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Characterizing the importance of clarity of roles and responsibilities in government inter-organizational collaboration and information sharing initiatives☆

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ABSTRACT

Previous research has shown that clarity of roles and responsibilities (CRR) influences the performance of individual organizations as well as inter-organizational efforts. In the context of cross-boundary information sharing (CBIS), CRR has been found to enable other important determinants of success, such as building trust among members, increasing their willingness to participate, and mitigating some of their concerns about security, among others. However, few studies have attempted to understand the determinants of CRR in government CBIS initiatives. Sayogo, Gil-Garcia, and Cronemberger's (2016) analysis of results of a national survey identified three significant determinants of CRR in CBIS, (1) the extent participants use boundary objects, (2) participant skills in terms of collaboration, coordination, and communication, and (3) the diversity of the participating organizations and their goals. Seeking to expand on their findings in terms of new understanding about the influence of significant determinants of CRR in CBIS, this study draws on findings from eight U.S. state and local government public health and criminal justice CBIS cases. This study contributes to existing knowledge about CBIS in the public sector by characterizing the determinants and providing new understanding of the nature of the influence of the determinants of CRR on CBIS. In particular, it shows how the extent of boundary object use, collaboration, and the diversity of participants affect CBIS initiatives in different contexts. In practical terms, creating new understanding of the determinants of CRR has value for public managers and their leadership as they must increasingly collaborate and share information across the boundaries of organizations in the process solving increasingly complex public problems.

1. Introduction

Interagency information sharing has been discussed in the literature as critical to helping solve complex problems that are beyond the capacities and capabilities of a single organization (Dawes & Pardo, 2002; Gil-Garcia, Chengalur-Smith, & Duchessi, 2007; Gil-Garcia & Sayogo, 2016; Pardo, Cresswell, Thompson, & Zhang, 2006; Pardo & Tayi, 2007). While traditional hierarchical bureaucratic structures continue to have value for government, they do hinder efforts to respond to those policy problems and citizen demands that require multi-organizational and collaborative approaches (Agranoff & McGuire, 2004; Christensen & Lægreid, 2007; Dawes, Cresswell, & Pardo, 2009; Ikenberry & Slaughter, 2006; Morse, 2011; Pardo & Burke, 2008; Purdy, 2012; UNDP, 2019). For example, day-to-day operations of government, as well as response preparation for crises and emerging threats, need to be carried out across the boundaries of organizations. Further, it has been argued that interagency information sharing generates technical, organizational, and political benefits for policy makers, public organizations, and citizens (Dawes, 1996). However, the division of labor and compartmentalization of expertise in these structures often inhibits easy knowledge sharing (Brown & Duguid, 1998; Law, 2014).

Government managers and researchers alike are now recognizing the value and opportunities offered by cross-boundary information sharing (CBIS). Advances in information and communications technology (ICT) make CBIS possible, but technology alone is not the solution. The complexity of creating CBIS lies in the interaction among

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policy, management, and technology factors (Pardo, Gil-Garcia, & Burke, 2008). Professional identities and organizational cultures may be barriers to trust and risk taking in forming new relationships. These structures separate and often isolate practice domains, knowledge resources, and routines (Pardo & Burke, 2008). The lines of authority, formal reporting relationships, and policy frameworks usually do not encourage and may even prohibit many forms of information and knowledge sharing, including cross-boundary collaboration (Dawes et al., 2009).

However, governments are increasingly developing and employing collaborative, cross-boundary strategies to meet their responsibilities to citizens (Fountain, 2001; Goldsmith & Eggers, 2004; Pardo, Gil-Garcia, & Luna-Reyes, 2008). Many of these cross-boundary strategies have at their core the use of information and communication technologies. Current research has identified some of the important factors that affect government efforts to improve information sharing through their investment in various CBIS initiatives (Gil-Garcia & Sayogo, 2016). One of these factors is the clarity of roles and responsibilities (CRR) of key organizations participating in such initiatives (Pardo, Burke, Gil-Garcia, & Guler, 2009).

