Summer 2015

Exploring Conceptualization and Operationalization of Interorganizational Interactions: An Empirical Study

Andrew Paul Williams
Old Dominion University, awill123@odu.edu

EXPLORING CONCEPTUALIZATION AND OPERATIONALIZATION OF INTERORGANIZATIONAL INTERACTIONS: AN EMPIRICAL STUDY

by

Andrew Paul Williams
MPhys(Hons) 1998, University of Manchester, United Kingdom

A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirement for the Degree of

DOCTOR OF PHILOSOPHY

PUBLIC POLICY AND ADMINISTRATION

OLD DOMINION UNIVERSITY
August 2015

Approved by:

John C. Morris (Director)
Professor of Public Administration and Urban Studies

Katrina Miller-Stevens (Member)
Assistant Professor of Public Administration and Urban Studies

John R. Lombard (Member)
Associate Professor of Public Administration and Urban Studies

Tancy Vandecar-Burdin (Member)
Associate Director, Social Science Research Center

ABSTRACT

EXPLORING CONCEPTUALIZATION AND OPERATIONALIZATION OF INTERORGANIZATIONAL INTERACTIONS: AN EMPIRICAL STUDY

Andrew Paul Williams
Old Dominion University, 2015
Director: Dr. John C. Morris

Collaboration and other forms of interaction between complex arrangements of private, nonprofit, and public organizations to address challenging policy problems now occurs routinely. In many cases collaboration is mandated by law, and often disbursement of grants to nonprofits is contingent upon demonstrating collaboration with other organizations. To understand this contemporary landscape of public administration and develop cumulative knowledge, theory requires reliable and valid constructs of collaboration and other forms of interorganizational interaction. Theoretical rigor then underpins practice, including the growing discipline of evaluating the level of interaction between organizations or an organization's "collaborative capacity," and to understand more broadly how public administrators should best lead, manage and interact in complex multiorganizational situations.

This dissertation reviews the approaches to conceptualization and operationalization of interorganizational interaction in the public administration literature. While many frameworks, typologies and arrays have been offered, few have been tested empirically. Furthermore, the literature incorporates a widely stated but untested notion that interactions between organizations can be placed on a "continuum" of intensity or integration.

Using insights from previously developed systems-based frameworks and arrays, this research creates a generalized interorganizational interaction array (GIIA) that conceptualizes and operationalizes three forms of interaction common in public administration literature: cooperation, coordination and collaboration. From a sample of over 200 interorganizational interactions between national and international defense organizations, the GIIA is tested using cluster analysis to determine: the extent to which collaboration, coordination and cooperation are observed; which variables are most important in differentiating interaction states, and to explore the concept of a continuum of interaction.

Results show the only interaction state clearly observed is collaboration in about half of sample cases; the remaining cases cannot be easily classified as either cooperation or coordination. Only variables relating to collective decision making structures and processes are essential for identifying collaboration, but are not useful in distinguishing between cooperation or coordination. Variables relating to the context or situation have little influence on differentiating interaction states, and variables describing properties of the organizations such as trust, autonomy and shared perspectives have more ability to distinguish outcomes rather than form. Finally, the concept of a continuum of interaction is not supported. The implications of this finding for future conceptualization and operationalization and development of theory is considered.

I dedicate this dissertation to Jenny and Éowyn, who have borne its burden more than anyone, but never let me fall.

"*...And he went on, and there was yellow light, and fire within; and the evening meal was ready, and he was expected...*

He drew a deep breath. 'Well, I'm back,' he said."

J.R.R. Tolkein, Lord of the Rings

ACKNOWLEDGEMENTS

There are many people to whom I am greatly indebted for their support, encouragement and guidance, in the eight years that have passed since I first started as a Ph.D. student. First, I thank my friend, mentor, and committee chair, Dr. John Morris. From first seeing me into the program to now signing me out, I appreciate deeply your guidance, flexibility and support, especially in helping me with extra-curricular publications. Thank you to my other committee members, Dr Katrina Miller-Stevens, Dr Tancy Vandecar-Burdin, and Dr John Lombard. I am grateful for your patience in putting up with my capricious and multiple changes of direction, but mostly for your counsel and suggestions concerning methods, surveys, and clarity. I am also tremendously grateful to Dr Berhanu Mengistu for making me think, and for supporting a very ambitious cognate subject. Last but not least from my Old Dominion family, I am much obliged to my fellow classmates over the years for their camaraderie, pilot-testing survey support, and for expanding my horizons and viewpoints in rich classroom discussion.

As a part-time student with a full-time job, this endeavor was never going to be easy, but I can thank my colleagues in the OAB for making it just that little bit easier and for allowing me to indulge fully my academic predilections in the office. Thank you especially, Han, for your generous flexibility, encouragement and survey support.

I am endlessly appreciative to my American in-laws and family for always being willing to take care of my family at a moment's notice, and for being understanding in allowing me to occasionally show up for Sunday dinner and drink their beer after a hard day's study. Thank you Richard and Christine, I could not have done it without you.

I thank my English family—my Mum, Dad and sister—for their love and belief in me, and for sowing the seeds of academia early on. Thank you, Mum, for your early lessons about doing jobs properly even if I did not like them, and showing me how to study, concentrate, and be organized. Thank you, Dad, for instilling early on my sense of curiosity and wonder in the world. I will never forget the stories about atoms, the skeleton in the box in the garage, and watching the shadows lengthen as the “sun went round the earth” before bedtime. And thank you “real” Dr Sarah, for always lightening things up.

Thank you, Jenny, for your remarkable support, love and encouragement. I am incredibly lucky that you put up with an absent husband for evenings, weekends, holidays, parties and many other events. Thank you for being super-mum and super-wife. And thank you Éowyn; I’m sorry your first question of the day is usually “Daddy, are you going to stay with me today?” Hopefully one day you will understand why I could not, and that you are what makes it all worth it.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1:

INTRODUCTION

The phenomenon of multiorganizational governance and implementation is of considerable importance to the disciplines of public administration and policy. A growing body of research and practice demonstrates that the landscape of public governance is characterized increasingly by interdependence, multiorganizational action, network governance and management, collaboration, and blurring public-private sector boundaries. While many government organizations execute their missions via hierarchically-structured bureaucracies, seldom is governance and implementation in any given policy area the sole domain of a single organization. Collective action with nonprofits, businesses, citizen groups and multiple levels of government to lead and administrate programs is now a necessity for public organizations, rather than a choice.

There are many drivers behind this phenomenon. In response to political forces to increase state legitimacy following the rapid expansion of centralized state power in the early twentieth century, many nations adopted political and administrative decentralization and regionalization policies (Joumard & Kongsrud, 2003; Kettl, 2002; Rodiguez-Pose & Gill, 2003; Sorens, 2009). As part of this broader devolution trend, fiscal conservatism in the 1980s and increasing calls for accountability in government led to the “new public management” movement, which saw governments enact a variety of strategies and policies based on results-orientated management principles and marketization ideas derived from the private sector and public choice concepts (Dunleavy & Hood, 1994; Hood, 1991). This “hollowing out the state” through privatization, contracting, and other forms of indirect government increased the extent to which government programs were implemented via complex and interconnected networks of public and private actors, rather than solely government bureaucracy (Kettl, 1993, 2000; Milward & Provan, 2000). These various trends are overlain against the basic fact that the growth in size and scope of government coupled with the complexity of contemporary "wicked" societal issues (Head & Alford, 2013; Rittel & Webber, 1973), makes defining boundaries of responsibility between government organizations challenging, and increases the need for multiorganizational policy formulation and implementation (Kettl, 2006; O'Toole, 1997).

There is growing recognition that in this era the "the task of public problem solving has become a *team* sport that has spilled well beyond the borders of government agencies and now engages a far more extensive network of social actors...whose participation must often be coaxed and coached, not commandeered and controlled" (Salamon, 2002, p. 601). In the light of this new reality, scholars and practitioners face fundamental questions (Agranoff & McGuire, 2001; Bevir, 2010; Haque, 2001): How to lead and manage effectively in this new landscape? How to ensure democratic legitimacy and accountability? And how to maintain the intrinsic "publicness" of public administration and the public sphere? In response to these challenges, academic literature has turned increasingly to topics such as policy networks, governance networks, multiorganizational policy implementation, interorganizational relationships, collective action, and collaboration.

The focus of this particular study is the manner in which the variety of contemporary multiorganizational arrangements are conceptualized. Given the increased focus on collective action in public administration, policy and management scholarship, a key research challenge lies in measurement of interorganizational interactions. Empirical research in multiorganizational settings is notoriously demanding: Defining appropriate units of analysis and the boundaries of research samples is often hard in network settings (Freeman, White, & Romney, 1992; Laumann, Marsden, & Prensky, 1992); the number of potentially important independent variables often outnumbers the possible analytical cases (Goggin, 1986); interorganizational structures and networks dynamically vary and are often strongly influenced by subjective perceptions (Huxham & Vangen, 2000); and while case study research is rich and varied, generalizability is low (O'Toole, 1997, 2000).

A particular problem—and the focus of this dissertation research—is a lack of conceptual and definitional coherence across the literature: multiple understandings, perspectives and definitions of interorganizational interactions exist, which prevents coherent cumulative research (Galaskiewicz, 1985; Thomson, Perry, & Miller, 2009; Wood & Gray, 1991). The past few decades have seen a variety of attempts to rectify this issue, and some stability in understanding has been achieved, with scholars developing definitions, constructs, typologies and scales of interorganizational interactions (Ansel & Gash, 2007; Bryson, Crosby, & Stone, 2006; Simo & Bies, 2007; Thomson, 2001; Thomson & Perry, 2006; Thomson et al., 2009; Varda, Shoup, & Miller, 2012). A consistent thread through the literature, for example, is the notion that interorganizational interaction exists on a *scale* or *continuum* from low intensity cooperation, to coordination, to high intensity collaboration (Keast, Brown, & Mandell, 2007; Mandell & Steelman, 2003; McNamara, 2012).

A small body of research develops operationalizations—in varying levels of detail—of these three distinct states, by describing what certain dimensions "look like" at each level of interaction. Dimensions can be related to the context in which the interaction takes place, the participating organizations, or the emerging interorganizational forms. While much of this literature has merit on its own terms, the majority of definitions are established conceptually, rather than taxonomically generated from empirical research (Bailey, 1994). A few case studies have developed and tested definitional schemes (Margerum, 2008; McNamara, 2008, 2012), but in general, subtly different interpretations of interorganizational forms persist.

An additional complexity to multiorganizational research is that often, context affects process and outcomes. In a now landmark review of "collaboration" research in the social sciences, Wood and Gray (1991) characterized the literature in terms of three main groupings: preconditions to collaboration, collaborative processes, and outcomes. They identified that while the preconditions had received much attention, the process aspect was poorly understood as a result of the complexity of collective action and the multiplicity of variables. In response to the challenge set by Wood and Gray, scholars have since developed various frameworks, which seek to describe the process of "collaboration" and its relationship with antecedent factors, context, and outcomes (Ansel & Gash, 2007; Bryson et al., 2006; Emerson, Nabatchi, & Balogh, 2012; Ring & Van de Ven, 1994; Simo, 2009). While the term "collaboration" is used, in reality much of the literature describes a spectrum of interorganizational interactions.

The framework literature, which generally takes a systems approach to the antecedent—process—outcome linkages in interorganizational interaction, emphasizes the dynamic iterative nature of collective action. This view is somewhat at odds with the more static interpretation offered by the continuum of interaction approach, which conceives of cooperation, coordination and collaboration as distinct points along a spectrum. These continuums do not consider process dynamics, but instead develop a “snapshot” of what interorganizational interactions look like as they increase in intensity or magnitude. This dissertation research refines the conceptualization and operationalization of the continuum of interorganizational interaction, and offers an survey-based test to determine if the particular states of “cooperation,” “coordination,” and “collaboration” can be distinguished empirically.

Problem Statement

While generally there is a large number of terms describing the myriad configurations of interorganizational interactions in the social sciences, within public administration—and to some extent organizational science—a stable set of terms has emerged in the past decade (Mattessich, Murray-Close, & Monsay, 2001). Many scholars work under the assumption that any particular form of interorganizational arrangement can be placed on a “continuum of interaction,” which is divided typically into three distinct states of cooperation, coordination and collaboration. While this concept is unproblematic for informal usage, there are several issues that inhibit more refined, empirical work on the subject of interorganizational interaction.

First, the literature employing a continuum approach assumes that collaboration, or other levels of interaction, are repeatable or “standard” forms of interaction. Yet the growing body of literature on the processes of interorganizational interaction demonstrates the complexity inherent in these processes (Bardach, 2001; Emerson et al., 2012; Huxham & Vangen, 2000). Interorganizational forms grow and ebb with time, membership, and contextual factors (Huxham & Vangen, 2005). Given this complexity, the notion that discrete “forms” of interaction exist on a linear scale is called into question. Likewise, the scale may better be interpreted as a typology, which defines all the possible combinations of dimensions. In a manner very similar to the debate surrounding the applicability of the stages model of policy process (deLeon, 1999), the continuum of interaction may be merely an abstraction, albeit a useful one, which masks a more complex reality.

