, Janssen, and Verhulst 2017, 2697; Verhulst and Young 2017; GSMA 2015). Additionally, Porter and Kramer argue private organisations can offer their capabilities and financial resources to support charitable causes that can improve their business environment (2002). As it is argued that private organisations may help during humanitarian disasters to take on CSR (Rieth 2009), fulfilling CSR could also be an incentive for private organisations to enter crisis response data collaboratives.

Moreover, the Humanitarian Connectivity Charter suggests private organisations choose to help humanitarian relief efforts to encourage others to fulfil their (corporate) responsibility. Specifically, the Charter states that "the [Mobile] industry can foster a stronger global citizenship and engagement around disaster awareness and relief possibilities" (GSMA 2015). Thus, private organisations may be incentivised to enter a crisis response data collaborative and to fulfil its CSR to subsequently inspire others to fulfil their (corporate) responsibility.

Partnerships

The literature suggests private organisations may enter data collaboratives to create or strengthen already existing partnerships with other stakeholders (GSMA 2015; Hammet and Mixter 2017; Rieth 2009). Hammet and Mixter argue that private organisations may choose to work with governments, NGOs, and other businesses after a disaster to create successful long-term relationships (2017, 17). Additionally, one of the Humanitarian Connectivity's Charter's principles is to "strengthen partnerships between the Mobile Industry, Government, and the Humanitarian Sector" (2015). Thus, engaging in (crisis response) data collaboratives could be a way for private organisations to form and/or strengthen relationships with other private and/or public organisations.

Protecting or Saving Human Life

Lastly, it seems protecting or saving human life is an incentive in itself for private organisations to engage in crisis response data collaboratives. The ultimate aim of the Humanitarian Connectivity Charter is "to strengthen access to communication and information for those affected by crisis in order to reduce the loss of life and positively contribute to humanitarian response" (2015). Thus, any signatory to this Charter ultimately pursues to protect or save human life, rather than it being a means to achieve other goals. Johnson seems to explain this by stating that "businesses are, after all, staffed by people who, in the face of a disaster, are compelled by their common humanity to help those in need" (2009, 227). Thus, the literature

suggests that protecting or saving human life is an additional and independent incentive for private organisations to engage in crisis response data collaboratives.

Risks

This research understands private sector risks as possible negative outcomes the private sector may face when engaging in a data collaborative. Drawn from the literature on data collaboratives and humanitarian crisis response in the network age, this review argues that the private sector can face risks in one or more of the following four risk categories: data quality/expertise risks, risks to data subjects' privacy and security, financial costs, and reputational damage. The findings of this part of the literature review reorganise and strengthen Klein and Verhulst's identification of the risks for private organisations to share data with public organisations (2017, 15-17), but also provides additional insights into the potential risks of conducting data expertise and resource support activities.

Data Quality Risks

Data quality risks include any risk that could harm data quality: the extent to which the data serves the purposes of the user (Haug, Zachariassen, and van Liempd 2011; Haug, Pedersen, and Arlbjørn 2009; Heo 2013; Gohdes and Price 2012). Data quality, or its usefulness to the public sector, may be affected in various stages of the data lifecycle, and unmitigated data quality risks in earlier stages of the data value process may continue to cause risks for later data stages (Verhulst and Young 2017; UN 2013; Wang, Storey, and Firth 1995, 624).

In the data collection phase, data may be inaccurate, outdated, biased, incomplete or non-representative of the concerned sample (Verhulst and Young 2017, 16; Mitroff and Sharpe 2017; UN 2013; Gohdes and Price 2012; Sandvik and Raymond 2017; Raymond and Al Achkar 2016, 4; Wang, Storey, and Firth 1995). Especially in the context of responding to humanitarian disasters, data may be collected in a fast way to speed up to the data use stage of the data lifecycle, possibly affecting its accuracy and reliability (Sandvik and Raymond 2017). There are also potential problems when storing data. For instance, data may be categorized or organized without considering the value that is supposed to be derived from the data (Galetto 2017), making the data more difficult to find or share. Furthermore, there is a risk that data is stored in a format that is incompatible with the software of the public organisations. Panhuis et al. argue that data may be collected and preserved in a hardcopy paper or electric format that "may be antiquated or incompatible with modern software systems (2014, 4), making the data more difficult to share or analyse. Pisani et al. similarly argue that if data is collected from

different sources, it needs to be standardised to allow for proper analysis by different actors (2016, 2).

In the processing or analysis stage, there can be a lack of anonymisation techniques to anonymise the collected data (Raymond 2016, 5). Furthermore, incompatible datasets may be aggregated (Klein and Verhulst 2017, 17; Verhulst and Young 2017; Gohdes and Price 2012). During analysis, there could also be issues in terms of a poorly defined problem or research design, flawed data modelling, or the employment of a biased algorithm (Klein and Verhulst 2017, 17; UN 2013, 3). In the final 'use' stage, data could be misinterpreted, or flawed decisions can be made based on poor data (Klein and Verhulst 2017, 17; UN 2013, 3; Haug, Zachariassen, and van Liempd 2011, 169). These risks could apply to the private sector engaging in crisis response data collaboratives too.

Privacy or Security Risks
Authors have especially highlighted the risks of breaching individuals' privacy and security through data sharing (GovLab 2017; Taddeo 2016; UN 2013; Patton 2005; Frizzo-Barker and Chow-White 2014). Data expertise activities may similarly carry the risk of breaching individuals' privacy or security, given that these activities also involve interaction with data throughout various stages of the data lifecycle. There are six separate risks under this category.