Research has shown that CRR influences the effectiveness and performance of both organizational and inter-organizational efforts. Role clarity has been found to increases job satisfaction, commitment, and involvement and reduces tension and anxiety among organizational members, which has positive benefits including a reduction of staff turnover rates (Backhaus, 2012; Hassan, 2013; Jackson & Schuler, 1985; Kauppila, 2013). At the inter-organizational level, Pardo, Gil-Garcia, and Burke (2006) have shown that CRR enables other important determinants of success in government CBIS, such as building trust among members. While research has demonstrated the importance of CRR, few studies have attempted to systematically uncover the determinants of CRR among participating organizations in government CBIS initiatives. Sayogo, Gil-Garcia, and Cronemberger's (2016) analysis of results of a national survey identified three significant determinants of CRR in CBIS, (1) the extent participants use boundary objects, (2) participant skills in terms of collaboration, coordination, and communication, and (3) the diversity of the participating organizations and their goals. Seeking to expand on their findings in terms of new understanding about the influence of significant determinants of CRR in CBIS, this study draws on findings from eight U.S. state and local government public health and criminal justice CBIS cases. The results of their analysis indicate that three determinants, the use of boundary objects, diversity of participating organizations, and communication skills, have a significant and positive influence on the CRR in inter-agency information sharing collaborations. This study contributes to existing knowledge about CBIS in the public sector by characterizing those determinants and providing new understanding in terms of the nature of their influence on CBIS in specific contexts.

The paper is organized in five sections including the foregoing introduction. Section two highlights the importance of CRR for CBIS in the public sector. Section three describes the research design and methods used for this study. Section four presents the results for each determinant and includes direct quotations to support the characterization of each of the determinants and their relationship with CRR. Finally, section five provides some concluding remarks, discusses policy implications, and suggests areas for future research about this topic.

2. Clarity of roles and responsibilities in cross-boundary collaboration and information sharing

CBIS initiatives are increasingly important for governments around the world. However, they are also affected by a myriad of internal and external factors. CRR has been identified as a factor that has an important influence on the results of CBIS initiatives (Pardo, Gil-Garcia, & Burke, 2006; Sayogo et al., 2016). Based on previous research, this section highlights the importance of CRR for CBIS and other information intensive problems and projects.

Recent research has shown that CRR influences the effectiveness and performance of both organizational and inter-organizational group efforts (Aritzeta, Ayestaran, & Swailes, 2005; Beauchamp & Bray, 2001; Beauchamp, Bray, Eys, & Carron, 2005; Bray & Brawley, 2002; Hassan, 2013; Kim, Egan, & Moon, 2013; Sarkar, Aulakh, & Cavusgil, 1998; Sayogo et al., 2016; Sayogo & Gil-Garcia, 2015). CRR has been identified as an important factor in job satisfaction and performance (Backhaus, 2012; Bray & Brawley, 2002; Hassan, 2013; Jackson & Schuler, 1985; Kauppila, 2013; Verville & Halingten, 2003). When roles and responsibilities are clear for organizational members, they are more satisfied and more committed to their job (Hassan, 2013; Kauppila, 2013). However, if their roles are ambiguous, they have more tension and anxiety related to their task; hence, they have a higher tendency to be absent and even leave their job (Hassan, 2013; Jackson & Schuler, 1985; Jung, 2010; Kemp, Kopp, & Kemp, 2013). At the organizational level, the clarity of roles has positive effects, including increases in job satisfaction, commitment, and involvement (Backhaus, 2012; Hassan, 2013; Jackson & Schuler, 1985; Kauppila, 2013).