Second, the literature is ambiguous on basic conceptual issues regarding constructs and operationalizations of states on the continuum. There is an unstated assumption that “cooperation,” for example, is defined by the occurrence of *all* the dimensional indicators at that level on the continuum. Yet it is unclear whether this state could still be considered as cooperation if one or two of the dimensions were not observed. Furthermore, the literature does not specify how to define simultaneous observations of dimensions *across* levels of interaction. There is lack of understanding about the basic conditions of necessity and sufficiency for dimensions and constructs underlying the continuum of interaction (Goertz, 2006), or whether the states are better distinguished based on less clear “familial resemblance” approaches (Wittgenstein, 1967).

Third, the literature to date poorly organizes and categorizes the dimensions underlying the continuum. Much of the broader literature on collaboration, for example, recognizes the importance of context, organization type, and history on how the interorganizational interaction plays out (Diaz-Kope & Miller-Stevens, 2015; Margerum, 2008; Morris, Gibson, Leavitt, & Jones, 2013). Yet the continuum of interaction research often uses potentially non-mutually exclusive dimensions such as context, type or historical factors, in the actual definition of levels of interaction. These dimensions could apply equally to any interaction state. The literature also fails to recognize that dimensions can be categorized by those relating to the participating organizations, and those relating to the *emergent* interorganizational form.

Finally, there is limited empirical confirmation of constructs of interorganizational interaction. One of the few notable examples is Thomson (2001), who tests the construct validity of a multidimensional construct of “collaboration.” Building on the work of Ring and Van de Ven (1994) and Wood and Gray (1991), Thomson identifies five unique dimensions of the process of collaboration: *governance*, *administration*, *organizational autonomy*, *mutuality*, and *norms of trust and reciprocity* (Thomson, 2001; Thomson & Perry, 2006; Thomson et al., 2009). This construct was tested via survey data from several hundred organizations, and was subsequently used in several other studies to test both the definitional aspects of collaboration and the process-outcome relationship (Chen, 2006, 2008, 2010; Graddy & Chen, 2009; Thomson, Perry, & Miller, 2008). The construct had mixed utility, however, in tests of the antecedent-process and process-outcome relationships, indicating that further refinement is needed.

In another notable example, McNamara (2008, 2012) develops a detailed operationalization of a three-level, cooperation—coordination—collaboration continuum of interaction as part of a single case study. While the operationalizations are the most detailed and comprehensive in the literature to date, the above problems are still present, and the sample was a single multiorganizational arrangement. McNamara’s work was based on previous studies from the education and public administration literature that employed similar approaches, but only on single case studies (Diehl, 2005; Edmondson, 2006; Thatcher, 2007).

Empirical studies of interorganizational arrangements can be found in other disciplines such as health sciences and management, education, infometrics, business and management. Several studies use multilevel confirmatory factor analysis in a manner similar to Thomson (2001), but with much less refined survey instruments (Barile, Darnell, Erickson, & Weaver, 2012; Brown, Hawkins, Arthur, Abbott, & Van Horn, 2008; Dedrick & Greenbaum, 2011). Others examine interaction at the individual or team level of analysis such as: Scientific research collaboration (Chompalov, Genuth, & Shrum, 2002; Cuijpers, Guenter, & Hussinger, 2011; Liao & Yen, 2012); health and emergency care worker interactions (Brock & Doucette, 2004; Dougherty & Larson, 2010; Haraoka, Ojima, Murata, & Hayasaka, 2012; Nair, Fitzpatrick, McNulty, Click, & Glembocki, 2012; Ushiro, 2009); or interprofessional interactions in teams (D'Amour, Goulet, Labadie, Martín-Rodriguez, & Pineault, 2008; Kenaszchuk, Reeves, Nicholas, & Zwarenstein, 2010; Orchard, King, Khalili, & Bezzina, 2012).

While much of this literature has merit and many of the survey scales have high validity (Dougherty & Larson, 2010; Kenaszchuk et al., 2010), they tend to be based on arbitrary definitions of collaboration or cooperation, are not grounded in the theoretical literature from organizational science and public administration, or emphasize partnerships or networks between private businesses (Parmigiani & Rivera-Santos, 2011). Furthermore, much of the focus is on individual—individual interactions in team settings, which although provides an interesting comparison to interorganizational and organizational level research, is ultimately not applicable to multiorganizational research in the public domain. In summary, there is a significant empirical gap in the literature concerning the measurement of interorganizational arrangements.

Research Objectives and Questions

Research Purpose

The overall purpose of this research is to investigate conceptualizations and operationalizations of common states of interorganizational interaction as described in the public administration literature. There are 2 specific objectives: 1) develop and improve the *interorganizational interaction array*[1] that conceptualizes and operationalizes states of multiorganizational interaction (such as cooperation, coordination and collaboration); and 2) test the interorganizational interaction array using a survey sample of multiorganizational interactions to determine if interaction states can be empirically observed and distinguished from one another.

Research Questions

There are four research questions addressed in this dissertation. 1) To what extent can the levels of interaction corresponding to the constructs of cooperation, coordination and collaboration be empirically observed? 2) Are other constructs observed? 3) Which dimensions of the interorganizational interaction array are most important for predicting an organization's level of interaction in a multiorganizational interaction? 4) To what extent can dimensions of the interorganizational interaction array be conceptualized as increasing along a continuum of interaction?

[1] *Interorganizational interaction array* is a general term to describe both typologies of interorganizational forms, and scales or continuums of interaction.

Statement of Research Importance

The idea that governance is now more important than government is commonplace in recent policy and administration literature, thus increasing the emphasis on studying how organizations work together rather than solely how individual organizations work (O'Leary & Bingham, 2009). Both practitioners and scholars of public administration need to ask important questions about performance, effectiveness, and outcomes in this new landscape. Interorganizational interaction is often a formal requirement for organizations, and a developing stream of research looks at how to evaluate joint efforts (Cross, Dickmann, Newman-Gonchar, & Fagan, 2009; Woodland & Hutton, 2012). It is imperative for future empirical research and evaluation that suitable tools exist to study the various forms of interorganizational interaction and its antecedents, processes, and outcomes.

This dissertation develops further a construct and operationalizations of interorganizational interaction at the interorganizational, organizational, and group levels of analysis in order to improve future empirical study. This is important for several reasons. First, with a few notable exceptions (McNamara, 2008; Thomson, 2001), there has been little attempt at rigorous conceptualization of interorganizational interaction for the purpose of empirical research. This has led to a multitude of conceptual frameworks, typologies, definitions and interchangeable terminology, many of which were developed in case studies. While many of these efforts have merit, cumulative empirical research has suffered in the absence of standardized conceptualization and operationalization.

Second, with the multitude of frameworks and definitions available, cross-case comparison is challenging. The development of a rigorous and valid construct, confirmed with data, facilitates better comparative research. Lastly, the intermingled usage of collaboration, cooperation and coordination is so widespread in general organizational life that these terms are practically interchangeable for most practitioners. This results in a loss of appreciation of the conceptual richness inherent in these constructs, and the potential for unknown and unintentional confusion, or intentional political distortion. A key role for academic research should be to establish a rigorous conceptual framework and accompanying terminologies, based on empirical data, which can prevent miscommunications or distortions in practice.

Theoretical Approach

This study can be considered as "descriptive" as it aims to create an empirical taxonomy of interaction terms and confirm existing theory from the literature (Bailey, 1994; Neuman, 2003). This research operates in line with the assumptions of organizational functionalism, which asserts that there is an objective reality "out there" that can be studied independently (Burrell & Morgan, 1979). This is key to the development of an interorganizational array, which affirms that interorganizational interactions can be objectively described by observable indicators. The level of analysis at which inferences at the construct level are made is the *interorganizational field* (Benson, 1975; Hjern & Porter, 1981; Warren, 1967), which emphasizes relationships between organizations, rather than organizational or individual attributes.

Overview of Methodology

This primarily quantitative research is conducted utilizing a web-based survey of individuals, representing their organizations, involved in multiorganizational projects convened by the North Atlantic Treaty Organization (NATO). The unit of analysis for the research is the *interorganizational interaction—organization dyad,* which is defined as the organization and the part of the organization that interacts or overlaps with the collective group of organizations interacting as part of a single project. The interorganizational interaction array dimensions are specified primarily by organizational and interorganizational attributes, rather than individual attributes. The research involves development and testing of an interorganizational interaction array, which defines constructs of three common interaction terms and operationalizes them with observable indicators across a set of common dimensions. There are several distinct stages of the research.

The first stage conducts a detailed review of the literature on interorganizational interaction arrays and systems frameworks to determine conceptualizations and operationalizations of various interaction states, and more generally about the construction of such arrays. Starting from an array created by McNamara (2008), a new array is created with more detailed operationalizations, and more refined categorization of dimensions into contextual, organizational and interorganizational groups. This categorization is on theoretical grounds and allows identification of necessary and sufficient dimensions as part of defining each interaction term.

The second stage involves development and deployment of a survey instrument, which measures the observed operationalizations of dimensions in the interorganizational interaction array. The third stage employs clustering analysis techniques to identify whether, based on the surveyed sample of interorganizational interactions, three clusters can be identified that correspond to the theoretically postulated levels of cooperation, coordination and collaboration (Aldenderfer & Blashfield, 1984; Romesburg, 2004). Different clustering solutions will be analyzed to determine necessary and sufficient dimensions to each interaction term, and to select the best fit within each category of dimension (contextual, organizational and interaction).

Organization of this Dissertation

This dissertation is presented in six chapters: Chapter 1 – Introduction; Chapter 2 – Literature Review and Theoretical Framework; Chapter 3 – Methodology and Survey Instrument; Chapter 4 – Descriptive Data Analysis; Chapter 5 – Clustering and Multivariate Analysis; and Chapter 6 – Conclusions.

This first chapter has introduced the research problem and study objectives, outlined the general approach to the study, and discussed the importance of the research and its relevance to the field of public administration. Chapter 2 reviews the literature and theory on interorganizational interaction as it pertains to this study and develops a refined interorganizational array to test the coordination, cooperation and collaboration terms. Chapter 3 discusses the methodology and the operationalization of the construct into indicators and a survey instrument. Chapter 4 presents the descriptive data analysis and preparations for clustering analysis. Chapter 5 presents the results of the cluster and multivariate analysis for each research question. Finally, chapter 6 draws overall conclusions and implications from the results, considers the strengths and limitations of the study, and suggests areas for future research.

CHAPTER 2:

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

This chapter reviews the relevant literature and summarizes, organizes, and draws conclusions on conceptualization and measurement of interorganizational interaction. The review is organized as follows. First, the rationale for the study introduced in chapter 1 is recapped and the broader context to this dissertation research is explored. Second, the scope, search parameters and approach to the literature review is described. Third, relevant literature focusing on interorganizational interaction definitions, frameworks, and conceptualization is summarized and reviewed. Finally, building from the work of McNamara (2008, 2012), a set of dimensions are selected and operationalized for an interorganizational interaction array, which will be tested via survey research.

The Context for Interorganizational Interaction Research

The foundational questions at the heart of political science, public administration, and economics concern how social, political and economic institutions adapt and work together to deal with problems, address conflicts, and create a stable and prosperous society. These questions are increasing in significance, as a growing body of research in multiple disciplines of social science suggests that we live in an increasingly complex society, which requires ever more novel and innovative approaches to managing problems and finding collective solutions (Mandell & Steelman, 2003). This context of complexity provided, to a large extent, the impetus for increasing focus on collaboration and networks in the literature.

A number of factors drive this complexity: rapid technological changes (Gray, 1989); changing economic production modes, the decline of manufacturing in the West and the rise of information technology and service industries (Alter & Hage, 1993); increasing competitive pressures generating increasing rates of innovation; globalization (Kettl, 2000, 2002); blurring of boundaries between public and private sectors (Ben-Ner, 2002; Dees & Anderson, 2003); increasing pressure on government revenues as expenditures grow (Goldsmith & Kettl, 2009); and the expanding reach of the state coupled with a shift away from direct government to devolution, decentralization, and privatization (Loughlin, 2004).

The implications of this complexity for organizations are numerous. Greater environmental complexity and turbulence increases the extent to which organizations become interdependent (Emery & Trist, 1965; Koppenjan & Klijn, 2004; Trist, 1977). Interdependence is a situation where individual organizations cannot act unilaterally without creating unanticipated and often unwanted consequences for other organizations (Gray, 1989). Interdependence make boundaries of responsibility or jurisdiction for organizational functions and structures challenging to define (Kettl, 2006). Given that both problems and solutions are often conceived through the lens of organizational boundaries, such conditions bound identification of problems with distributive or political economy issues in society, and favor solution by "argumentation" rather than analysis (F. Fisher & Forester, 1993). Societal problems are often intractably "wicked," meaning there are neither optimal solutions nor standards of judgment to know right from wrong or good from bad (Rittel & Webber, 1973). Problems are rarely isolatable or divisible;

instead there are “systems of problems” in which efforts to deal with any individual problem generates unwanted consequences with others (Ackoff, 1974).