Firstly, the literature identifies the problem of a lack of authority of data. For instance, data can be collected in an unauthorized or intrusive manner from individuals and organisations (Klein and Verhulst 2017, 16). Furthermore, private or public organisations may not have the authority to access shared data, as legal jurisdictions on their authority may conflict (Ibid., 17). Additionally, individuals' privacy or security may be breached when data is unprotected through inadequate, differing, or confusing security provisions (Ibid.). Data may also be left unprotected because of the lack of so-called 'data stewardship', meaning that the concerned data collaborative parties are unable to ensure the responsible use of personally identifiable data as it travels across use cases and sectors (Ibid.; Sandvik and Raymond 2017, 18; Gliklich, Dreyer, and Leavy 2014). Another important risk is the re-identification of individuals. As authors point out, data, even after being anonymised, can include risks of re-identification of subjects (Klein and Verhulst 2017, 17; UN 2013, 39; Taddeo 2017, 2; Heeney et al. 2011). Lastly, individuals' privacy and/or security may be breached when data is exploited (King 2014; UN 2013; Taylor, Leenes, and Schendel 2017; Scarnecchia et al. 2017; Raymond and Al Achkar 2016). For instance, the data collaborative parties may use data in ways that are discriminatory against protected groups (Taylor, Leenes, and Schendel 2017, 5). Alternatively,

access to (anonymised) data may stimulate individuals to manipulate or undermine humanitarian assistance, for instance by misreporting or attracting violence to humanitarian workers or communities (UN 2013, 39-40; Scarnecchia et al. 2017; Raymond and Al Achkar 2016; Raymond 2016, 4).

When it comes to acute humanitarian disasters, Sandvik and Raymond argue that concerns over data privacy and protection may be less influential when the threat to life is high (2017, 19). Nonetheless, breaches of individuals' privacy and security could also lead to the loss of (quality of) life of the communities and humanitarian workers involved (Ibid.; UN 2013), and, as will be discussed in the next risk category, cause legal or financial repercussions. Therefore, it seems plausible that private organisations engaging in crisis response data collaboratives would consider and weigh the present privacy or security risks, regardless if the collaborative aims to prevent or quickly respond to a humanitarian emergency.

Financial Costs
Data collaboratives seem to accompany financial costs for private organisations. In the case of data sharing, scholars agree that providing access to data may increase operational costs, as it requires investments in time and money (Mitroff and Sharpe 2017, 95; Klein and Verhulst 2017, 17; UN 2013; Engel, Fischer, and Galetovic 2014, 139; Haug, Zachariassen, and van Liempd 2011; van Panhuis et al. 2014, 4; Pisani et al. 2016). The increase of operational costs also seems to hold true for data expertise activities. For instance, companies may incur costs when cleaning and ensuring high quality data (Haug, Zachariassen, and van Liempd 2011, 170) or during data analysis, as "each additional unit of data that requires analysis has a transaction cost" (UN 2013, 38). Specifically, when it comes to conflict humanitarian emergencies, Johnson mentions that it is very difficult for a private organisation to get insurance for its employees and resources (2009, 228). Pursuing without such insurance could also translate into higher operational costs for the private organisation.

There are several less frequently cited monetary risks. For instance, regulatory fines may result from the failure to comply to legal jurisdictions regarding data authority and the protection of data (Klein and Verhulst 2017, 17). Breaching data subjects' privacy or security may also result in the loss of private organisations' competitive positions and advantage (Ibid.). Lastly, as this research suggests the possibility of private organisations funding public organisations through 'resource support' activities, such funding can be seen as an expense on behalf of the organisation and as a possible financial risk.

Reputational Damage

The literature suggests that engaging in data sharing activities comes with a risk of damaging a private organisation's corporate reputation (Klein and Verhulst 2017, 17; Panhuis et al. 2014; Montague 2011; Mitroff and Sharpe 2017). For one, private organisations that choose to share data with other parties could face public backlash (Mitroff and Sharpe 2017; Sathi 2014). Sathi explains customers may feel they have not given consent to the private organisation to share their data with other parties, causing public backlash that may lead to "irreparable damage to the brand and their mainstream business" (2014). Johnson argues that private organisations are especially wary of damaging their corporate reputation by helping in complex, often conflict, humanitarian emergencies (2009, 228).

In addition, authors argue that a private organisation supplying data may face corporate reputational damage if it fails to mitigate data quality, privacy or security risks (Klein and Verhulst 2017, 17; van Panhuis et al. 2014, 4; Montague 2011, 276). For instance, van Panhuis et al. argue that "data providers could be discredited by errors found during secondary use of their data" (2014, 4-5). As this research has outlined data expertise activities similarly carry risks to data quality and data subjects' privacy and security, private organisations supplying data expertise may similarly face reputational damage when failing to mitigate such risks in (crisis response) data collaboratives.

4. Survey and Interview Findings

This part of the research will discuss the survey responses and interviews that shed light on the three selected case studies. For each case study, there was one respondent for both the survey and the interview. To maintain the order of the conducted interviews, the respondent for BBVA will be referred to as 'respondent A', the respondent for Radiant as 'respondent B', and the respondent for Digicel as 'respondent C'.[4]

Objectives

All three case studies indicated to have 'increasing the public sector's access to valuable privately-owned data' as an objective. Additionally, BBVA and Radiant ticked 'increasing the public sector's access to data expertise' as an objective. Lastly, Radiant ticked the 'increasing the public sector's access to technical or monetary resources' objective.

BBVA and Digicel also listed additional objectives for their respective collaborative. For the former it was to prove whether financial transaction data could be useful for measuring the economic resilience of communities vulnerable to disasters. For the latter it was to "make everyone understand where the help was needed" after the earthquake, referring to NGOs, the Haitian government, and the general public. In these two cases, increasing the public sector's access to data expertise and/or relevant privately-owned data was a way to achieve these additional goals.