CRR has been found to provide participants in inter-organizational initiatives with a sense of their own and other participants' contributions. Having a clear sense of what should be done to achieve common goals in a collaborative effort gives participants confidence about what they need to do and what they can expect from other participants (Thomson & Perry, 2006). Thus, participants can form mutual expectations about their roles and other participants' roles in a collaborative initiative (Sarkar et al., 1998; Vangen & Huxham, 2003). Without CRR, a collaborative effort is challenged in meeting its expected goals and could create dissatisfaction and resistance to inter-organizational collaboration among participants (Fedorowicz, Gogan, & Culnan, 2010; Hassan, 2013). Inter-organizational collaborations aim to gain advantages by working together in order to reach collective goals (Huxham, 1996). Although collaborative initiatives provide an advantage because problems are tackled jointly rather than alone, collaboratives are difficult to establish and manage (Austin, 2010; Bonnell & Koontz, 2007; Huxham, Vangen, Huxham, & Eden, 2000; Huxham & Vangen, 2000; Pardo, Cresswell, et al., 2006; Pardo & Tayi, 2007).

Role complexity and role ambiguity have been found to prevent collaborative efforts from reaching their expectations and goals (Huxham & Vangen, 2000, 2005). According to Huxham and Vangen (2000), while ambiguity comes from members' perceptions about membership and status in a collaborative initiative, complexity arises because of multiple hierarchies and structures and multiple participants. Moreover, shifts in membership, alterations to the purpose of a collaborative initiative and the pace of change can contribute to increased ambiguity and complexity. Due to the ambiguous, complex, and dynamic nature of inter-organizational collaboration, organizations participating in collaborative initiatives sometimes do not realize collaborative advantages, but are instead, exposed to collaborative inertia (Huxham & Vangen, 2000, 2005).

Clear roles and responsibilities decrease ambiguity and complexity in collaborative efforts (Hassan, 2013; Huxham & Vangen, 2000; Sarkar et al., 1998; Vangen & Huxham, 2003). To create CRR, at the outset of such efforts, members from participating organizations work to understand their roles and the expectations of other organizations (Davies & White, 2012; Kegerise, 1999; Wakerman & Mitchell, 2005; Werr & Runsten, 2013). In governmental contexts, CRR among participating organizations has been found to help achieve collaborative goals by reducing uncertainty and facilitating trust building among the members of CBIS initiatives (Pardo, Cresswell, et al., 2006). CRR has also been found to reduce stress and to positively affect relational bonding among participants, thus increasing work effectiveness (Lynch, O'Toole, & Biemans, 2014; Sarkar et al., 1998). A study by Sayogo et al. (2016) identified determinants of CRR using the results of a national survey in the U.S. According to their results, diversity of participating

organizations, the use of boundary objects, and communication are significant factors influencing CRR in CBIS. Cronemberger, Sayogo, and Gil-Garcia (2017a), using the same data to analyze the mediating role of boundary objects in inter-organizational information exchanges, found that boundary objects have greater impact on trust and CRR than communication. A second study by Cronemberger, Sayogo, and Gil-Garcia (2017b), found that while executive involvement and information needs significantly affect the success of information integration and sharing efforts through influencing governance, governance also plays a mediating role.

While current research seems to support the claim that CRR among organizations participating in a collaborative effort, such as government CBIS initiatives, is an important factor affecting those initiatives, much less research has been devoted to the analysis and characterization of the determinants of CRR in this context. This study aims to fill this gap in the literature by focusing on the set of determinants of CRR previously identified as significant in CBIS by Sayogo et al. (2016). Utilizing data collected from interviews with criminal justice and public health professionals, this study aims to illustrate and characterize the influence of boundary object use, collaborative skills of participants, and the diversity of the participating organizations as determinants of CRR in CBIS initiatives. The next section provides an overview of the research design used in this study.