In response to this uncertain environment, organizations adapt and evolve in order to reduce uncertainty, enhance legitimacy, maintain survival, and “negotiate order” (Gray, 1989). While private business organizations are often able to rearrange their forms and functions contingent on environmental conditions, government organizations find adaptation challenging. Geopolitical boundaries between states, regions and cities, and the jurisdictions of responsibility and function of the patchwork of bureaucracies that implement policy, are developed and negotiated over long periods of time and are relatively immovable. Interest-based politics when combined with the specialist nature of bureaucracy and fixed budgetary cycles, generates stability in policy domains and favors incremental forms of problem solving (Lindblom & Woodhouse, 1993; Wilson, 1989). When wicked problems arise that traverse geographical and functional boundaries or require rapid action, governments bureaucracies are challenged to act directly (Kettl, 2006). A feature of contemporary governance is that few organizations have the resources and control over their functional domain to be able to accomplish their mission alone (Donahue & Zeckhauser, 2011; Milward & Provan, 2000).

The difficulty faced by governments to address complex societal problems has been extensively covered in the public administration and policy literatures, and provided impetus for the development of three related strands of research and practice, which in many ways precede the contemporary era of collaboration and network governance (Bevir, 2010; Dunsire, 1995). The first strand considered factors affecting policy implementation and whether top-down control or bottom-up adaptation explained implementation mechanisms (Goggin, Bowman, Lester, & O'Toole, 1990). The second strand focused on privatization and decentralization, underlain by political efforts to shrink the state (Feigenbaum, Hening, & Hamnett, 1998). The third strand of "new public management" (NPM) attempted to change the way government was run by introducing a set of private sector techniques and concepts with the aim of increasing accountability and focusing on results (Hood, 1995). These three bodies of literature developed roughly in the same time period from the 1970's onwards, however, with the exception of some early work on implementation (Hjern & Porter, 1981), the literature developed in isolation from interorganizational research occurring in the same time period.

The development of NPM and the growth of various privatization tools such as vouchers, user charges, and direct contracting, signaled a transition away from the "problem solving" paradigm of the early to mid-twentieth century where policy formulation and policy implementation were led by government, to a paradigm of "managerialism" (Hill & Hupe, 2009). Implementation was being "defined away," and made the responsibility of contracted "agents," where government "principals" focused instead on management and accountability (Hill & Hupe, 2009; Isett, Ines, LeRoux, & Mischen, 2011). The practical consequence of these changes were a large increase in the number of nonprofit and profit-making organizations involved in public service provision (Salamon, 2002), a gradual growth in new governmental organizations with missions of oversight and regulation (Hill & Hupe, 2009), and changing—although not completely new—emphasis on networking and management skills of public managers (Agranoff, 2006). However, the privatization and NPM literature rarely considered the challenges of multiorganizational implementation, given its basic assumption that contracts, monitoring schemes, and management would be sufficient for implementation, even when multiple organizations were involved.

In contrast, implementation literature did recognize the complexity of joint action and its importance in implementation success; however, this aspect was under-theorized and conceptualized in research (McNamara, 2008). Multiorganizational implementation literature took policy as a starting point for analysis while considering broad issues such as: the top-down/bottom-up synthesis and the normative issues in this distinction (Barrett & Fudge, 1981; Sabatier, 1986); the difference between policy formation and implementation (Sabatier, 1988; Sabatier & Jenkins-Smith, 1993); and the effects of political contexts and policy content on implementation success (Matland, 1995). Interorganizational interaction was considered indirectly by the extent to which policies identify actors important to the implementation process, or more generally the relationship between policy design and organizational interdependence (T. E. Hall & O’Toole, 2000; O'Toole, 1986).

With the move away from direct government implementation to a complex mix of governmental, private and nonprofit actors, scholars began to characterize this mix of actors in terms of “network,” which required “network governance” to provide services in a coherent manner towards public goals. By tracing the development of the public administration, policy implementation, and NPM literatures, Head and Alford (2013) identify three themes that emerged gradually, which are essential to dealing with the contemporary network governance landscape: systems thinking, leadership, and the subject of this research—collaboration. Public administration literature tends to characterize the past two decades as a distinct “era” of collaborative or network governance, which requires “new” collaborative or network public management techniques (Hill & Hupe, 2009; McGuire & Agranoff, 2011; Rethemeyer & Hatmaker, 2008). As the subsequent analysis reveals, however, the term “collaboration” is often used to describe a broader range of interorganizational interactions including deconfliction, coordination and cooperation.

In the same time frame as the development of policy implementation and NPM literatures, an almost entirely separate body of organizational science literature developed, which focused on interorganizational relations. Organizational science, however, tended either to be related directly to business studies, or existed independently without necessarily recognizing the public-private distinction. Consequently, the extent to which findings from this body of work are generalizable to the public sector is unknown (Isett & Provan, 2005). The development history of interorganizational research is similar to that of collaboration and networks in public administration, and involved general recognition about the importance of considering network relationships on firms’ operations, and the necessity for firms to adapt and change their structure to this new landscape (Parmigiani & Rivera-Santos, 2011). Part of this literature review covers and applies key findings from the literature on interorganizational relationships.

In the light of this wide recognition that contemporary society is characterized in terms of networks, and that societal problems are ever more intractable, the importance of interorganizational relationships has never been greater. A large body of research in public administration, management and organizational science literatures has developed on the topics of cooperation, coordination, collaboration and interorganizational interaction. The disparate and broad nature of the literature has led to a multitude of conceptual frameworks, typologies, definitions and interchangeable terminology, many of which were developed in case studies. While these efforts have merit, cumulative empirical research has suffered in the absence of standardized conceptualization and operationalization.

This dissertation aims to build cumulative knowledge in the conceptualization of interorganizational interactions by developing an improved *interorganizational interaction array*, which specifies a construct of different levels of interorganizational interaction. A critical aspect for cumulative development in scholarly research is the need for stable definitions and rigorous conceptualizations and operationalizations, which permits valid empirical research such as organizational surveys, evaluations of collaboration and comparative analyses. This is the main subject addressed in this literature review.

Literature Review Approach

The literature on interorganizational interaction in public management and administration is large, and when other disciplines are included such as business, management, organizational science, psychology and sociology, the body of work is vast. A problem encountered generally in this work is that interaction terms such as "collaboration" are often used interchangeably or in combination with a wide variety of related ideas that involve individuals or organizations working together in some manner: coordination, cooperation, interorganizational interaction, joint action, alliances, partnerships, networking, multiorganizational implementation, and governance, to name a few. An important part of this research, therefore, is to disentangle interaction terms from one another.

The following paragraphs summarize the scoping, questions, search parameters, and overall methods used for the review. The review is conducted and the findings structured in accordance to guidance presented in Boote and Beile (2005); Galvan (2006); and Randolph (2009).

Scope. Given the sizeable literature featuring variously-termed interorganizational interactions, three scoping criteria are adopted from the outset to delineate and prioritize the literature. First, only literature on voluntary interactions is considered; mandated types of principal-agent interactions such as contracting or hierarchical interactions internally in an organization are excluded. Second, a small body of recent work that considers interorganizational interaction mandated by circumstance (e.g. where disaster response compels organizations to work together (Bryson et al., 2006; Simo, 2009)) or mandated by policy or organizational mission (Ivery, 2008; Rodríguez, Langley, Béland, & Denis, 2007) is included. Third, only interorganizational interaction in the public sphere is considered; business partnerships or industry alliances are excluded. However, references from business and management literature that are listed in the reference sections of primary search results are reviewed based on their theoretical merit. A small body of organizational science literature is consulted to inform the theoretical sections, mainly from well-known and classic textbooks.

Focusing questions. The main goal of this dissertation is to test and refine existing definitional constructs of interaction terms. This chapter will neither recreate nor update other recent appraisals of the interorganizational interaction literature from which the constructs were derived. Instead, the aim is to understand more broadly how interorganizational interaction is conceptualized and defined by other scholars, with a view to evaluating the results of empirical testing against the overall body of literature. Several questions are adopted to guide the literature review.

- How is interorganizational interaction defined and conceptualized?
- Which theoretical perspectives inform these conceptualizations?
- How are different forms of interorganizational or collective interaction distinguished from one another?
- How are interorganizational interactions operationalized and measured?

Search parameters. The initial literature search was conducted via the Old Dominion University library "ProQuest" database for journals and dissertations by searching using the search terms in Table 2-1.

Table 2-1: *Search parameters used in the literature review*

Search Term	Date Range
"Interorganizational; Organizational+[collaboration, coordination, cooperation]"	Jan 2008 – Dec 2014
"Collaborative + [public management, governance, leadership, public administration, implementation]"	
"Network governance"	Jan 2008 – Dec 2012
"Policy networks"	
"Collaboration; coordination; cooperation + [assessment, framework, indicator, measure, measurement, metric, survey]"	Jan 1990 – Dec 2014
"[assessment, framework, indicator, measure, measurement, metric, survey] + of collaboration; coordination; cooperation"	

Method of review. A first pass through the collected literature identified articles from the following categories: definitional research; collaboration frameworks; interorganizational interaction arrays; applications or tests of frameworks and arrays; empirical measurement of interorganizational interactions; network based research or commentary; and policy implementation research. A second pass identified interorganizational research that focused on one or two variables of interest (e.g. trust, boundary spanners, leadership), but that did not address broader definitional or theoretical issues. Further "cross-cutting" categories were created for literature review articles and dissertation research focused on collaboration, networks, interorganizational relationships, or some combination (e.g. collaborative network management). Given that the focus of this dissertation is testing and adjusting an existing construct, articles concerning definitions, frameworks and typologies were prioritized. The reference section of these articles were consulted, and a secondary "manual" literature search gathered important books, older articles outside the original search date ranges, and non-academic works.

Conceptualizing Interorganizational Interaction

This section lays the conceptual and theoretical scaffolding on which the literature review and subsequent empirical research is conducted. First, the challenges of conceptualizing and defining interorganizational interaction are explored. Second, the meaning of the three most common interaction terms are reviewed. Finally, the "language" necessary for theoretical analysis is established to guide and frame the literature review: types of organizational theory, paradigms, and levels of analysis.

The Challenges of Conceptualizing Interorganizational Interaction

Many scholarly works in this field often refer to the challenge of defining interorganizational interaction terms, but rarely specify exactly why this should be the case. Creating a definition starts with building a conceptualization of interorganizational interaction, which is challenging for a variety of reasons. First, as a fundamental aspect of human society collective action has a long history both in terms of practice and theory.

Some scholars have expressed interorganizational interaction in terms of the political traditions of civic republicanism and classic liberalism in America (Perry & Thomson, 2004), whereas others identify American federalism and associated intergovernmental cooperation as the crucible for multiorganizational practice (Agranoff, 2006; Agranoff & McGuire, 2003; McGuire, 2006). Interorganizational interaction is a thread, although often not explicitly mentioned, which runs through the broader disciplines of public administration and policy implementation (O'Toole, 1986). This long history means that interorganizational interaction is linked with many interrelated ideas and disciplines and is part of our basic paradigms of thought and value systems, making it challenging to isolate and objectively study.

Second, within this broader political and governmental context, the study of multiorganizational interaction has incorporated various theoretical traditions through the course of its development. For example, Ostrom’s (1990, 2007) institutional theory of collective action relies on game theoretic and rational actor assumptions with a lineage from Olsen’s (1965) *Logic of Collective Action* to Axelrod’s (1984) prisoner dilemma theory of cooperation. Other related theoretical lineages can be found in conflict resolution and management (R. Fisher, Ury, & Patton, 1991; Kriesberg, 2007), group psychology and conflict (R. J. Fisher, 1990), stakeholder theory (Barringer & Harrison, 2000), and interorganizational relations (Alter & Hage, 1993). A basic issue is that different theoretical areas use terminology inconsistently. A more fundamental problem is that scholars have emphasized these different and often competing theoretical lineages to varying extents in conceptualization of interorganizational interaction.

Third, interorganizational interaction can be studied at different levels of analysis: individual, group, organization, or society. Yet definitions rarely acknowledge the conceptual level of inference. A related challenge is that interaction can occur on different scales, depending on the particular "unit" involved (Emerson et al., 2012). A large body of literature, for example, covers "collaboration" between individuals that occurs in "teamwork," although recent scholars have rejected defining this as collaboration (Bedwell et al., 2012). Interorganizational interaction can be conceptualized as interactions between groups, organizations, individuals or various combinations of the units, yet this is rarely specified in definitions. While several definitions use general terms such as "participants" or "actors," or specifically refer to individuals, studies have recognized the critical importance of identifying the extent to which an individual represent themselves or an organization (Huxham & Vangen, 2005).

Fourth, any particular term used for interorganizational interaction is typically nested among a set of related terms describing other forms of interorganizational interaction—cooperation, coordination, partnering, and so on. Much of the literature focuses on antecedents that support or hinder interaction in collaboration, for example, yet many of these antecedents apply equally to other forms of interorganizational interaction such as cooperation or coordination (McNamara, 2012). This issue stems from the fact that the literature often describes a "continuum" of interaction, usually from cooperation at the lower end to collaboration at the higher (Keast et al., 2007; Mandell & Steelman, 2003; McNamara, 2008, 2012). Much of this literature attempts to separate out the various meanings of each level of the continuum; however, as will be shown in the following review, the “continuum of interaction” is an abstraction that masks quite a complex reality.