Activities

With part A of the survey, BBVA and Digicel indicated to have participated in data sharing activities. Respondent A indicated that the data sharing arrangement between BBVA and UN Global Pulse was a research partnership, with BBVA sharing aggregated and anonymised financial transactions records. However, from the interview it becomes clear that UN Global Pulse did not have direct access to this data. As respondent A clarified, "they only had access to the conclusions." Therefore, this research would argue that BBVA indirectly participated in data sharing activities with the public sector, with its collaborative forming a mix between a 'research partnership' arrangement and a 'trusted intermediary' arrangement: in this case, the

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[4] Due to technical difficulties, the interview with respondent A was conducted via telephone and recorded with the IPhone Voice Message application. Due to respondent C's busy schedule, the interviewer and interviewee agreed to discuss and fill in the survey during the interview.

same private organisation that owned the data also analysed the data, and merely shared the findings with the public sector. In comparison, Digicel has directly shared anonymised SIM location data with Flowminder, and later also through Flowminder with other private and public organisations. Flowminder is another private organisation that analysed Digicel's data, and consequently shares the findings with public organisations. According to respondent C, after the earthquake hit Haiti, Flowminder specifically shared insights with UNOCHA, "who at the time oversaw the crisis." Accordingly, respondent C indicated that Digicel has participated in a 'trusted intermediary' sharing arrangement. Digicel and Flowminder have continued their data collaborative and Digicel continues to provide Flowminder and other public organisations with anonymised SIM location data today.

Continuing to part B of the survey, two case studies, BBVA and Radiant, indicated their private organisations had provided data expertise to the public sector. BBVA provided data expertise in multiple areas, namely with the processing and analysis of the data, as well as the data-informed decisionmaking. Respondent A specified that BBVA has not directly helped to provide real-time solutions to humanitarian disasters. Instead, by validating the usefulness of financial data on measuring the economic resilience of vulnerable communities, BBVA has laid the groundwork for improved humanitarian decisionmaking. Although Radiant's platform is in its trial phase, Radiant has provided data expertise to the private and public sector in all areas. Regarding the collection of data, respondent B explains that Radiant helps by collecting the already available global and regional datasets, but also by allowing its users to upload data directly onto the platform. In terms of the processing/analysis of data, Radiant is working with some initial partners around 'used cases.' Respondent B explains this involves the organisation "actively going to the data that we currently have and expertise that we have to analyse and enrich the data we've been provided with. Or even just to go and search what they're looking for and give them some initial sense of the possible." Additionally, referring to data-informed decisionmaking, Radiant is actively coaching and training its users on "how to find that data in the future … what it can be used for, and these are some of the sources, and where we are using landsat or sentinel data we're obviously giving them direct links to that." Thus, by teaching its private and public users how to use the platform and the available data, Radiant is directly improving their data-informed decisionmaking.

Interestingly, although Digicel did not provide data expertise directly to public organisations, respondent C elaborated Digicel ran SQL queries on its database to pull the relevant data for Flowminder and also anonymised the data before sharing these with Flowminder. This collecting and processing of data before sharing shows that Digicel has

provided essential data expertise to another private organisation in this data collaborative, which was crucial for the public sector to gain Flowminder's analyses. Thus, this research argues that Digicel has, albeit indirectly, provided the public sector with data expertise.

Moving to part C of the survey, Radiant was the only private organisation that indicated to have supplied no resource support to the public sector. Nevertheless, after the interview with respondent B it became clear that Radiant, just like BBVA, has also provided the public sector directly with technical resource support. Digicel provided technical resources to Flowminder, which, again, indirectly helps the public sector. This means that all three private organisations have participated in some form of resource support activities.

Specifically, all three case studies provided personnel to work on the data collaborative and IT resources. Additionally, BBVA supplied logistics and operational security. The interviews with Radiant and Digicel's respondents also suggest these private organisations have supplied logistics, as the former formulated a terms of agreement for its users and the latter formulated a strict protocol with Flowminder on the way data is accessed and the way data is shared. These two private organisations seem to provide operational security as well. For instance, respondent B explained Radiant staff act as gatekeepers and look at the data that has been uploaded by its users before it goes onto the platform, to ensure the uploaded data fulfils the technical and privacy requirements. Further, according to respondent C, Flowminder has a server running in Digicel's data centre that provides access to real-time data since 2012, which relies on Digicel's infrastructure and security protection.

None of the case studies have currently directly provided the public sector with financial resources. However, providing the technical resources has brought operational costs, meaning that these three case studies have indirectly provided the public sector with financial resources.

Incentives

The three case studies had many and various incentives for entering their respective collaborative. From the 14 available incentive boxes in the survey, only two, 'the generating profit' under the 'revenue' category and the 'Regulation' incentive, were left unchecked across all case studies. This research will discuss the different incentives per category.

Reciprocity

Two cases, BBVA and Radiant, indicated multiple 'reciprocity' incentives were relevant to their data collaborative. Firstly, BBVA ticked the 'giving back data gathered from individuals

or society' incentive and the 'gaining/improving technical resources' incentive. Upon elaboration within the interview, respondent A clarified that "not the programming, not the software, this is not so important, but the analytical skills, the statistical, and the numerical, geographical skills, these types of possibilities." This means that there is an additional 'reciprocity' incentive for the private sector to engage in crisis response data collaboratives this research had not listed in the survey, namely gaining or improving of a private organisation's own data analytical skills.

For the Radiant case study, it is important to understand Radiant is a non-profit private organisation, and acts as a mediator for its private and public users. Radiant wants to be the platform that facilitates the private and public sector's collection, sharing, analysis, and use of geospatial data. Thus, the incentives and risks for the private and public organisations to use the Radiant platform are shared by Radiant. This led Radiant to tick all the available boxes under the 'reciprocity' category. In the interview, respondent B also stated the Radiant platform aims to improve its users' data expertise capacity by saying "if you do not provide the expertise, the educational element, you just have a dead resource... Because they get frustrated with it." Thus, it seems that there is an incentive for private organisations to gain or improve other private or public organisations' data analytical skills, or, just like with the BBVA case, their own.