3. Research design

This study is part of a broader research project focused on developing and testing models of the social and technical interactions in inter-organizational information sharing across the boundaries of government agencies and across levels of government. The project involved eight separate case studies of CBIS in the criminal justice and public health policy domains.[1] The case studies were conducted in two consecutive phases. First, there was one intensive in-depth case study in New York State to explore how effective information integration and sharing occurs within and across organizational boundaries. Then, in phase two, seven additional case studies, mostly from other states in the U.S., were included in the study to enrich the findings with experiences in very different contexts (see Table 1). Cases were selected based on several criteria including diversity of institutional context and experience in sharing information across multiple agencies regarding either criminal justice or public health.

In the public health arena, the research focused on the creation of information sharing capabilities as part of state and local government responses to West Nile Virus (WNV) outbreaks in four states: Colorado, Oregon, Connecticut, and New York. In the criminal justice arena, research focused on initiatives in the states of New York, North Carolina, and Colorado, as well as in New York City, to share criminal justice related information. As a result, nearly 70 group and individual semi-structured interviews were conducted with public health and criminal justice professionals to understand the issues related to CBIS among government agencies and different levels of government.

The study employed a multi-method research approach, which is a powerful way to examine complex social phenomenon, especially those which are not yet well understood (Creswell, 2013; Mingers, 2001, 2003). Specifically, qualitative data was collected through a set of interviews followed by a national survey and quantitative analysis of the survey data. The qualitative data was used to characterize the findings from the quantitative analysis and provide more details about the influence of the determinants of CRR on the establishment of CRR in CBIS. The case studies presented in this paper were developed using only the qualitative data collected, which was analyzed through qualitative analysis processes using grounded theory techniques (Glaser, 1992; Glaser & Strauss, 2009; Strauss & Corbin, 1998). Atlas-ti, a qualitative analysis tool, was used to code and analyze the interview data. Through this process, the research team identified critical factors and processes involved in sharing information across government levels and agencies and across organizations from different sectors.

Through the grounded theory analysis, one of the factors that emerged as critical to CBIS was the degree of CRR. We used this finding as a guide to review the literature to identify what was known about determinants of CRR. After careful analysis of existing literature, we focused on the findings of Sayogo et al. (2016) which identified (1) the use of boundary objects; (2) collaboration, coordination, and communication skills; and (3) the diversity of participating organizations as significant factors of CRR in interagency information sharing. Our study characterizes those relationships and elaborates on their findings in the context of criminal justice and public health CBIS initiatives.

4. Analysis and results

The determinants identified in the extant literature of (1) the extent of boundary object use, (2) collaboration, coordination, and communication skills, and (3) diversity of participating organizations and their goals are introduced next and excerpts from the case interviews are provided to illustrate and contextualize the more abstract explanations of those determinants.

4.1. Extent of boundary object use

As a concept, boundary objects were originally developed to understand and explain collaboration within scientific communities (Fox, 2011). In their effort to understand scientific collaboration among different actors, Star and Griesemer (1989, p. 393) defined boundary objects as "*objects which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites*". Boundary objects are flexible enough to adapt to different social settings while they are robust enough to preserve their identity (Fox, 2011; Star & Griesemer, 1989). This feature of boundary objects provides advantages for social actors by offering weakly structured concepts for common use in collaborative efforts.

Boundary objects in the form of regular meetings, implementation plans, and formal agreements influence the CRR of organizations participating in collaborative efforts (Cronemberger et al., 2017a; Kegerise, 1999; Sayogo et al., 2016). Formalization of rules and procedures for interaction is a crucial factor in the success of CBIS because it helps to clarify the roles and responsibilities of each entity (Nidumolu, 1995). Early reference to boundary objects decreases the duration of conflict identification, while repeated reference reduces the duration for resolving conflict in culturally-diverse, distributed networks (Iorio & Taylor, 2014). Similarly, Wakerman and Mitchell (2005) argue that the roles of participating stakeholders should be clearly defined at the initiation of a collaborative effort in order to prevent power conflicts among participants. Ancona (1989) accepts the view that specifying roles by routines, procedures, and prescribed behaviors does create CRR among group members, but also notes that formalization could also limit the flexibility and capacity of a group to respond to changes in the environment. In contrast, Thomson, Perry, and Miller (2009) argue that routinized communication channels rather than relational ones are important to achieving CRR in collaborative efforts.