Finally, a problem relevant particularly in public administration literature where one form of interorganizational interaction—collaboration—is more distinct as a concept, is the overlap with “networks,” which also have a strong body of scholarship. For example, some of the leading network scholars define networks using the same criteria for collaboration developed below (Provan, Fish, & Sydow, 2007; Provan & Kenis, 2008). Furthermore, many scholars cite findings from network research in studies of collaboration, and vice versa, without necessarily acknowledging any difference (Isett et al., 2011; Mandell, 1999). Given the importance of networks to theories of society and collective action in general, defining “network” is as challenging—if not more so—as defining collaboration, for many of the same reasons listed above. Network scholarship has a long history of development in sociological analysis (Brass, Galaskiewicz, Greve, & Wenpin, 2004; Galaskiewicz, 1985; Granovetter, 1973), policy studies (Adam & Kriesi, 2007; Heclo, 1978; Heilman, Johnson, Morris, & O'Toole, 1994; Sabatier & Jenkins-Smith, 1993), organizational science (Borgatti & Foster, 2003; Nohria & Eccles, 1992), and business and management (Parmigiani & Rivera-Santos, 2011), and thus inherits a complex theoretical lineage.

Cooperation, Coordination, and Collaboration

While the definitional challenge posed at the start of this chapter is still the case, several advances have been made in the past decade with regard to terminology and understanding is becoming increasingly stabilized. Many scholars have offered definitions, which do not need further review here. Thomson (2001), for example, presents an exhaustive review of definitions offered up to date of publication, and much of the interorganizational interaction array literature reviewed in this chapter, in effect, offers definitions for various interaction terms. While there is a surprising lack of rigorous "construct" definitions and operationalization of interaction terms, a short overview of the differentiation between these three levels of interaction is instructive for proceeding. More detail is provided on collaboration, mainly because understanding collaboration aids understanding of the other interaction terms by defining what they are not. At this stage, it is critical to note the empirical evidence that these three levels of interaction can be empirically differentiated is fairly limited; a fact which underscores the importance of this dissertation research.

Cooperation. As a widely used term both in academia and general usage, the lack of definitional rigor is surprising. Much of the social science literature references landmark works such as Axelrod (1984) and Ostrom (1990), which examine how repeated interactions or "cooperation" between individuals and groups lead to stable institutions of decision-making. In the interorganizational literature, cooperation has been used as a general term to convey "working together" for mutual benefit (Alter & Hage, 1993) for which a typology of interorganizational arrangements is possible.

The notion of a continuum of interaction took hold in the public administration, policy and program evaluation literatures, which placed cooperation at the lower end of the scale. Scholars view cooperation as an interaction between organizations or individuals that do not necessarily need to work together, but chose to do so for varying reasons. Cooperative work may occur within existing organizational structures and processes, and generally does not conflict with individual participants' goals (Keast et al., 2007; Mattessich et al., 2001; McNamara, 2008, 2012). A succinct definition of cooperation is provided in Keast et al. (2007, p. 17): “getting along with others so that you c[an] both achieve your own goals.” Cooperative interactions may involve information sharing, social networking, or de-conflicting work programs.

Coordination. The term coordination has been typically used in organizational and administrative sciences to refer to the structuring, management and control of different components of a complex body or process to enable the components to work together effectively, usually in the case of a departmentalized organization (Fayol, 1949; Gulick, 1937). Coordination, therefore, assumes some interdependence meaning that individual organizations would not be as effective on their own without active coordination. Furthermore, coordination—in the context of an individual organization—requires some system of legal rational authority both to compel different departments to work together when needed, and to facilitate independent action without having to constantly communicate, by assigning clear domains of responsibility to departments. In the case of interorganizational interaction, this legal rational authority may be formally created by a collective group, or other dimensions such as trust may act as proxies for authority (Ring & Van de Ven, 1994).

Coordination is placed on the middle of the scale of interaction, for the reason that mutual goals between participants may exist, but they do not conflict with individual organizational goals (Keast et al., 2007; McNamara, 2008). The presence of shared goals and interdependence to effectively achieve them necessitates some level of shared planning, whether or not this occurs formally or informally depending on circumstances (Kettl, 2003; Morris, Morris, & Jones, 2007).

Collaboration. In the public administration literature in particular, collaboration is the interorganizational form that has garnered most attention in recent decades, although perhaps the term is often used to refer to a broader set of interactions. A group of relatively stable common themes can be identified from the literature to distinguish collaboration from other interaction forms, although definitions vary or overlap in the extent to which these themes are emphasized (Mayer & Kenter, 2016).

A necessary prerequisite for collaboration is the condition of *shared problem interdependence* between actors (a generic term for individuals, groups or organizations), such that a certain problem affects actors in way that they cannot resolve it alone (Emery & Trist, 1965; Gray, 1989). A conference of city managers from across the country meeting to discuss how to resolve homelessness in cities, for example, would not qualify as collaboration. While the problem is shared by all actors, each city manager could resolve the problem individually in a way unique to a particular city and state. However, a group of city managers from contiguous cities such as in Hampton Roads, may frame homelessness in terms of the transient nature of people through the region and poor geographic distribution of shelters. The case where city managers worked to pool resources, create an intercity committee on the subject, and develop a coherent homeless regional policy, would qualify as collaboration as the homelessness problem could not be resolved individually by one city.

If collaboration forms around situations of interdependent problem-solution sets, typically the group will adopt a *common goal*—the next key discerning characteristic of collaboration (Ansel & Gash, 2007; Conley & Margaret, 2003; Frey, Lohmeier, Lee, & Tollefson, 2006; Mattessich et al., 2001; McNamara, 2012; Vangen & Huxham, 2012).

This distinguishes collaboration from other forms of interaction such as coordination in which actors may “review goals for compatibility” (Mattessich et al., 2001, p. 61), or deconfliction, in which actors simply inform each other about their respective missions (Williams, 2010). Related to the common goal characteristic is the requirement for *mutual benefit*; it is unlikely an actor would agree to a goal that was wholly incompatible with its interests, thus all participants to a collaboration must gain something (Gray, 1989; Morris et al., 2013). Often, the link between interdependence, common goals and mutual benefit is expressed in terms of *shared purpose* (Woodland & Hutton, 2012).

Collaboration can be identified by several process conditions. First, collaboration requires the development of *trust* between actors (Ansel & Gash, 2007; Johnston, Hicks, Nan, & Auer, 2011; Klijn, Edelenbos, & Steijn, 2010; Kocoglu, Imamoglu, & Ince, 2011; Lundin, 2007; Ring & Van de Ven, 1994; Tsasis, 2009). Other lesser forms of interaction such as coordination can occur in the absence of trust (Raymond, 2006). Trust is critical given the related condition that participation in the collaboration is *voluntary* (R. H. Hall, Clark, Giordano, Johnson, & Roekel, 1977; Morris et al., 2013). In the absence of formal organizational authority and legitimacy, collective action must emerge initially through informal relationship development (Thomson et al., 2009). While informal relationships eventually become institutionalized in governance structures, trust is a prerequisite to their development (Emerson et al., 2012).

The second process condition required for collaboration is a specific type of multidirectional *communication* that emphasizes conflict resolution, shared perspectives, consideration of power dynamics, and equality (Gray, 1985, 1989; Huxham, 2003; Huxham & Vangen, 2005; Imperial, 2005). The voluntary nature of collaboration means there is no external arbiter of disputes nor formal organizational tools to end conflicts via authoritative measures, thus communication between actors is essential. In other forms of interorganizational interaction in which actors do not have common goals, conflicts may go unresolved between actors or communications may be via intermediary bodies and is of lesser importance.

Third, collaboration is defined by a situation where actors *share resources* (Guo & Acar, 2005; Kanter, 1994; Tschirhart, Amezcua, & Anker, 2009). Resources may include personnel, expertise, funding or materials. Sharing or pooling resources requires an assumption of *shared risk*, and a distribution of organizational authority over resources. This distinguishes collaboration from lesser forms of interaction in which resources may be offered, but are strictly controlled by a sending organization or must prioritize only the sending organization's goals (Williams, 2010).

Finally, collaboration is defined by *collaborative rationality*, where "rationality" means the normative conception of reasoning. Hierarchical organizational forms tend to develop "instrumental" rationality, in which individuals are conceived as reasoning on the basis of objective information to attain clear organizational goals, and "true" knowledge is defined by that which permits prediction and thus control (Fay, 1975). The implication of this conception of rationality for organizations is the tendency to assume that "solutions" can be engineered or discovered and thus "planned" in order to attain goals or solve problems.

Instrumental rationality is distinct from that which is used in collaboration. Habermas (1981) described a "communicative rationality," in which rational reasoning is conceived as a discursive process to uncover realities hidden by socially constructed understandings, thus rationality is defined by *process* rather than knowledge outcome. In their landmark text on collaboration in urban planning, Innes and Booher (2010) detail "collaborative rationality," which like Habermas' theory is defined by process conditions of a diversity of participants with interdependent interests engaging in authentic dialogue to develop shared meanings and "heuristic" solutions (Innes & Booher, 2010, p. 35).

While this set of common themes provides some stability to the definition of collaboration and its respective empirical study, points of disagreement and ambiguity remain in the literature. For example, some contend that a key feature of collaboration is a flat (or no) hierarchical structure organizing participants (Gray, 1989). Others present evidence, however, of complex organizational forms emerging in collaborations that in many respects resemble, if not replicate, features of organizational hierarchy (Bardach, 1998; Thacher, 2004).

Other contended distinctions involve whether collaboration can be defined by the type of participants involved, the organizational level of participants (leadership, management or working level), the extent to which individuals represent themselves or an organization, the reason for the collaboration forming or its intended goal, the time duration of the activity, the extent to which a stable set of participants is required, and the extent to which participant's commitment is legally formalized. Another major source of ambiguity lies in distinguishing collaboration from network concepts (Isett et al., 2011; Provan & Kenis, 2008). These issues are explored in the empirical data analysis in chapters four through six.

Theoretical Language of Interorganizational Interaction

This short review of current understandings of common interaction terms illustrates the complexity of establishing rigorous conceptualizations and thus definitions. Definitions allow us to determine what is and what is not included as part of the *definiendum*—the "thing" being defined. Yet for complex, multidimensional phenomena such as collaboration, definitions often hide more than they convey. As interorganizational interaction involves a complex mix of variables interacting at different levels of analysis, single paragraph definitions cannot fully capture the true meaning nor allow sufficient distinction between other similar cases (Bailey, 1994). An analytical approach to understanding the phenomena is required, which involves specification of constructs built from dimensions, and detailed operationalization of those dimensions. This section presents the theoretical grounding for defining states of interorganizational interaction.

Interorganizational Interaction and Organizational Science

Whether occurring between organizations, groups, or individuals, interorganizational interactions are social groupings or collectivities that come together to pursue goals (Bedwell et al., 2012). In the most general sense—and with some important caveats—interorganizational interaction and the various social structures that emerge during the process can be analyzed through the lens of organizational science. Surprisingly, contemporary interorganizational literature in public administration pays little reference to classic organizational science work. Partly, this may be because early literature already incorporated key organizational science tenets, however, the definitional problems concerning interorganizational interactions stem from the challenge of defining the boundaries of interorganizational forms and the level of analysis. Much contemporary interorganizational literature glosses over these issues (Klein & Kozlowski, 2000), thus it is pertinent to review the fundamental definitional and theoretical concepts in organizational science to start on a solid foundation.

Organizations as a general class of social collectivity are ubiquitous in modern societies (Parsons, 1960). Scholars have identified several common features of any organization whether bureaucracy or network: *social structure, participants, goals, technology,* and *environment* (Rainey, 2003; W. R. Scott, 2003). Social structure refers to the patterns of relationships among participants in a collectivity and features normative, cultural, and behavioral elements. While a long tradition of organizational research conceives of structures as objective, separate from participants, and largely static, some suggest structure should be replaced with the dynamic concept of "structuration," where social structures are "virtual" indicators of dynamic human activity (Giddens, 1984; Weick, 1985).

Participants are the social actors, whether individuals or groups, that contribute to the organization in return for inducements. It is a matter of debate, however, the extent to which participants can be used to define the boundaries of an organization (Pfeffer, 1982). Goals are the desired ends of the organization or the reason why the organization came into being. Again, debate surrounds whether individual participants' goals, shared organizational goals, or the basic goal of organizational self-sustainment are more important (Pfeffer, 1997). Technology is a general term for the process, systems or objects that translate inputs into outputs; the "work" that the organization conducts (W. R. Scott, 2003). Finally, all organizations exist in a "specific physical, technological, cultural, and social environment" (W. R. Scott, 2003, p. 23). A large part of organizational study examines how goals, technologies, participants and structures adapt to and with the environment.