While Digicel did not enter the data collaborative with Flowminder in 2010 for any of the listed reciprocity reasons, respondent C explained that the data collaborative brought a positive effect on Digicel's resources, which became an incentive to continue the collaborative for potential future crises. As respondent C explains,

"*typically when there are crises like that, you are very busy with your operations and a lot of NGOs come and knock on your door and ask for things and for information about network availability... Now that we have this system in place, it means that Flowminder can take over part of those tasks. So when [hurricane] Matthew happened, they were actually the ones issuing the reports to the aid community about where our network was up and working again or not working again. So it gave a very reliable channel, because they have built up their reputation with the aid community ... about network availability, which kind of took work out of our hands.*"

Therefore, this case study indicated that gaining/improving resources is another possible incentive for the private sector to participate in crisis response data collaboratives.

Improved Reputation
Two cases, Radiant and Digicel, checked 'strengthening or embracing one's corporate reputation' as an incentive to enter their data collaborative. Radiant indicated this has been an

important reason for private organisations to use its platform, but also a key factor for Radiant to obtain its objectives. Respondent B explains in the following excerpt,

"there's that danger that you've built something nice, it's elegant, and people who use it really like, but there's just not enough visibility of it. Then, unfortunately, it's going to be an underutilized tool and you ... want to reach, at some point, a critical mass of users. So yes, by doing these things properly and getting the, if you like, recognition of it, it drives the whole vicious cycle we want to have."

While initially not an incentive for Digicel, respondent C explained the positive press and the improved reputation that came along collaborating with Flowminder in 2010 became an important incentive to continue the data collaborative.

Additionally, all three case studies indicated that improving one's reputation towards employees was or became an important incentive to enter the data collaboratives. All three private organisations believed that participating in the data collaboratives would improve morale and motivate employees, either by working on a good cause (BBVA), being able to use the data and see it make a difference and become comfortable with using it (Radiant), and in the case of Digicel, by seeing the positive results of the first data collaborative with Flowminder, which removed scepticism of employees and became a motivator to continue the collaboration.

Revenue

Initially, none of the case studies indicated to have checked any of the 'revenue' incentives boxes. However, the interviews with the respondents clarified that BBVA and Digicel believed 'limiting one's own further financial losses' was, indeed, an incentive to enter their respective data collaboratives. To illustrate, respondent A states that, "the sooner a population affected by this event recovers, the sooner the activity of the bank recovers in that area. So we [have] the incentive to help and to make a good contribution to improve resilience in these cases."

Corporate Social Responsibility

All three case studies checked the 'fulfilling one's corporate social responsibility' incentive under the CSR category. Noteworthy is that the respondents indicated a close relationship between fulfilling the private organisations' CSR incentive and the protecting or saving human life incentive- an incentive that all three case studies indicated applied to their data collaborative. Respondent A explains protecting or saving human lives is the long-term goal and incentive of BBVA, "of our social responsibility department and the bank as a whole." Alternatively, although Radiant indicated its focus is more on improving the resiliency aspects of communities to crises rather than direct crisis relief, Radiant also believes CSR and

protecting/saving human lives go hand in hand. Respondent B explained that Radiant fulfilling its CSR can help to achieve one of their long-term goals of protecting human life. Thus, in the case of crisis response data collaboratives, fulfilling one's CSR seems to be a means to achieve the protecting or saving of human life.

Additionally, Radiant and Digicel believed 'encouraging others to fulfil their (corporate) responsibility by fulfilling one's own corporate social responsibility' was a relevant incentive.

Partnerships
All three case studies indicated 'creating partnerships with other private/public organisations' was an incentive to enter their crisis response data collaborative. Radiant additionally checked the 'strengthening existing partnerships with other private/public organisations' incentive.

Interestingly, respondent C suggested a possible relationship between this incentive and the CSR and protecting/saving human life incentive. Specifically, the respondent stated "the reason we [Digicel] created the partnership is because we wanted to do the other two." Thus, creating a partnership, and conducting a crisis response data collaborative, can form a means for a private organisation to achieve its other incentives. This statement also suggests that some incentives can be more important for the private organisation to enter the crisis response data collaborative than other incentives.

Protecting/saving human life
After the interviews with the respondents, it became clear that all case studies believed protecting or saving human life was an important incentive to enter their respective collaborative. While this incentive was more of a long-term and indirect goal for Radiant and BBVA, this goal was a direct incentive for Digicel to enter and continue the collaborative with Flowminder.

Risks and Mitigation Techniques
Across the three case studies, only the 'lack of anonymisation techniques' risk under the 'data quality/expertise risks' category was left unchecked. This means that the private organisations considered a wide variety of risks. This research will discuss the different risks per category, as well as the private organisations' mitigation thereof.

Data Quality/Expertise Risks

All three cases faced at least one risk in this category. Digicel indicated that only the 'misinterpretation of data' risk applied to its data collaborative. However, as Digicel had much trust in its partner Flowminder, Digicel specified it only feared the public sector and other organisations would misinterpret the analysis results they would receive from Flowminder. Respondent C indicated this risk was mitigated by having Flowminder agree to "a clear prerogative that nothing would be shared externally until we collectively saw what we could get out of it."

BBVA indicated 'poor quality data', 'unclear categorisation of data', 'poorly defined problem or research design', and 'flawed decision based on poor data' were relevant risks to the crisis response data collaborative. BBVA mitigated these risks with a quick feasibility analysis. Respondent A explains that, *"we dedicated like one month to this kind of feasibility analysis from a technical perspective … We wanted to measure the data density, the data structure, the data quality, the classifications, some measures so the data would be properly dealt with."* Thus, by conducting a feasibility analysis, the private organisation sufficiently mitigated the data quality/expertise risks before entering the crisis response data collaborative.