According to our results, boundary objects play a significant role in influencing the CRR of organizations participating in a CBIS initiative. Across the cases we studied, the use of written plans and other documentation that formalized and visually depicted roles and responsibilities proved useful in bringing about role clarity and acceptance among the organizations involved. This section describes how two types of boundary objects, statewide response plans and information flow maps, were used to clarify the roles each participating organization

[1] For more information about the cases refers to Pardo, Gil-Garcia, Burke, and Guler (2009).

Table 1
Some characteristics of the cases.

Case	Leading agency	Policy domain	Project focus[a]	CBIS level[b]
Colorado	State	Public Health	Problem-Solving	Intergovernmental
Oregon	State	Public Health	Problem-Solving	Intergovernmental
Connecticut	State	Public Health	Problem-Solving	Intergovernmental
New York State	State	Public Health	Problem-Solving	Intergovernmental
North Carolina	State	Criminal Justice	Systemic Capacity Building	Interagency
Colorado	State	Criminal Justice	Systemic Capacity Building	Interagency
New York State	State	Criminal Justice	Systemic Capacity Building	Interagency
New York City	Local	Criminal Justice	Systemic Capacity Building	Interagency

[a] Project focus refers to the main goal of the CBIS initiative, either problem solving (mostly solving a specific problem) or systemic capacity building (creating information sharing capacity for the present and the future).
[b] CBIS level refers to whether the initiative was intra-agency (across different units within the same agency), interagency (across multiple agencies from the same level of government), or intergovernmental (across different levels of government).

would play in collecting, sharing, and analyzing information among networks of organizations spanning multiple levels of government and different program areas.

The natural cycle of the WNV, including dormancy in the winter, provided an opportunity for governments to come together during the "off-season" to prepare response efforts for the next season. In most of the U.S., WNV responses included both state and local government agencies with responsibilities for dealing with disease outbreaks involving humans and non-humans (i.e., birds, animals, and mosquitoes). While these local and state agencies had worked together for several years on a wide range of issues, the WNV outbreaks required a level of information sharing and coordination more complex and involving more agencies than in the past. For example, in some states the information exchanges had never been between the human health and the animal health agencies, but between the human health agencies and between the animal health agencies. While the initial outbreak of the virus occurred in late 1999, much planning went into developing response capabilities for the annual reemergence of the virus. The data highlights how planning efforts were typically led by the states but involved significant collaboration with research institutions and local health departments, all of which played key roles and had specific responsibilities for information sharing as part of the response. A number of these roles and responsibilities fell outside of the organizations' typical day-to-day duties. Essentially, what was needed was a new data collection and information sharing network among a set of state and local government and research organizations.

In one case, the development and implementation of the state's WNV surveillance plan became the tool through which state and local government agencies and other institutions involved were able to create CRR for CBIS. According to one local government health director, "This [plan] described who was doing what and what the local health departments would be responsible for…There are many, many state programs that sort of get dumped on the locals, mandated or, you know, whatever, strongly encourage that, nowhere near as well thought out. And I think this one was well laid out and thought out because of the people behind it [the WNV program leads in the state department of health and environmental conservation agencies]."

The cases also provided new understanding of the influence of boundary objects in establishing CRR in CBIS. In one northeastern state, a group of state-level criminal justice agencies came together to develop a statewide criminal justice information sharing network. Initially conceived as a technology project, the agency participants soon realized that before they invested in any new IT, they needed to come to an understanding about their relative roles and responsibilities in the development and implementation of such a network. Boundary objects in the form of process diagrams and the joint process of producing them helped with this clarifying process. The chief information officer (CIO) from one of the state agencies involved in the initiative described this development:

> "I think one of the parts of the exercise that helped was the process diagrams that looked at these things to map out the processes that [crossed] organization boundaries. I think that was valuable because if there was anyone sitting in that room who felt that he or she just got the blinders on and should focus exclusively on their individual agency... I think that helped just resolve all that and demonstrate that they really need to work together because these processes, these business processes transcend organizational boundaries. We all have a piece of these special processes."