The ongoing debates about the nature and relative importance of these core organizational features result from the differing sociological paradigms of thought underpinning any organizational analysis. Depending on one's ontological and epistemological perspectives, there are several possible paradigms. Burrell and Morgan (1979) contrast subjectivity-objectivity debates in social science methodology, with consensus-conflict debates in the "theory of society" (Hassard, 1991) to identify four main paradigms: functionalism, interpretivism, radical humanism, and radical structuralism. Each paradigm focuses on different elements of organizations and incorporates very different explanatory frameworks (Vibert, 2004). While individual interpretation of organizational phenomenon is critical in how organizations operate and how organizational reality is constructed, extensive research on institutionalist logic tells us that individual perspectives are shaped greatly by objective structures such as organizational design, policies, processes, and resources (J. P. Olsen, 2007). Consequently, organizational science is dominated by functionalism, which searches for regularities and patterns leading to generalizable and universal principles (Gioia & Pitre, 1990).

In addition to these core paradigmatic positions, key debates in organization science revolve around the choice of level of analysis and assumptions about the extent to which participants' behaviors are self-determined or dictated by organizational structure (Astley & Van de Ven, 1983). Thus depending on the level of analysis and assumptions, organizational theories come to varying conclusions about key questions such as whether organizations should be viewed as functionally rational or socially constructed, whether structural change is driven by internal or external factors, and whether organizational-level behavior is determined by individual or collective action.

This short probe into organizational science serves to prime the analysis on interorganizational interaction by highlighting several important considerations. First, a researcher's choice of ontological and epistemological positions affects fundamentally how theories of organization and thus interorganizational interaction are conceptualized. Recent investigations show that, similarly to organizational science, the dominant paradigm in public administration research is functionalism, yet rarely is there discussion about the implications of this choice (Raadschelders, 2011; Raadschelders & Lee, 2011). The remainder of this literature review periodically questions the paradigm aspects of various interorganizational interaction frameworks and theories. Second, the level of analysis at which theoretical inferences are made has an equally large impact on understanding, yet this aspect remains generally underspecified in interorganizational public administration literature. Third, defining the core features of organizations is important to determine the scope of inquiry. This aspect is well covered in the literature, although part of the definitional problem lies in different choices for core variables.

Levels of Analysis in Interorganizational Interaction

The "level of analysis" is the level of social reality at which theoretical inferences or explanations are made and is usually determined by the nature of the dependent variable (Neuman, 2003; Rousseau, 1985; Yurdusev, 1993). Levels of analysis are often described as micro, meso, and macro, which generally correspond to individual, group, and societal levels. Levels of analysis are distinct from “units of analysis,” which refer to the unit with which data are directly attached (Hitt, Beamish, Jackson, & Mathieu, 2007). Correct specification of levels and units of analysis is critical in empirical research, as inappropriate combination of different levels and units risks biases of misspecification and aggregation (Rousseau, 1985). While many of the interorganizational interaction frameworks described in the following review group variables at different levels of analysis and show interactions, they do not typically specify rigorous theoretical relationships—a task necessary for development of a multilevel measurement and construct model (Hitt et al., 2007).

Scott’s (2003) categorization of levels of analysis as social psychological, organizational structure, and ecological, is particularly suited to organizational research. The social psychological level focuses on the behavior and characteristics of individuals, interpersonal relations between individuals, and the impact of context or environment on individual attributes. Group or organizational characteristics are viewed as the environment or context. While interorganizational interaction is a multilevel phenomenon, much of the process dynamics occurs between individuals thus basic social-psychological theories about decision making, trust building or sensemaking are important, as are their basic models of the individual. Axelrod’s (1984) theory of cooperation, for example, employs a rational self-interested actor model and shows that under the right context of repeated interactions, group level cooperation emerges. This emergent property, however, is explained by the individual self-interest.

The organizational structure level encapsulates structural and process characteristics of an organization or its sub-units including department structure, authority ranks, hierarchy, specialization and division of labor, or communication networks. Examples of this level in the interorganizational interaction literature include a large body of work on governance structures in collaboration (Ansel & Gash, 2007; Emerson et al., 2012; Hardy & Koontz, 2009; Hodges, Ferreira, Mowery, & Novicki, 2013; Huxham, 2000; Johnston et al., 2011; C. Lewis & Marsh, 2012).

The ecological level examines relationships between an organization and its environment, viewing the organization as a single entity. Examples of ecological level literature include studies that treat an interorganizational form as a single unit and ask, for example, whether collaboration reduces service delivery costs (Bel, Fageda, & Mur, 2014), or whether performance or outcomes are affected (Chen, 2010; Gulati, Lavie, & Madhavan, 2011). Scott also defines three further graduations of the ecological level: *organizational sets*, which views the environment from the perspective of one particular organization; *organizational populations*, which examines populations of organizations with similar structures or functions; and *interorganizational fields*, which highlights the competitive and cooperative relationships between organizations in the same policy or business domain.

The construct in this dissertation research is theorized at the level of interorganizational field, reflecting the fact that interaction between organizations is affected by the broader collectivities or networks of organizations in which the interacting organizations are embedded (Warren, 1967). Interorganizational interaction is an emergent phenomenon with a set of characteristics distinct from the participating organizations and individuals. This is analogous to the idea that the social network in which an individual is embedded—what one might call the “inter-individual” field—can be characterized by emergent properties such as centrality, complexity or differentiation, which are not attributes of an individual. As a multilevel construct, however, interorganizational interaction features lower level constructs at the structural and individual levels of analysis.

Distinguishing between Frameworks, Theories, Models, and Heuristics

In order to compare the various conceptualizations, frameworks and theories of interorganizational interaction, a set of comparison criteria is required. “Theory” is a word appearing with high frequency in social science literature and is used with several understandings. Ostrom (2005, 2007) distinguishes between “frameworks,” “theories,” and “models” as three levels of specificity to the term “theory” in its most broad sense. According to Ostrom, frameworks “help to identify the elements and relationships…that one needs to consider…Frameworks organize diagnostic and prescriptive inquiry…, provide the most general list of variables…(and) provide a metatheoretical language that can be used to compare theories” (Ostrom, 2007, p. 25). A framework, therefore, is the broadest organizing construct with which to begin “theory” development.

A framework focuses theories—the next level of specificity—on the general classes of variable necessary to explain phenomena (Ostrom, 2005). According to Schlager (2007), theories “place values on some of the variables identified as important in a framework, posit relationships among the variables, and make predictions about likely outcomes” (p. 296). Theory is always bound by assumptions, either explicitly defined or implicitly received from the theorist’s paradigm (Miner, 2005). The criteria that define a scientific theory are well known (Sabatier, 2007). In order to achieve the criteria of falsifiability variables should be logically coherent, show a clear sense of causality and explicit drivers of causal processes. Finally, theories should clearly identify their boundaries and scope of application. In order for theories to meet these scientific requirements in multilevel multiorganizational fields such as collaborative governance, policy implementation and policy process studies, theories should specify: boundaries and scope of inquiry; a model of, or assumptions about the individual; a mechanism for collective groupings and organizations to emerge; wider environmental contexts or institutional structures; and an explanation about how the system changes (Blomquist, 2007).

Models are one step more in specificity from theories and make “precise assumptions about a limited set of parameter and variables” (Ostrom, 2007, p. 26). Although the difference between models and theories is somewhat contrived, models can be considered as the first level abstraction of operationalized variables. By fixing a limited number of variables at specific values in certain settings, models can test, revise and further develop theory (Schlager, 2007).

A final category of “theory” is termed a heuristic, which means a “short-hand” aid to learning, problem solving or discovery. Heuristics display certain features of frameworks in terms of organizing concepts, certain features of models in terms of focusing on a limited set of variables, and sometimes may verge into metaphor. An example is the policy stages heuristic (deLeon, 1999), the garbage-can “heuristic” of organizational decision-making (Cohen, March, & Olsen, 1972), and the policy streams framework (Kingdon, 1995). Rather than make predictions or specify causal links, these heuristics provide us with a starting point to sort through and understand very complex organizational and social systems. Given their limited Theoretical scope, heuristics are not considered further.

The interorganizational literature leans heavily on the use of frameworks—reviewed in the following sections—that order important variables at various levels, and to some extent develop more specific models, which focus on one or two key relationships of interest. In the terms described above there are few theories, and approaches using frameworks and models generally gloss over important theoretical aspects such as levels of analysis, boundaries, paradigms, and units. The following sections review the literature to date on the development of frameworks and theories of interorganizational interactions. The term "Theory" with a capital "T" is used to describe to describe the collective group of framework, theories and models.

Review of Interorganizational Interaction Frameworks and Theory

Interpretation of empirical results gained from testing interorganizational interaction arrays would likely benefit from a greater understanding of the numerous threads of thought that form the interorganizational relations discipline's knowledge base. This section unravels several such threads by focusing on two important bodies of literature. First, the mainstay of contemporary interorganizational interaction Theory in the public administration literature is analyzed, which exists in the form of systems-based frameworks. Second, literature on interorganizational arrays is reviewed. The arrays specify constructs and operationalizations of interorganizational interaction terms in the forms of scales or continuums of interaction, or in the form of classification typologies, which enumerate the possible ways to arrange different dimensions. Finally, the analysis compares and contrasts these two bodies of knowledge, discusses the link with network research, and sets the scene for the development of the interorganizational array to be tested in this dissertation research.

Interorganizational Interaction Frameworks

Given that interorganizational interactions occur as dynamic processes in complex organizational and institutional settings, there are many variables to consider (Emerson et al., 2012). Scholars have made a variety of attempts to describe these variables and their interactions. Most attempts are examples of frameworks, as Ostrom termed them, which strive to organize, order, and prioritize key variables for further theoretical refinement. For example, an influential early attempt by Wood and Gray (1991) organizes key variables into three separate, but sequentially linked, categories: antecedents (preconditions), processes, and outcomes. They do not specify hypotheses between these categories but instead investigate important factors in each category as determined by various organizational theories.

Early Systems-Based Frameworks

Attempts such as Wood and Gray's to order basic components of sociological knowledge stem from work of early system theorists, who recognized that social systems could be represented in the form of input—process—output frameworks. Easton's (1957) political system framework, for example, describes a general political system as one that converts inputs into outputs, with a feedback loop connecting back to the inputs, and nested within a wider contextual environment. While this approach was critiqued as overly general, it laid the foundation for a way of thinking about and ordering research on complex organizational systems; the vast majority framework literature adopts this basic systems approach. The purpose of this section is to review key interorganizational interaction frameworks from the past two decades.

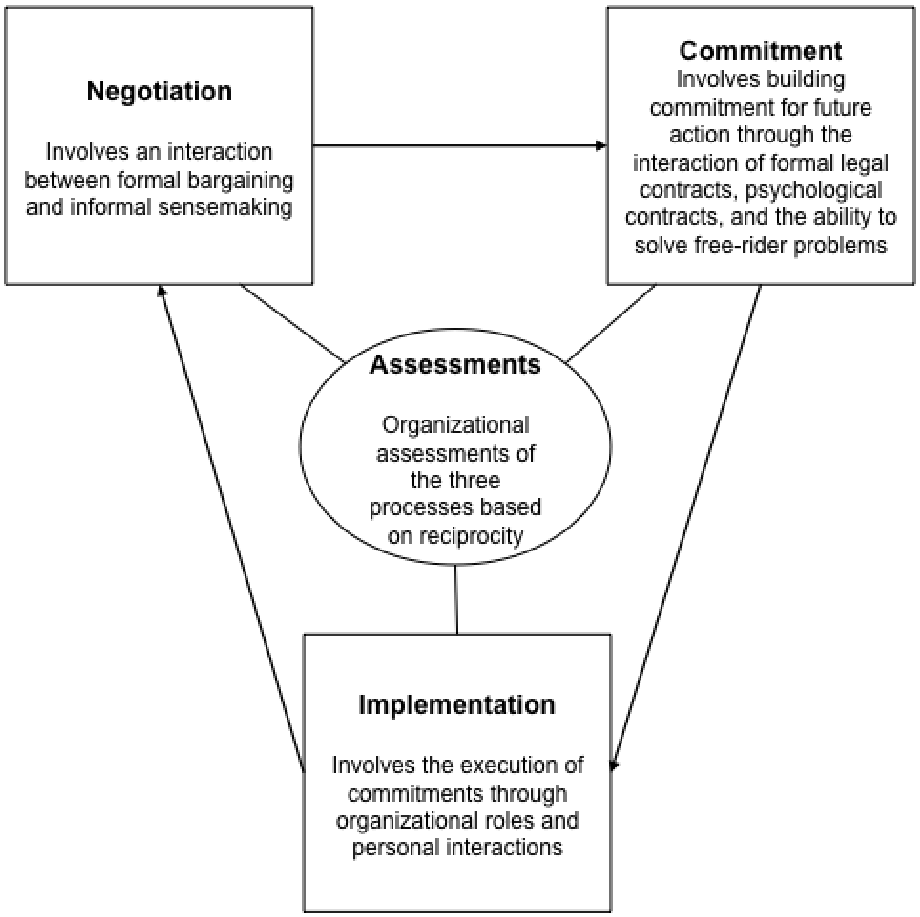
Frameworks vary in their level of detail and specificity. Some simply organize important variables in the categories of inputs, processes, and outcomes, and suggest basic associations between them at the level of category (e.g. that processes affect outcomes). Some propose hypotheses that a variable in one category affects another category overall (e.g. continuous trust building (a variable in the "process" category) leads to greater collaboration outcomes (Bryson et al., 2006)). Others specify causal paths directly between variables in different categories, causally linking for example a specific antecedent variable to a specific process variable (e.g. interdependence between stakeholders (antecedent variable) leads to greater interorganizational communications (process variable) (Gray, 1985)). Furthermore, some frameworks operate at an individual level of analysis, while others—the majority in fact—are multi-level. While all frameworks employ the basic systems template categories of inputs—processes—outputs, some frameworks emphasize the process aspect more so than others.