Lastly, Radiant ticked all of this category's incentives, except for 'lack of anonymisation techniques' and 'poorly defined problem or research design.' As Radiant allows the community to supply data to its platform, there are data quality and expertise risks for both the users and for Radiant. Respondent B explains that if users upload unusable data, "then they can't address what they're trying to address, which is to get their partners to use it, understand, use and play with what they have." Additionally, the users' data needs to be proper and have a good quality in order to have high quality data available to all the users, which is Radiant's aim. Radiant has tried to mitigate the data quality/expertise risks with a terms of service (TOS) that users need to sign before using the platform, as well as acting as having its staff act as gatekeepers to confirm whether the uploaded data fulfils all the required technical aspects. The respondent explains that "we put some of the burden on them … and we put some of the burden on us to try to clean up or assist the work." Additionally, Radiant's efforts to build its users data expertise capacity could also mitigate its users from uploading unusable data.

Risks to Data Subjects' Privacy and Security

Under this category, all case studies indicated at least one risk that applied to their data collaborative. Radiant ticked all the listed risks, and indicated that these are mitigated in the same manner as the data quality/expertise risks: having users sign TOS and by screening

uploaded data on whether it fulfils the privacy requirements. The respondent specified that uploaded data will not go on the platform *unless* it fulfils the privacy requirements, otherwise private organisations will refrain from participating in their data collaborative. BBVA checked the 're-identification of individuals' risk, which were mitigated by aggregating and anonymising the data before analysis. Respondent A argued that these mitigation techniques before analysis were a precondition to sharing the findings with UN Global Pulse. Similarly, Digicel noted that while internal leaks by Flowminder could have been a 'insufficient, differing, or confusing security provisions' risk, this was sufficiently mitigated in three ways: anonymising the data, adhering to the stringent Swedish regulations Flowminder abides by, and lastly with Flowminder's reputation as being a small organisation with much integrity. Respondent C stressed the good reputation of and sufficient trust in Flowminder were reasons to join the data collaborative. In fact, the respondent explained Digicel has declined requests from other, often larger, organisations to gain access to its datasets, because it believed the risk of internal issues with these organisations was still too large. In these cases, "we would have Flowminder do their work and share their results with the other [organisation]." Thus, the inability to mitigate data subjects' privacy or security risks actively prevents private organisations from entering crisis response data collaboratives with other organisations.

It is noteworthy that data anonymisation may potentially pose risks to reaching the objectives of crisis response data collaboratives. For BBVA's data collaborative, respondent A explains that "we have to work with data that is eloquent enough and safe as well at the same time. And this is not an easy task." Completely anonymising data would reduce the strength of BBVA and UN Global Pulse's conclusions that financial data can be used to measure the economic resilience of communities vulnerable to disasters. Thus, to some extent, private organisations may consider a trade-off between *complete* privacy and the descriptive capacity of the data.

Financial Costs
All three case studies faced risks in this category. Firstly, all respondents checked the 'increase of operational costs' risk. All private organisations tried to mitigate this risk to some extent. For instance, respondent A explained that BBVA's Data Analytics team had their focus of and the budget for the study approved, ensuring the financial resources were available to carry out the data collaborative. Respondent B indicated that Radiant has mitigated its increased operational costs by trying to ensure the format of the uploaded data "minimizes the amount of space that it uses," because exceeding the amount of storage donated by Amazon to host the

data would likely mean Radiant has to start paying for extra storage space. In case Radiant does exceed the donated storage space, Radiant is considering mitigating the increased operational costs by charging its users through a membership system based on the storage they need and what they are using the storage for. Digicel has been able to mitigate some of the increased operational costs by charging development agencies to access the same anonymised data that has been made available to Flowminder for development studies. Important here is that Digicel does not aim to create profit, but merely to cover some of the costs of running the Flowminder server.

The 'regulatory fines as a result of failing to comply with legal jurisdictions' risk also applied to all case studies. This risk was closely related to the risks to data subjects' privacy and security, as respondent A explained "there are fines for those corporations that violate privacy." Thus, private organisations mitigated this risk by mitigating the risks to data subjects' privacy and security. Interestingly, respondent A indicated a hierarchy of risks by stating that a fine is "an economical harm that we can cope with … the bigger problem is the kind of relationship that we want to have with our customers. Wanting to trust us as a bank. So we don't want to erode that trust." Violating privacy may therefore be seen as a larger risk to a private organisation because of the effect it has on its clientele, rather than the regulatory fines that result from it.

The 'loss of competitive advantage' was ticked by both Radiant and Digicel. The former referred to this as a small risk. Respondent B explains that if Radiant's platform becomes successful, it may increase the amount of users in total, but the users could "start to spread themselves out over lots of different platforms." Radiant will therefore track whether its users keep coming back to use the platform and, to prevent low 'stickiness', incorporate feedback from the users to design the platform according to its users' needs and wishes. Alternatively, Digicel explains that raw data gives a lot of information about its clients that competitors could use for competitive purposes. Respondent C argued that data anonymisation mitigated this risk.

Lastly, Radiant indicated 'donating funds to public organisation to enable data-driven solutions to societal problems' was a potential risk. Radiant is working on conducting big country mapathons and training sessions to train people on how to use the platform. This would require some financial assistance from Radiant, but this risk could be mitigated by sharing the costs with potential partners, like the US State Department or USAID. Further, Radiant pointed out the possibility of donating funds to private organisations that would have relevant expertise

for these projects, possibly in a sub-contracting role. Thus, this risk could be rephrased to 'donating funds to relevant public or private organisations.'