The data provides additional insight into the characterization of boundary objects such as documents, which explicitly create visual representations of actions, pending items, and different roles, create CRR in CBIS initiatives. Plans, formal meetings, diagrams, maps, information systems, and other boundary objects were used to build understanding of the current situation in each case, thereby creating CRR. In addition, the use of boundary objects made it easy to communicate the initial roles and responsibilities and negotiate formal arrangements.

4.2. Collaboration, coordination, and communication skills

Previous research has emphasized the impact of collaboration, coordination, and communication on CRR (Buono, 1997; Casey, 2008; Luna-Reyes, Black, Cresswell, & Pardo, 2008; Sayogo et al., 2016). Hardy, Lawrence, and Grant (2005) approach collaboration from a discursive perspective and propose that members of a collaborative initiative define their roles and responsibilities through intensive conversation among participants. In addition, in a study exploring factors that affect role ambiguity and role conflict of top-level public administrators, Rogers and Molnar (1976) found that if public administrators have more interactions in the inter-organizational arena, they feel less role ambiguity and role conflict.

Collaboration, coordination, and communication skills are important in any group dynamic where organizations and individuals representing organizations are being asked to work together in new and, many times, more demanding ways (Buono, 1997; Casey, 2008; Hardy et al., 2005; Luna-Reyes et al., 2008; Suter et al., 2009). Explicitly investing time and resources into building a cross-boundary group that better collaborates, coordinates, and communicates among its members was evident across our cases; the more these members communicated, coordinated, and collaborated with each other, the better defined were their roles and responsibilities (Suter et al., 2009).

In one of our criminal justice cases, the emphasis on communication, coordination, and collaboration skills strongly influenced CRR for the participating members. This focus on collaboration and communication in this case from a southeastern U.S. state, took the form of a morning meeting that involved everyone with a role and responsibility in the ongoing CBIS initiative. According to one project manager, "The morning meeting [included] everybody that touches the project so that

includes management that includes testers, everybody that touches the project. And that's to keep everybody focused and to share information on a daily basis." The sharing of information during these meetings resulted in CRR among the participants; they knew how the work they were doing was impacting the work of others. They also understood the impact of anyone not doing their work. This realization promoted additional communication and, as a result, more CRR among all team members.

Collaboration, coordination, and communication skills also played a very important role in generating CRR during a large CBIS initiative taking place in a county district attorney's (DA) office in a large northeastern state. In this case, a specific individual was tasked with project management responsibilities focused on meeting with future users of a new system to identify not only requirements, but also to map out information flows among the various divisions of the DA's office. According to the lead sponsor of this initiative, the process was very effective: "[This individual] spoke to all of us [division heads] about what our needs were, which now became more detailed, and started writing down requirements of our needs. And then he went down to the user level, [which] was the next step, and spoke to them. And ultimately pulled together an overview, a plan of what the office needed and how the office should integrate all of our computer needs." The various meetings used to discuss system requirements and the constant communication among all team members helped to clarify the goals of the project and the roles and responsibilities of individual members. The IT manager involved in this project explained it as follows:

> "The process [this individual] went through, in my mind, became more educational. It was the way to introduce the issues and get people to see them. Very hard for the technical staff to articulate those challenges when building [a system]. But introducing it from their perspective [the users] and talking about business and business processes, introduced to them [using] their vocabulary and [at] their level. So when we were able to roll out systems, they knew what we were talking about, they knew what the issues were, [and] they knew why we did it this way."