One of the early and influential frameworks, developed by Gray (1985, 1989), shows association between antecedent factors, collaborative forms, and outcomes. For example, if the antecedent factor behind collaboration is conflict and the expected outcome is a joint agreement, then the collaborative process will likely take the form of a negotiated settlement. Gray also elaborates "collaborative forms" to specify a sequential process conducted during collaboration: problem setting → direction setting → implementation. Each of these stages are described by specific activities performed by collaborative groups such as stakeholder or resource identification, establishing ground rules, and searching for information jointly (Gray, 1989).

Gray is explicit about the boundary of application of her framework. Its level of analysis is the interorganizational domain, where domain is the "set of actors that become joined by a common problem or interest" (Gray, 1985, p. 921) and the problem is one that cannot be dealt with unilaterally by any single organization. The framework applies only to "underorganized systems," meaning that domains are characterized by loosely connected networks, rather than well-established collaborations. Thus the three stage process of "collaboration" conveys moving from a state of low intensity to higher intensity interorganizational interaction. The framework is not intended to apply only to a particular level of interaction such as a well-developed stable collaborative situation, but captures the full development process from initial conditions to full collaboration. Gray's framework is also not strictly limited to organizational interaction, as some of the actors may be individual citizens.

Gray emphasizes the process aspect of interorganizational interaction, which was recognized to be under-theorized (Gray & Wood, 1991). In another similar framework that emphasizes process but omits inputs and outputs, Ring and Van de Ven (1994) analyze how interorganizational relationships develop and dissolve over time. They describe an iterative and cyclical process of negotiation, developing commitment, and implementation, with assessments of each stage (Figure 2-1). If organizations negotiate and then develop certain expectations about necessary collective action, they will then commit to certain steps of implementation. If organizations assess that commitments are met, then they will increase their mutual commitments to further implementation. If commitments are not met, then corrective measures will be taken to potentially de-escalate their commitment or the implementation overall (Thomson & Perry, 2006)

Figure 2-1: *Ring and Van der Ven's (1994) cyclical collaboration process, adapted from Thomson and Perry (2006)*



Ring and Van de Ven's framework is multi-level. The overall framework explains, at the interorganizational domain level, how organizations develop interorganizational relationships involving mutual commitments and trust at the organizational level; however, the explanatory variables are all individual or group level phenomena such as trust, sensemaking, and motivation. Ring and Van de Ven hypothesize that as interorganizational relationships become more "institutionalized," informal relationships become initially more important than formalized organizational structures and rules, but eventually formal agreements such as rules, policies and contracts then start to mirror the informal relationships. Thus organizational level characteristics are driven partially by individual level variables.

There is broad consensus that the process aspect of interorganizational interaction is intrinsic to the very nature of phenomenon; indeed, as Weick (1985) considered “organizing” a more appropriate way to discuss “organization,” the literature on “collaboration,” for example, could be better described by “collaborating.” Many of the key frameworks in the interorganizational interaction literature emphasize this dynamic and self-reinforcing process aspect and specify causal pathways involving individual level variables in a manner similar to Ring and Van de Ven (1994).

Interorganizational Interaction Frameworks in the Public Administration Literature

In the context of public administration, the process of governance is an important consideration. “Governance” is a slippery concept like its interorganizational interaction cousin (Pollitt & Hupe, 2011), however, broadly speaking it refers to the manner by which collective impacts are produced in a social system (Hill & Hupe, 2009). Using a major review of the collaboration literature, Ansel and Gash (2007) derive a “collaborative governance” framework that describes “a governing arrangement where one or more public agencies directly engage nonstate stakeholders in a collective decision-making process that is formal, consensus-orientated, and deliberative and that aims to make or implement public policy or manage public programs or assets” (pg. 544). This differentiation between state and nonstate actors implies that multiorganizational collaboration between only state agencies is somehow different from when nonstate organizations are included. While Ansel and Gash do not elaborate on the extent to which actor type affects the nature of collaboration, other scholars have explored this question in typologies, described in the next section (Diaz-Kope & Miller-Stevens, 2015; Margerum, 2008; Moore & Koontz, 2003; Morris et al., 2013), and in research on the mechanisms of collective action in networks (Herranz, 2008).

Ansel and Gash's collaborative governance framework incorporates multiple levels of analysis. At the individual and group levels of analysis, they describe a cyclical positive feedback process that is very similar to the Ring and Van de Ven framework. Face-to-face dialogue leads to trust building, which in turn enhances participants' commitment to the process. Commitment is characterized by mutual recognition of interdependence, shared ownership of processes, and understanding of mutual gains. Trust and commitment allows shared understanding to develop. Depending on the context and the activity undertaken by the interorganizational form, partners may work on problem definition, mission planning, and identification of mindsets and values. These intermediate outcomes reinforce further face-to-face dialogue and further trust building, and a positive feedback loop is created.

Ansel and Gash recognize that the interorganizational interaction process is highly dynamic and cyclical, but is affected by broader institutional factors such as the formal or informal governance and administrative structures created by interacting organizations. Part of the interaction process involves creating such organizational level structures, which then in turn interact with the individual level variables. Positive feedback loops at the individual levels then reinforce the development and subsequent stability of organizational or institutional level structures and rules.

Emerson et al. (2012) refine the Ansel and Gash framework by removing the emphasis on government as the convener of interorganizational interaction. They describe a “collaborative governance regime” as the:

> processes and structures of public policy decision making and management that engage people constructively across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished (Emerson et al., 2012, p. 2).

Thus they do not limit collaboration to only formal state-initiated arrangements.

Emerson et al.’s framework is in the form of input—process—output, but with some key differences to many other frameworks of this form. First, they distinguish between two types of inputs/antecedents to collaboration: the general system context, which describes situational aspects that are often present in collaborations such as turbulence and complexity; and specific drivers of collaboration, which are necessary conditions to collaboration forming (leadership, consequential incentives, interdependence, and uncertainty). Second, they distinguish between the immediate outputs of collaboration (e.g. getting resources, enacting policy) and the longer term impacts that are described in reference to the system context. Finally, they specify adaptation as a separate outcome of collaboration, in that collaborations that adapt to system contexts and changes in rule structures are more likely to be sustainable and self-reinforcing. In a manner similar to Ansel and Gash, they identify the positive feedback between individual level factors such as motivation and engagement, with the creation and sustainment of more formalized institutional rules and processes.

While the Emerson et al. and Ansel and Gash frameworks are widely cited in recent collaboration literature, a closer look reveals some potential issues. First, both frameworks clearly focus on the "governance" level of organizations and thus are more applicable to organizational leadership responsible for negotiating and authorizing collaborations; it is not clear if these frameworks apply at all levels of the organization including at the "street level" where much actual collaborative implementation happens. Second, the frameworks do not elaborate on important organizational factors such as authority to commit resources, organizational size, goals, and structure. As the following review of interorganizational interaction arrays reveals, hierarchical structure and the distribution of authority within an organization are of key importance to determining the intensity of interorganizational interaction. While the Emerson et al. and Ansel and Gash frameworks are clearly multilevel, it is not clear how to overlay the frameworks on the recognized levels of analysis of individual, structural-organizational, interorganizational domain, and ecological. This reflects the challenging nature of identifying levels of analysis at which conceptual or statistical inferences are made in networks and collaboration research.

The frameworks covered so far have placed great emphasis on the process of interorganizational interaction, but lesser focus on the surrounding context, antecedent conditions, and outcomes. A framework developed by Bryson et al. (2006) expands more on the other dimensions[2] in addition to the process. The framework links antecedents—which they call "starting conditions"—to outcomes, via two related dimensions: process, and structure and governance. The process dimension identifies both formal and informal

[2] Note: Up to this point, *category* was used to refer to a collection of variables organized in input, process or output *categories*. As subsequent frameworks create separate groupings of variables within categories, they are referred to as *dimensions*.

mechanisms for developing interorganizational agreements, leadership, legitimacy, and trust. They identify that managing interorganizational conflict (e.g. disagreement over goals, strategy, or use of resources) and planning are key elements of any interorganizational interaction (Bryson et al., 2006; Lai, 2012).

In contrast to other frameworks covered, they separate out the structure/governance dimension from the process dimension, although a bi-directional arrow between the two dimensions conveys a close relationship. The structure dimension considers how partnering organizations are structurally arranged in their collective work, such as the linkages between levels of organization, or whether their interdependence is sequential or pooled (O'Toole, 1986). While other frameworks emphasize the self-reinforcing relationship between individual motivation and trust, and institutional governance structures created in the collaboration, Bryson et al. point out the connection between antecedents and context. The governance structure in a collaboration could take one of a number of forms: hierarchically flat inclusive deliberative panels; via a powerful lead agency such as a government agency or major nonprofit; or via a "network organization" created especially for the collaboration. Bryson et al. contend that the matching between antecedent factors (such as stability of the policy context, turbulence of situation, and participants) and the particular governance structure has a major effect on collaborative outcomes.

In a modification to the Bryson et al. framework, Simo and Bies (2007) look at the particular nature of cross-sector collaborations as an explanatory dimension for collaborative outcomes. Simo and Bies identify the importance of "informal sector involvement," in which out of a sense of community spirit individuals and local groups spontaneously organize. This localized emergent collaboration often becomes formalized, or strengthens the collaborative initiatives of formal organizations including government agencies and established nonprofits. Morris et al. (2013) pick up on this theme by introducing the dimension of social capital to the input—process—output framework. In the context of local grassroots collaborations, social capital is considered as an antecedent, process, and output and thus is a key explanatory factor in the self-reinforcing nature of the collaborative process (Wagner & Fernandez-Gimenez, 2008).

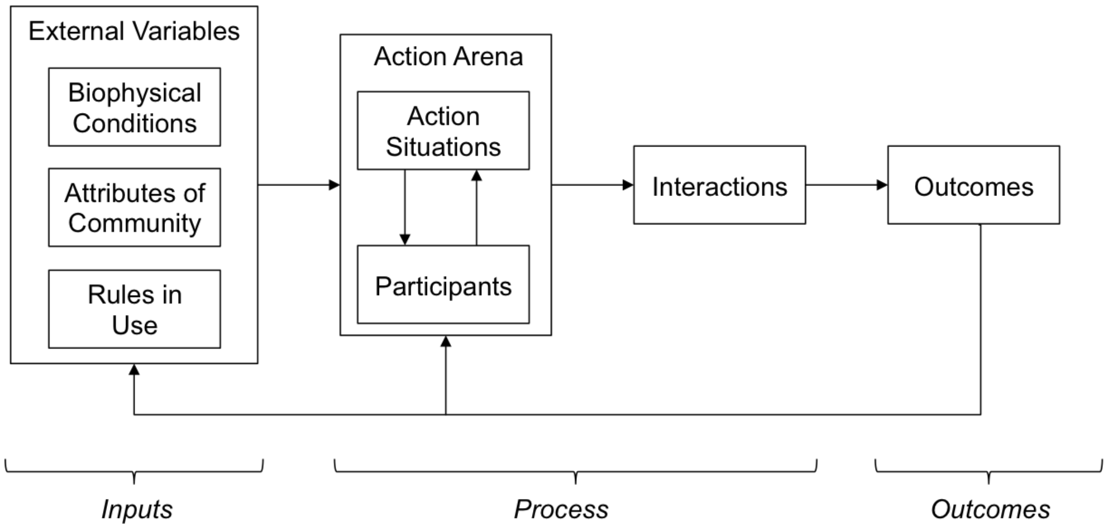
The concept of social capital is fundamental to Thomson's (2001) framework, which seeks to conceptualize and operationalize interorganizational interaction—or "collaboration" as she terms it—rather than describe the dynamics of interaction as other frameworks do. Thomson describes two competing views of collaboration in the literature: aggregative, in which collaboration translates private preferences into collective choices via a mechanism of rational utility maximization (Ostrom, 1990); and integrative, in which collaboration creates new shared understandings and consensus over compromise (March & Olsen, 2010). Underlying these collaboration mechanisms are two perspectives of social capital, described by Morris et al. (2013). One views social capital as a transactional mechanism between actors that requires mutual exchange to establish norms of trust and reciprocity. Another views social capital as generated in a generalized way from social interactions across a network (Putnam, 2000).