Reputational Damage

Two case studies believed this risk category applied. Firstly, Radiant ticked the 'negative public response to increasing public (organisation's) access to private data' risk'. Radiant is trying to mitigate this risk by showing the public that, with its platform, private organisations can provide certain types of data without violating their data subjects' privacy and security. Contrastingly, Radiant posited that *not* increasing public access to private data, especially in highly sensitive contexts such as natural disasters, can also evoke a negative public response to private organisations. Respondent B explained this is a "damned whether you do or whether you don't" scenario. The respondent believes private organisations can mitigate this risk by working with public organisations in advance to explain what they can and cannot give.

Secondly, both Radiant and BBVA checked 'negative public response to failure to ensure adequate data quality or individuals' privacy/security' as an applicable risk. This reiterates the finding that failing to ensure privacy brings more risks. BBVA and Radiant have both tried to mitigate this risk by mitigating the risk to breaching data subjects' privacy, as discussed earlier.

5. Analysis

With the literature analysis and the survey and interview findings, this research is able to answer its sub-questions and main question.

Sub-question 1: what are the objectives of the crisis response data collaboratives?

All three crisis response data collaboratives had the objective to increase the public sector's access to valuable privately-owned data. BBVA and Radiant also had the objective to increase the public sector's access to data expertise. Furthermore, Radiant aimed to increase the public sector's access to technical or monetary resources. Both BBVA and Digicel had another separate objective to help the public, and they believed they could achieve these additional objectives by achieving the earlier indicated objectives. Thus, crisis response data collaboratives aim to address at least one of the overarching obstacles the public sector faces in creating data-driven solutions to societal issues, and achieving these objectives may also be a means to achieve other public goals.

Sub-question 2: what are the different possible data collaborative activities the private sector engages in?

The literature analysis suggested the private sector could engage in three types of data collaborative activities: data sharing, data expertise, or resource support. This research has found that all three analysed private organisations of the selected three case studies assisted the public sector, in Digicel's case indirectly, by providing resource support activities and data expertise activities. BBVA and Digicel both participated in data sharing activities, although in different ways. BBVA's collaborative suggests a new type of data sharing arrangement, as BBVA only provided UN Global Pulse access to its data analysis conclusions. Digicel's collaborative indicated a 'trusted intermediary' arrangement, where Digicel provides Flowminder with access to anonymised data, which consequently shares the data and/or insights with the public sector.

Sub-question 3: what are the incentives for the private sector to enter crisis response data collaboratives?

The literature suggested seven incentive categories could apply to the private sector. Across the three case studies, only one, the 'regulation' category, did not apply. Five categories of incentives applied in all cases, namely the 'reciprocity', 'improved reputation', 'corporate social responsibility', 'partnerships' and 'protecting human life' categories. The two for-profit

private organisations, BBVA and Digicel, indicated that the 'limiting one's own further financial losses' from the 'revenue' category applied to their collaborative too.

Sub-question 4: what risks does the private sector face when entering a crisis response data collaborative?

All three case studies faced 'data quality/expertise', 'risks to data subjects' privacy and security', and 'financial costs' risks. Two cases, BBVA and Radiant, also believed they faced 'reputational damage' risks. Thus, these findings suggest that crisis response data collaboratives bring at least three of the four categories of possible risks for the private sector.

Sub-question 5: to what extent does the private sector mitigate these risks?

The private sector seems to sufficiently mitigate risks through a variety of mitigation techniques. Regarding the 'data quality/expertise risks' and 'risks to data subjects' privacy and security' categories, the three case studies employed one or more of the following mitigation techniques: a feasibility analysis, a TOS or strict protocol with the concerned data collaborative partner(s), acting as a gatekeeper and checking whether uploaded data hits the technical and privacy requirements, and/or the aggregation and anonymisation of data. The three case studies also believed that mitigating these risks automatically mitigated the 'regulatory fines' risk under the 'financial cost' risk category.

All three cases mitigated their 'increase of operational costs' risk under the 'financial costs' risk category differently: BBVA by getting its study focus and budget approved, Radiant through its TOS and the incorporation of feedback from partners to improve its platform, and Digicel by providing development agencies with the anonymised data through Flowminder for development research at a small fee. Regarding the 'loss of competitive advantage' risk, Digicel used data anonymisation as a mitigation technique, and Radiant expects to mitigate this risk by incorporating users' feedback into the design of the platform. Radiant also believes the potential 'donating funds to relevant public or private' risk can be mitigated by sharing such costs with other partners.

Furthermore, the two private organisations that claimed to face one or both of the 'reputational damage' risks, BBVA and Radiant, have tried to mitigate this category of risks by mitigating 'risks to data subjects' privacy and security' risks. Radiant also believed that providing examples of private organisations sharing private data in a way that protects data subjects would mitigate such risks. An important finding is that the three private organisations

suggested that sufficient mitigation of these risks, especially the 'risks to data subjects' privacy and security' category, was a precondition to joining their respective data collaborative.

Main question: why does the private sector enter crisis response data collaboratives?

In all cases, the private sector participates in crisis response data collaboratives to increase the public sector's access to valuable privately-owned data. In some cases, the private sector may want to increase the public sector's access to data expertise, and in a rare case, to increase the public sector's access to technical or monetary resources. Attaining these objectives may also help the private sector attain additional goals that aim to help the public good. The private sector aims to achieve these objectives by participating in a variety of activities, namely data expertise activities and resource support activities, and in some cases data sharing activities. Crisis response data collaboratives allow the private sector to pursue many and various incentives. However, the private sector will only join a crisis response data collaborative if it is able to mitigate the many risks such a collaborative presents, especially the risks to data subjects' privacy and security.