One of the criminal justice cases included a number of participants with numerous prior experiences with CBIS initiatives; these participants understood that they must work to understand one another's missions and needs. According to one county-level public health manager from a Pacific Northwest state, achieving this level of clarity required specific collaboration and communication skills. The group, according to the public health manager, needed to go through "several critical stages of collaboration." The first stage is shaking hands: meet and get to know the people from the agencies that you will be working with. The second stage is to "get involved in coordinated planning and training" with agencies through exercises and routine responses. Only after going through these first two stages can "your agency and the other agencies involved be able to move into the final stage of true information integration." Citing one specific example, this public health manager discussed how the collaboration process involving his county-level health department and representatives of a federal criminal justice agency, which evolved over time, resulted in a clarification of roles and responsibilities for CBIS in different ways and according to diverse situations, particularly considering the types of information and the context in which different types would be used.

> "For example, we know they have restrictions on sharing criminal information and they know we have restrictions on sharing personal, patient-identifying information. However, if there's a bio-terrorism event, we could set up a hospital-based surveillance system in a day, collect data, and make sharable information available to each other and other organizations."

The cases provide new understanding of the influence of collaboration, coordination, and communication skills in helping to better clarify roles and responsibilities by communicating the tasks at hand, dividing a job in meaningful ways, and creating the capabilities to jointly decide the roles and responsibilities of each organization and individual involved in a CBIS initiative. In contrast, the lack of collaboration, coordination, and communication could lead to poorly defined roles and responsibilities. In addition, even if the roles and responsibilities are defined, they are not necessarily clear without being communicated to the whole team working on the CBIS initiative.

4.3. Diversity of participating organizations and their goals

In recent literature, diversity of the key participating organizations and their goals have been found to be an important determinant of CRR within the CBIS initiatives (Sayogo et al., 2016). In some cases, acknowledging and acting on those differences helped create CRR; in other cases, the opposite occurred. Throughout the interviews, initiative leaders discussed how being sensitive to the diversity of goals and interests among the participating organizations helped them successfully delineate roles and responsibilities that organizations were comfortable with and that supported the intended goals of the initiatives. Participants also commented on how if this diversity was not dealt with, it negatively impacted efforts to achieve the necessary clarity. In one state, the diversity between front-line agencies, like the state police and corrections, and other less "front-line" criminal justice agencies had a significant influence on willingness to work together to achieve CRR for CBIS. One senior IT manager from a state police organization described this organizational mismatch and how it could lead to a lack of CRR among participating organizations, and subsequently to a perception of risk and lack of willingness to participate in the information sharing initiative:

> "Here at the State Police, the culture is very focused on quick action. We're operational; it's a very tactical organization. At any given moment our workers, our troopers, our investigators are out there in harm's way putting themselves at risk. ...And then all of a sudden we're now looking at this idea that we're going to start coming together with other organizations that are culturally different from us. The concern I hear the most from people that work in these organizations is, how is that going to work? ...And when the folks and agencies are operational in nature, they think that there's a possibility that … [a] non-operational agency [could] rise to the top and take over stuff and they get really nervous."

In the WNV-related case studies, the diversity among state-level animal and human health agencies and research institutions involved in the CBIS initiatives was also found to influence CRR. Research-oriented organizations, in the form of universities and other institutions, played very important roles in the response efforts. However, one state-level public health epidemiologist charged with developing a new state-wide disease surveillance capability for WNV commented that:

> "These organizations were initially very cautious about sharing their research data with public health officials due to the simple fact that these organizations must be able to publish and take credit for their discoveries. Data, once in the hands of a public entity, generally becomes public information."

He explained the impact this requirement had on achieving CRR. Certain organizations have goals that require different arrangements in terms of roles and responsibilities. Therefore, the diversity of organizations and their goals affect the way an initiative is organized and how participating organizations can define their roles and responsibilities.