Linking Back to Foundations – Ostrom's Institutional Framework

Social capital as the basis of collective action is also at the heart of Ostrom's institutionalist framework, which is one of the most refined and general frameworks derived from a systems approach. Institutional approaches to political science analyze how a wide variety of social interactions found in hierarchies, markets, political systems and societies can be described by a set of underlying components universal to all situations. One such component is that of the institution—formal and informal rules, prescriptions and structures that individuals use to organize a variety of structured interactions. Institutions affect the behavior of individuals by affecting the various incentives and constraints confronting an individual (Ostrom, 2005, 2007), and the development of reciprocity, reputation, and trust, which are the drivers of collective action (Ostrom, 1998). By adopting the basic assumptions of institutionalism and systems theory, Ostrom led a research effort to develop multilevel frameworks and conceptual language to describe the fundamental components of social interactions, whether market or hierarchy (Seidl, Becker, & Luhmann, 2005).

The basic conceptual template is a systems framework that describes a process of social interaction affected by inputs and contexts, and leading to certain outcomes, which then become part of the inputs in a cyclical fashion (Figure 2-2). In true systems fashion, this template is "nested" at different levels depending on the scale of the participants (e.g. from individual to nation state) and the type of rules governing the situation (from "operational rules" to "constitutional rules"). The most important part of the framework is arguably the basic process unit of social interaction called an "action arena," which refers to the social space in which individuals interact, exchange resources, and enact or resolve conflicts. Using a rational actor assumption and game-theoretic reasoning where actors rationally evaluate costs and benefits of their actions and expected outcomes, Ostrom surmised that any collective interaction situation could be generalized by looking at seven core variables: the involved participants; their positions; their potential outcomes; the link between their actions and outcomes; the various controls that participants exercise; the types of information generated; and the costs and benefits assigned to actions and outcomes (Ostrom, 2007).

Figure 2-2: *Ostrom's institutional analysis and development framework*



New institutionalism is a foundation of Ostrom's collective action framework. This theory presumes that actors are rational and self-interested, but that their perception of what is optimal is affected by a surrounding institutional context. Moreover, in situations where no external authority is present to resolve problems or coordinate action, actors create new institutions in the form of rules, sanctions and monitoring systems in order to govern self-organized collective action (Ostrom, 2007). A problem with previous rational theories and economically-focused game theoretical models of collective action, was that they failed to explain why rational actors create self-governing systems in the first place, when in many cases a better option would be to "defect" and act purely in their own self-interest (M. Olsen, 1965; Ostrom, 1990).

Ostrom showed that this “institutional supply” problem, coupled with the interrelated problems of development mutual monitoring and credible commitments, could be solved by face-to-face communications involving discussion about the governance system of rules and monitoring. Face-to-face communication builds trust, which increases the propensity of actors to commit to a governance system. Once the governance system of joint-decision making, mutual monitoring, and administrative implementation is established and continued, participants experience joint benefits. Successful governance systems continue, while others are either discarded or adapted. This evolutionary adaptation of governance systems, in effect, increases trust between participants. Ostrom found that, providing a minimal amount of face-to-face communication occurred, governance systems transform into trusted institutions. This explains why, in general, stronger governance and administrative systems in interorganizational interactions are associated with great norms of trust and reciprocity.

Likewise, while an antecedent to interorganizational interaction is known to be “problem” interdependence (Emerson et al., 2012; Gray, 1985; Trist, 1977), once participants jointly develop governance and administration arrangements a new form of interdependence emerges. First, as a governance system is created, participants face increasing psychological sanctions for defection from a collective action, where breaking commitments is viewed very negatively in a group setting (Ostrom, 2007). Second, entering into a shared governance and administration system involves transaction costs, which represent a deterrent to leaving the system especially when significant time and resources have been committed. Finally, increasing development of joint decision making and administrative processes enables participants to better identify opportunities where resources can be shared. Thus interorganizational interaction is stimulated by resource dependence; however, in order to be activated, this dependence requires collective governance processes to enable resource *sharing* rather than purely economic considerations of resource exchange (Tschirhart et al., 2009).

These basic theoretical mechanisms explained by Ostrom underpin much of the more recent work on interorganizational interaction frameworks. Emerson et al. (2012), for example, describe a “collaborative governance regime,” meaning the implicit and explicit principles, rules, norms, and decision-making procedures that govern actors’ behaviors. The collaborative governance regime is bolstered by an iterative interactive process in which “principled engagement” (communication), “shared motivation” (trust, commitment and mutuality), and “capacity for joint action” (administrative procedures) reinforce each other in a positive feedback loop to strengthen the institutional regime of collaboration. Based on this logic, Emerson et al. (2012) hypothesize that “the quality and extent of collaborative dynamics depends on the productive and self-reinforcing interactions among principled engagement, shared motivation, and the capacity for joint action” (p. 17).

Ostrom’s framework works well for common-pool resource problems where the costs of not participating are often greater than participation. The framework relies upon the assumption that the above list of core variables such as costs and benefits are explicitly known, and that the boundaries of the collective interaction situation can be defined; indeed, a core prediction of the game-theoretic logic behind the framework is that collective action is more effective when costs are known, information is available, and participants can expect repeated and routinized interactions thus increasing incentive to cooperate (Axelrod, 1984; Ostrom, 1990). Much of the interorganizational public administration literature, however, takes different starting assumptions due to the previously identified "wickedness" of public problems where costs and benefits are much harder to calculate and the constituent factors and participants of the problem situation are rarely stable and identified.

While there are interorganizational interaction cases where Ostrom's framework likely can be applied, public domain problems require different incentives to participate in collective action such as high levels of interdependence (Emery & Trist, 1965; Logsdon, 1991; Trist, 1977, 1983), turbulence (Bryson et al., 2006; Gray, 1989) and a favorable social and political climate (Mattessich et al., 2001). Furthermore, interorganizational interaction mechanisms, which mirror "action situations" in Ostrom's framework, can be described in different ways by variables derived from other bodies of literature such as conflict resolution, leadership, management and stakeholder theory. This does not mean that the list of core variables of action situations identified by Ostrom are incorrect or do not apply, but that given the wicked problem situations encountered in public domain interorganizational research, the core variables rarely can be objectively identified in a useful manner.

Theme-Based Frameworks of Interorganizational Interaction

Other scholars do not use a systems-based approach to develop Theory of interorganizational interaction. The final framework covered, developed by Huxham (2003, 1996) and Huxham and Vangen (2000, 2005), is a "theme-based" framework. The core of the framework is a collection of "practitioner-generated" themes created from extensive grounded theory case study work of participants in interorganizational interactions, which Huxham and Vangen term “collaborations.” They subsequently identify “cross-cutting” themes that are part of all the practitioner themes, “policy-maker” themes identified by policy researchers and policy makers not necessarily directly involved in the collaborations, and “researcher-generated” themes such as social capital, which academic researchers identify as important but are not necessarily identified by practitioners. The work by Huxham and Vangen does not specify detailed dynamic processes nor suggest causal linkages, but instead intuitively maps out the conceptual landscape of interorganizational interaction by identifying and describing key variables of interest.

One particular variable of interest with respect to the present study is that of *membership structure* in the interorganizational interaction; Huxham and Vangen identify three issues of ambiguity, complexity, and dynamics. They note that interactions are often characterized by ambiguity in membership and status, meaning that participants’ perceptions about the extent to which other participants are involved may vary. Furthermore, participants exhibit ambiguity over the extent to which an individual participant is acting individually or representing an organization. While many other frameworks and arrays define interorganizational forms, in part, by membership structure and type, (Keast et al., 2007), Huxham and Vangen present evidence to suggest otherwise. For the purposes of this study, as interorganizational interaction may be intrinsically different depending on the extent to which individual citizens are involved versus individuals acting on behalf of organizations, or citizen groups, it is important to sample only one kind; in this case, interaction between organizations.

Another key observation is the complexity of interorganizational structures, especially within a single policy domain. Huxham and Vangen show that often multiple interactions exist within any policy domain, and most have overlapping goals, structures, and participants. Often, interorganizational interactions evolve complex hierarchies of structure such as working groups, committees, and network organizations—a fact identified in other frameworks. Different departments within an organization may participate independently in the same interaction, or are involved in many different ones. This creates difficult sampling issues in terms of whether individuals, departments, organizations or collaborative groupings are the unit of analysis. This point is addressed in chapter 3.

Finally, Huxham and Vangen note the dynamic nature of membership. Many scholars identify increasing membership stability as a feature of increasing interorganizational interaction (Keast et al., 2007; McNamara, 2012), or assume stable membership in the cyclical trust-commitment feedback loops (Ansel & Gash, 2007; Ring & Van de Ven, 1994). Huxham and Vangen point out that inevitably, people change jobs, organizations send different staff to the interaction on different days, and organizations face other pressures that affect their involvement. They contend that dynamic variation in membership affects the interorganizational interaction *purpose* and creates a situation of continual negotiation and renegotiation of aims and goals. While interorganizational interactions with stable memberships can be found, care is needed in research as application of many of the systems frameworks requires an assumption of stable membership.

Conclusions – Interorganizational Interaction Frameworks

Several conclusions can be drawn from this review of interorganizational interaction frameworks. First, they reflect a fundamental point about the complexity of collective action. Most frameworks are constructed in input—process—output form with multiple possible hypotheses linking variables and feedback loops between dimensions, demonstrating that collective action situations are *complex adaptive systems*. Various scholars have considered the implications of this in organizational terms (Anderson, 1999; Bovaird, 2008; Buijs, 2010; Innes & Booher, 2010; Thietart & Forgues, 1995). Multiorganizational systems tend to exhibit chaotic (unpredictable but not random) behavior as a result of counteracting forces such as the autonomy tension between individual or organizational goals and those of the interorganizational form (Thietart & Forgues, 1995). Positive feedback loops between interorganizational dimensions and variables creates nonlinear relationships, meaning caution must be applied when attempting to use linear regression modeling to test hypotheses (Aydinoglu, 2010). Stable equilibrium states such as regular stakeholder meetings may develop but are highly sensitive to contextual conditions (Bryson et al., 2006; Van Buuren & Gerrits, 2008)

Consequently, as a result of the multiplicity of variables, their potential combinations and dynamic iteration, organizations and derivative interorganizational groupings exhibit *action irreversibility* such that encountering the same situation and combination of factors more than once is unlikely (Thietart & Forgues, 1995). This emphasizes the importance of rigorous case study research, however, as was realized in earlier strands of policy implementation research (Goggin, 1986; O'Toole, 2000), complexity and an abundance of variables does not make cumulative and generalized research a hopeless endeavor as the various frameworks show broadly similar findings and prioritize important factors.

Second, in conceptual terms all frameworks suggest relationships between levels of analysis. In many cases, positive feedback loops generate emergent characteristics in which aggregate, higher level characteristics are generated from a complex interactions of individual level factors such as the link between individual trust and organizational level structures created during interorganizational interaction. However, this is also an indication of institutionalism. Apart from the special case of conflicts over common pool resources, which have particular dynamics and outcomes (Ostrom, 1990), in situations where stakeholders are interdependent and face a common and individually unresolvable problem, certain interorganizational interactions tend to develop features of organization (regular meetings, aspects of hierarchy, division of labor) reflecting the pervasive institutional norm of organization as a way to achieve collective goals in unstable or unordered situations (Thacher, 2004).

Third, inherent in the basic systems structure of most frameworks is adaptation and iteration, allowing for changes in processes, participants and governance structures as a situation changes. While the frameworks specify little about how this adaptation might unfold, other scholars have described a series of first, second, and third order effects that result from higher intensity interaction (collaborative) activities. Innes and Booher (1999), for example, describe first order effects as *collaborative outputs* as per many of the frameworks: creation of social capital, robust agreements, innovative solutions, or stable collaborative organizations. Second order effects are similar to the *collaborative impacts* described by Emerson et al. (2012): changes in original contexts, offshoot partnerships arising as a result of increasing network density, or changes in practices and perceptions (Bryson et al., 2006). Finally, third order effects may emerge after some time and include new cultural or societal norms about conflict resolution and deliberative planning. This suggests that second and third order effects may be an “indicator” of collaboration, an observation that is missing from the interorganizational interaction literature reviewed in the next section.

Fourth, the frameworks have little utility in defining interorganizational interaction terms, with the exception of Thomson (2001). All the frameworks could apply at different levels of interorganizational interaction, and some are explicitly intended to capture the whole life cycle of interorganizational interaction from birth to dissolution. The basic self-reinforcing feedback loops show how these collective action situations form with limited levels of interaction (i.e. “deconfliction” or “cooperation”) and then ratchet up all the way to full collaboration—a much higher intensity of interaction. While this is not necessarily a problem in terms of the frameworks, there is an inconsistency with the body of work on interorganizational interaction arrays, which ascribe specific operationalizations to common terms such as coordination, cooperation or collaboration. In some cases, a more appropriate and general name for many of the “collaboration” frameworks reviewed may be “interorganizational interaction” framework.