6. Conclusion

This research provides insights into the context and motivations that lead the private sector to participate in crisis response data collaboratives, and, in extension, data collaboratives in general. Based on the literature analysis, and the survey responses and interview answers of three case studies (BBVA, Radiant, and Digicel), it concludes that private organisations enter crisis response data collaboratives to assist the public sector by achieving a variety of objectives, by participating in a variety of activities, to pursue a variety of incentives, provided a variety of risks are sufficiently mitigated.

To contextualise the private sector's decision to join a crisis response data collaborative, this research conducted a literature analysis to outline possible (crisis response) data collaboratives' objectives, and the private sector's activities, incentives, and risks. The comparative case study helped to verify and explain which of these aspects existed in practice, and how the private sector mitigated existing risks. In all cases, private organisations indicated that their collaboratives were meant to address one or more of the obstacles the public sector faces: inadequate access to valuable privately-owned data, lack of data expertise, and/or lack of technical or monetary resources. In two cases, achieving such goals were believed to achieve other additional goals for the public good. Thus, it seems that the private sector joins crisis response data collaboratives primarily to achieve public objectives.

The comparative case study also demonstrated that the private sector participates in a wide range of data collaborative activities: all three cases participated in data expertise and resource support activities, and two in data sharing activities. This means that, contrary to the expectation of the available literature, data sharing activities are not the only way, nor the most common way, for the private sector to help the public sector create data-driven solutions to address societal problems. The findings also suggest that data collaboratives are not necessarily synonymous with data sharing activities, broadening the current scope of data collaboratives.

The case studies demonstrated that there are many and various incentives that motivate the private sector to enter crisis response data collaboratives. Five of the seven identified incentives categories applied to all three cases, namely 'reciprocity', 'improved reputation', 'corporate social responsibility', 'partnerships', and 'protecting human life.' For the two for-profit private organisations, limiting one's financial losses under the 'revenue' category after a disaster was also a relevant incentive to enter their crisis response data collaborative. Only the 'regulation' incentive category did not apply to any of the three case studies. These findings suggest that the private sector's incentives to join a data collaborative in the crisis response sector do not entirely align with the private sector's incentives to join a data collaborative in other sectors.

Simultaneously, there are multiple risks that demotivate the private sector from engaging in crisis response data collaboratives. Three of four identified risk categories applied to all three cases: the 'data quality/expertise risks', 'risks to data subjects' privacy and security', and 'financial costs' categories. Two cases also indicated the 'reputational damage' risk category applied. However, all private organisations believed to have sufficiently mitigated the presented risks through a variety of mitigation techniques. The three cases indicated that the adequate mitigation of risks, especially of the 'risks to data subjects' privacy and security' category, was a precondition to start their respective collaborative. Thus, the ability to mitigate relevant risks seems to be a necessary requirement for the private sector to enter crisis response data collaboratives, regardless of the private sector's objectives to help the public sector or the incentives such collaboratives offer.

The different nature of each data collaborative ensure that the external validity of this research's findings is limited. Further analysis of more (crisis response) data collaboratives may strengthen these findings or provide new insights. At the least, this research has provided a better understanding as to why three different private organisations have chosen to enter crisis response data collaboratives. At the most, these findings will stimulate the creation of more crisis response data collaboratives by helping its readers better understand what such a collaborative may entail for the private sector and why the private sector may be motivated to participate in one. This would ultimately ensure that the private sector becomes a bigger hero to the public sector and, potentially, protects and saves lives.

Appendix

Survey: Crisis Response Data Collaboratives

Contact information:
Master student: Jamie Holton, j.l.holton@umail.leidenuniv.nl
Supervisor: Dr. A. O'Malley, a.m.omalley@hum.leidenuniv.nl

Information:
This survey aims to gain a better understanding of why the
private sector[5] chooses to enter so-called 'crisis response' data collaboratives with the public
sector.[6] Crisis response data collaboratives are cross-sector partnerships meant to improve
data-driven humanitarian relief efforts (GovLab 2017). Your thoughts on the topic will provide
insight into the private sector's activities within such data collaboratives, as well as the
incentives for a private organisation to enter them, and the risks it considered or faced. Filling
in the survey should take no longer than 15 minutes. You can fill out the survey electronically
by checking the boxes and typing in answers. You can also choose to fill out the survey
manually.

Disclosure:
*The results will be treated with confidentiality, meaning that only the researcher will be able
to identify the subjects. The subjects will be assigned a code in the research results, e.g.
'Respondent A.' Your responses will be used exclusively for educational purposes.*

Please fill in the following information:

Name of concerned private organisation	
Name of concerned public organisation	
Contact name	

1.What have been the objectives of the data collaborative? Check multiple boxes if applicable.
□ Increasing the public sector's access to valuable privately-owned data
□ Increasing the public sector's access to data expertise
□ Increasing the public sector's access to technical or monetary resources
□ Other. Please specify in the box below:

A. Data Sharing

Please answer this part if the private organisation has shared private-owned data with the
public organisation. *If not, please continue to part B.*

2. What kinds of data has the private organisation shared? *Check the applicable boxes and
elaborate.*

Kinds of Data (UNDP & UN Global Pulse 2016)	Check box and comment if applicable:
1. What is reported *Data produced from explicit attempts to gather information from people*	
Large surveys (household surveys)	□

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[5] non-state bodies, i.e. corporations, non-governmental organisations, and academia (Robin, Klein, and Jütting 2016)

[6] (inter)governmental bodies and agencies, and public enterprises where the government is the major shareholder (Dube and Danescu 2011)

Programme data	☐
Mobile surveys	☐
Crowd sourced data	☐
Other	☐
2. What people say *Data produced when people explicitly share something with the world (usually big data)*	
Social Media	☐
Online News	☐
Blogs and forum posts	☐
Online archives	☐
Radio and TV	☐
Other	☐
3. What people do *Data produced passively when people make transactions through digital services (usually big data)*	
Online searches	☐
Mobile phone use	☐
App use	☐
Postal traffic	☐
Financial transaction records	☐
Digital shopping records	☐
Other	☐
4. What physical sensors measure *Data collected by physical sensors recording actions and physical changes (usually big data)*	
Weather sensors	☐
Traffic cameras	☐
Satellite and drone imagery	☐
GPS records	☐
Ambient sensors	☐
Other	☐