> "For instance, we need to recognize that [a state university and another research institution], unlike the state laboratory, are research organizations. And if we ask them to do work for us, we have to recognize their need to maintain a certain control over some of the data, for instance. So there's negotiation over the detail of data to be shared and how it will be disseminated. So, all of those are also

important issues that sometimes go unrecognized."

In these instances, the diversity of participating organizations was found to be an important determinant of the CRR in the CBIS initiatives. First, was the difference between organizations where the safety of a police or corrections officer is closely linked to timely and accurate information sharing versus other organizations where the link between information and agency action is less critical in terms of safety, and more associated with standard business processes, even when the agency is in the same domain, as in these cases. Second, the diversity of goals required a negotiation among participating organizations (which were dominated by different groups) and a clarification of roles and responsibilities that addressed not only the goals of each of these organizations (and their members), but the goal of the CBIS initiative as a whole.

5. Concluding remarks

Previous research on CRR has shown it to be a critical factor in the success of government CBIS initiatives. This study contributes to this body of research, with particular attention to the determinants of CRR and the understanding of CRR as a critical factor in the success of CBIS initiatives in government settings, in particular, extending what is known about the influence and character of the determinants of CRR in CBIS by examining boundary object use; collaboration, coordination, and communication skills; and diversity of participating organizations in eight cases of CBIS initiatives. This study provides evidence of how these determinants affect CBIS initiatives and how the effect of these determinants could be different in various government contexts. For instance, the diversity of participating organizations has been identified as important in previous research, but in this study we are able to specify that such diversity is related and should be addressed at least in terms of two different aspects. First, information needs in terms of completeness and timeliness could be very different across collaborating agencies and this difference needs to be considered in the negotiation of roles and responsibilities. Similarly, the diversity of goals of the agencies involved could become the catalyst of additional enablers or barriers for the CBIS initiative and, therefore, it is important to address these differences not only at the organizational level, but frequently, also at the individual level.

In terms of policy implications, our findings suggest that the use of boundary objects such as plans, formal meetings, diagrams, maps, and information systems play a critical role in achieving CRR for the organizations participating in a CBIS initiative. Further, our findings suggest that such use of boundary objects makes it easier to communicate roles and responsibilities and negotiate formal arrangements. This finding emphasizes the importance of the use of boundary objects and provides guidance to government organizations and practitioners about ways to enhance CRR in CBIS initiatives. Moreover, our findings provide a better understanding of the role of collaboration, coordination, and communication skills in a CBIS initiative. The application of these skills in a CBIS initiative provides a working environment wherein participants can effectively discuss their roles and responsibilities collectively. This finding also indicates that public managers should consider the importance of collaboration, coordination, and communication skills in achieving a successful CBIS initiative. The diversity of participating organizations is also an important determinant of CRR in CBIS initiatives. If public managers want to be successful in CBIS, our findings show, they have to be sensitive to the diversity of participating organizations and their goals while delineating roles and responsibilities.

As with any study, this study has some limitations which can be addressed in future research. First, only three factors were identified in the literature as significant to CRR. Further studies are necessary to identify and test additional determinants of CRR. Second, this study examines cases from two policy domains, criminal justice and public health, from several states in the U.S. Future studies could extend this effort by expanding to additional policy domains and beyond the U.S. to different organizational and cultural contexts.

Understanding the larger set of determinants of CRR in government cross-boundary information sharing is theoretically and practically relevant. Theoretically, there are very few studies that attempt to systematically identify the determinants of CRR and how they influence government information sharing initiatives, which could be also considered collaborative digital government. This study begins to fill this knowledge gap in an important manner by providing rich data about the determinants of CRR in government CBIS initiatives and characterizing their influence in achieving CRR in CBIS in important policy domains such as criminal justice and public health. In practical terms, creating new understanding of the determinants of CRR has value for public managers and their leadership as they must increasingly collaborate and share information across the boundaries of organizations in the process solving increasingly complex public problems.

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