3. Did the private organisation provide access to raw/unprocessed data?
☐Yes
☐No (please specify in the box below what kind of processing had been done before sharing the data, e.g. anonymisation):

4. Who did the private organisation share the privately-owned data with? *Check multiple if applicable.*
☐ public organisation(s)
☐ private organisation(s)
☐ the public

5. How did the private organisation share this data? *Check more if applicable.*
☐ By making the privately-owned data public

□ 'Data Pools' (grouping together data with other private organisations and/or important dataholders, which the public organisation(s) could access)
□ Through a competition (access to private-owned data was the reward)
□ Through a research partnership
□ By providing access to the private organisation's Application Programming Interfaces (APIs)
□ Through a trusted partner who shared trends/findings of private-owned data with the public organisation
□ Other. Please specify in the box below:

B. Data Expertise

Please answer this part of the survey if the concerned private organisation has supplied data expertise to the public sector. *If not, please continue to part C.*

6. In what area did the private organisation provide data expertise? Check multiple if applicable.
□ Collection of data
□ Processing/analysis of data
□ Data-informed decisionmaking
□ Other. Please specify in the box below:

C. Resource Support

Please answer this part of the survey if the concerned private organisation has supplied technical/operational or financial resources to the public sector. *If not, please continue to part D.*

7. What kind of resource support did the private organisation provide? *Check the applicable boxes and elaborate.*

Type of resource	Check box and comment if applicable:
1. Technical/Operational Resources	
Recruitment and placement of specialist personnel	□
IT (e.g. provision of software)	□
Logistics	□
Procurement	□
Operational security	□
Other	□
2. Financial Resources	
Donation of funds	□
Other	□

8. Did the private organisation provide another type of technical or financial resource? If so, please specify in the box below:

D. Incentives

9. What were potential positive results of the data collaborative that encouraged the private organisation to enter the data collaborative? *Check the applicable boxes and elaborate*.

Type of incentive	Check box and elaborate if applicable
Reciprocity	
Gaining access to other data sets	☐
Giving back data gathered from individuals or society	☐
Gaining access to other data expertise	☐
Gaining/improving technical resources (e.g. software skills)	☐
Improved Reputation	
Strengthening or embracing one's corporate reputation (e.g. by increasing (free) media attention and visibility)	☐
Improving one's reputation towards employees (e.g. by boosting employee morale and motivation)	☐
Revenue	
Generating profit (e.g. new or continued sale/business opportunities with public organisations or affected community)	☐
Limiting one's own further financial losses	☐
Regulation	
Encouraging one's private organisation to meet regulatory requirements (e.g. by publishing employment data on race/ethnicity, gender and job category)	☐
Corporate Social Responsibility	
Fulfilling one's corporate social responsibility (i.e. supporting the eco-system in which the private organisation operates)	☐
Encouraging others to fulfil their (corporate) responsibility by fulfilling one's own corporate social responsibility	☐
Partnerships	
Creating partnerships with other private/public organisations	☐
Strenghtening existing partnership with other private/public organisations	☐
Protecting human life	
Protecting and/or saving human life	☐

10. For your specific data collaborative, do you think there were other motivations for the private organisation to help improve humanitarian relief efforts? If so, please specify in the box below:

E. Risks

11. What were the potential negative outcomes of the data collaborative the private organisation considered before participating or faced during the data collaborative? *Check the applicable boxes and elaborate.*

Type of risk	Check box and elaborate if applicable
Data Quality/Expertise Risks	
Poor quality data (i.e. inaccurate, outdated, biased, incomplete or unrepresentative data)	☐
Unclear categorisation of data	☐
Data stored in a format that is incompatible with other (organisation's) software system	☐
Lack of anonymisation techniques	☐
Aggregation of incompatible datasets	☐
Poorly defined problem or research design	☐
Flawed data modelling	☐
Employment of biased algorithm	☐
Misinterpretation of data	☐
Flawed decisions based on poor data	☐
Risks to Data Subjects' Privacy and Security	
Lack of authority when collecting data	☐
Lack of authority when accessing (shared) data	☐
Insufficient, differing, or confusing security provisions	☐
Lack of responsibility of either party to ensure data protection	☐
Re-identification of individuals	☐
Data exploitation (e.g. data used to discriminate a protected group, or to manipulate/undermine humanitarian assistance)	☐
Financial Costs	
Increase of operational costs (e.g. investments of time and money, inability to insure employees or resources for conflict humanitarian emergencies)	☐
Regulatory fines as a result of failing to comply with legal jurisdictions	☐
Loss of competitive advantage	☐
Donating funds to public organisation to enable data-driven solutions to societal problems	☐
Reputational Damage	
Negative public response to increasing public (organisation's) access to private data	☐
Negative public response to failure to ensure adequate data quality or individuals' privacy/security	☐

12. Do you think the crisis response data collaborative presented other risks for the private sector? If so, please elaborate in box below:

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13. What did the private organisation do to mitigate those risks?

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14. Please share any additional insights or experiences on the motivations for private organisations to enter data collaboratives with the public sector to improve humanitarian relief.

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15. Are you willing to be interviewed to discuss the answers given in this survey with the researcher?
Yes □ No □

16. If you would like to receive a copy of this research's results, please leave your contact e-mail below:

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-   END OF SURVEY -
Please save/scan the filled-in survey and send it to j.l.holton@umail.leidenuniv.nl.
Thank you very much for participating in the survey!

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