Fifth, while most frameworks intend to be general, the dynamic of interorganizational interaction is affected by context, specifically the nature and organizational level of participants, the scale of the policy problem, and the membership size of the interaction. For interactions involving organizations rather than individual citizens, the organizational hierarchical level at which a framework applies is not specified. In the array literature, for example, lower levels of interaction (cooperation) are distinguished from higher levels (collaboration) by the involvement of more senior staff or denser interactions from working level up to leadership level. Some frameworks may apply only to leadership (Ansel & Gash, 2007), but then other frameworks explicitly spell out roles for all participants (Gray, 1989). While there is no conclusive evidence from the literature and further research is needed, the case may be that regardless of level in the hierarchy, drivers and mechanisms of interorganizational interaction are similar, with the exception that higher up levels tend to have greater authority to commit resources.

Another issue affecting interorganizational interaction dynamics is the importance of the *scale* of the policy problem and the way participants “interface” with the problem. Morris et al. (2013), for example, points out that the failures of collaborative efforts in Chesapeake Bay restoration projects may stem from the large number of organizations involved, the large geographic area over which the problem exists, and the very broad policy problem. This is in contrast to successful efforts to restore the rivers in the Hampton Roads area, which involved locally-based groups, smaller numbers of organizations and individuals, and thus allowed social capital to be a “gluing” mechanism of collaboration. While some of the array literature has attempted to include characteristics of the policy problem into a definition of interorganizational interactions, it is unclear the extent to which the frameworks reviewed apply across varying geographic, financial or impact scales of policy problems.

The final conclusion concerns the state of Theory in collaboration literature. This review started out by selecting “frameworks,” with a general observation that most do not meet the set of five criteria for theory presented by Blomquist (2007) and Schlager

(2007): specification of boundaries and scope of inquiry; assumptions about individual actors; a mechanism for collective grouping; links to the wider context / environment; and a mechanism for system change. A closer inspection shows that while none of the frameworks other than Ostrom's meets the five criteria, some do come close, as illustrated in Table 2-2. Ostrom's framework is not considered as theory, however, as it is "empty" of specific hypotheses linking variables (Ostrom, 2007).

Table 2-2: *Assessment of theoretical potential of interorganizational interaction frameworks*

	Selection of frameworks reviewed						
Criteria for Theory	Ansel and Gash (2007)	Emerson et al. (2012)	Gray (1989)	Ring and Van de Ven (1994)	Bryson et al. (2006)	Huxham and Vangen (2005)	Ostrom (2005)
Boundaries / scope of inquiry			X				X
Assumption about individual			X			X	X
Mechanism for collective action	X	X	X	X		X	X
Link to wider context	X	X			X	X	X
Mechanisms for system change	X	X		X	X	X	X

Several scholars note that the particular type of collaboration (Gray, 1989) or the particular organizational forms that emerge from the process (Bryson et al., 2006) depend strongly on the localized context such as the nature of the participants or the stability of the policy domain. Thus for a framework or theory to meet the above five-fold criteria would require a typology of cases, pairing up combinations of participants, situation type, policy domain, and other contextual factors, with different forms of frameworks. This conclusion points towards the tension between creating generalized mechanisms of interorganizational interaction versus highly specific cases that enumerate all possible combinations of inputs, processes, and outputs. This may explain why many scholars either develop high level frameworks, or pick out specific variables for study and create highly specific "models," which look at one or two particular relationships from a framework under particular cases. In sum, developing Theory of interorganizational interaction is very challenging.

Another related Theory aspect concerns the paradigmatic basis of the frameworks. With the exception of Huxham's, all are generally functionalist—they assume objective reality and tangible variables. Huxham, however, opens the door for a social constructivist perspective, noting that interorganizational interactive dynamics depends largely on the perceptions of participants. All the frameworks treat interorganizational forms as an open system, as defined by W. R. Scott (2003), yet they emphasize natural and rational aspects to varying extents. While Thomson (2001), for example, specifies explicit operationalizations of governance and administration structures as intrinsic to the collaborative process, Gray (1989) emphasizes human relations aspects such as the legitimacy and power balance of participants, and the importance of the convener and mediator roles in collaboration.

Lawrence and Lorsch (1967) postulate that the reasons for such diversity of Theory lie in the different backgrounds and experiences of the theoreticians: rational theorists typically have managerial or engineering backgrounds, while natural theorists tend to be academics. W. R. Scott (2003) notes that the type of organization that theorists study is important. Rational theorists typically study business firms or government bureaucracies, while natural theorists study voluntary, service or community organizations. Continuing the example above, Thomson, who trained at a mainstream public administration school, developed her framework by studying a major nationwide nonprofit organization; Gray, who was an organizational behavior theorist, developed her work from studying conflict situations in local community problems.

While these observations may be unsurprising, they highlight an important point with regard to the interorganizational interaction frameworks. Rational paradigms are intuitively applicable to stable interorganizational forms, while natural paradigms fit with dynamically varying or less-structured groupings. The interorganizational interaction frameworks do not specify their limits of applicability in terms of the various actors constituting the interaction, the stability of participation, or the dynamic variation in system context. The case may be that interorganizational interactions between government bureaucracies, with all other things equal, are more likely to recreate signatures of hierarchy during the interaction as observed by Bardach (1998), in comparison to interactions between local community groups and individuals. This highlights the limits of generalized frameworks, as the dynamic unfolding of a interorganizational interaction over time may vary quite considerably depending on the history, experiences and identities of the participants. This conclusion will be revisited when the sample for this particular study is defined.

Interorganizational Interaction Arrays

Organizations are intricate systems composed of multiple social structures, participants, goals, and technologies, interacting with the external environment and exhibiting complex individual and group behaviors. From this initial description, scholars have identified many distinct “dimensions” of organizations that merit study and often form the basis of entire disciplines. Rainey (2003), for example, identifies key dimensions as: goals, values, leadership, strategy, culture, organization type, hierarchical structure, processes, tasks, technologies, performance, incentives, individuals, and groups. Each of these dimensions can be further broken down; the dimension “structure” is composed of: specialization, division of responsibility, departmentalization, centralization, hierarchy, and formalization.

While this list of dimensions describes a single organization, the interorganizational literature recognized that when organizations interact and form interorganizational relationships and structures, these dimensions are generally affected by the interaction (Whetten, 1981). Efforts to define interorganizational interaction terms can be considered part of this broader body of interorganizational literature, which attempts to create typologies and arrays of interorganizational forms using the organizational dimensions—with some additions particular to interorganizational structures—as discriminating characteristics. This section reviews important interorganizational interaction array work from the interorganizational and collaboration literatures.

Table 2-3: *Generic structure of an interorganizational interaction array*

Dimensions (distinguishing characteristics)	Interorganizational Form		
	Form Type A	Form Type B	Form Type C…
Dimension 1	Indicator of Dimension 1 for Form Type A	Indicator of Dimension 1 for Form Type B.	Etc.
Dimension 2	Indicator of Dimension 2 for Form Type A	Etc.	
Dimension 3			

From the literature reviewed, the scale forms of interorganizational interaction arrays generally have two axes as illustrated in Table 2-3. The first (horizontal) axis defines names for a particular interorganizational interaction, form or relationship, for example: collaboration, cooperation, or partnership. The second (vertical) axis contains the discriminating characteristics or "dimension," for example: information, structure, resource, or decision-making. Each cell of the typology then describes what that particular dimension looks like for each interorganizational form.

Early scholars realized that different interorganizational forms exhibit different processes, depending on their purpose and how they operate. As shown in Table 2-4, Astley and Fombrun (1983) create a typology of "forms of internal interdependence" based on three dimensions: resource flow through the network; form of control; and emergent structures of coordination. They define four general types of interorganizational forms or "collectives:" *agglomerate, confederate, conjugate,* and *organic*. The organic collective, for example, is characterized by an "indirect symbiosis" form of internal interdependence, where diverse types of organizations depend on the same resource pool for existence, such as vast spectrum of medical providers depending on the supply of sick people. An organic's forms of institutional control (second dimension) is "political," where the dominant regulative force between organizational interactions is the political system in a state.

Table 2-4: *A typology of "ideal type" interorganizational forms adapted from Astley and Fombrun (1983)*

	Forms of Internal Interdependence			
Dimensions	Agglomerate (indirect commensualism)	Confederate (direct commensualism)	Conjugate (direct symbiosis)	Organic (indirect symbiosis)
Resource flow through network	Information flows	Personnel flows	Work flows	Influence flows
Form of institutional control	Economic	Social	Legal	Political
Emergent structure of coordination	Cartels Professional associations	Collusion Informal leadership	Contract Joint venture	Network organizations' institutionalized rule structures

While this typology presents "ideal types" of interorganizational forms, a problem with this approach is that the four forms are not mutually exclusive, meaning the same dimension indicator can be repeated for multiple interorganizational forms (Gueguen, Pellegrin-Boucher, & Torres, 2006). For example, it is likely that "information flows" and "influence flows" would both be seen in the organic form. Categorizing interorganizational forms aims to support theoretical development and empirical study by analyzing which forms lead to certain outcomes or behaviors, yet non-mutually exclusive independent variables (the interorganizational forms) negatively impact a typology's empirical utility (Smith & Larimer, 2009). While Astely and Fombrun describe the cells as representing "dominant" aspects of each interorganizational form, the dimensions are not practicable for rigorous empirical research.

Gray (1989), in her influential book on interorganizational relationships, which she terms as "collaborations," again emphasizes that the characteristics of interorganizational forms vary depending on context, and that the form eventually affects outcomes. As show in Table 2-5, she defines four interorganizational forms or "collaborations" first by the function that they perform, and secondly by the possible outcomes that may result.

Table 2-5: *Interorganizational forms and their functions, adapted from Gray (1989), p. 241*

	Interorganizational Form			
Dimension	Exploratory	Advisory	Confederative	Contractual
Function	Acknowledge interdependence Establish trust Clarify parameters of problem domain	Analyze problem Draft recommendations	Draft and adopt recommendations for ongoing interaction	Operational agreements Resource exchanges Nonbinding agreements
Possible Outcomes	Shared problem definition Initial policy analysis Focusing of issues	Policy recommendations	Formally regulate interactions Institutionalize relationships	Contractual legal agreements Binding agreements

An "exploratory" collaboration may occur as one of the first activities between organizations in order to acknowledge interdependence between actors, establish trust and conduct initial problem scoping to "formulate the mess" (Ackoff, 1974). "Advisory" collaborations extend these functions and identify solutions. "Confederative" collaborations consider implementation of solutions, and may start to exchange resources to do so and develop increasingly formalized agreements. Finally, "contractual" collaborations see a high level of formalized solution implementation with legally binding contracts. A research and development consortia of industry and academic organizations is an example of a contractual collaborative, in which participants develop legal contracts about profits and copyright, but also complex formal and informal rules about how participating organizations interaction.

Employing the function or purpose to discriminate interorganizational forms such as in the Gray typology is useful to allow a researcher to relate interorganizational interaction directly to the context of the situation or environment, and this approach has been employed in many typologies and scales of interaction. From a review of 36 environmental management case studies, Margerum (2008) constructs a typology of three interorganizational forms: action, organizational, and policy "collaboratives," according to whether the main reason for interaction between organizations is to act directly, change organizations' policies about a collective problem, or attempt to change government policy concerning the problem. In a similar vein, Alter and Hage (1993) identify different "coordination methods" depending on whether the interaction is for policy making, administration, or operations. In a more detailed analysis, Aiken et al. (1985) note that the comprehensiveness, accessibility and compatibility of an interorganizational form depends on whether the purpose of interaction is for coordinating programs, resources, suppliers, consumers or information. More recently, Donahue and Zeckhauser (2011) organize their analysis on whether collaboration is for the purpose of improving productivity, gaining information, increasing legitimacy, or sharing resources. As will be discussed later, however, while this approach is useful in some respects, attempting to define interaction terms using dimensions of function, purpose or outcomes introduces logical errors.

Gray, Aiken and Margerum do not elaborate further on the discriminating dimensions of interorganizational forms, making it challenging to use their typologies other than for initial theory development. Gray, however, introduces the notion that interorganizational interactions become "progressively more institutionalized" (Gray, 1989, p. 240) proceeding from exploratory to contractual forms. That different interorganizational forms exhibit different "intensities" of interaction is the foundation for another influential early work on interorganizational theory: *Organizations Working Together* by Alter and Hage (1993).

Building from the Astley and Fombrun (1983) typology, Alter and Hage (1993) start with a "form of interdependence" dimension with two values of competitive and symbiotic—the justification being that organizations in symbiotic relationships have much different logics and more opportunity for interaction compared to competitive relationships. As shown in Table 2-6 they add another dimension with two categories based on the number of partnering organizations (dyadic / triadic interactions, or multisectoral / networks), given strong findings from interorganizational relations literature noting that collectivities with few members exhibit much greater tendency for self-interested behaviors. They use these four basic combinations to define the nature of three types of interorganizational forms: limited, moderate, and broad "cooperation." Alter and Hage's work, which established the idea that interorganizational interaction occurred on a scale of "intensity" or magnitude, led to subsequent efforts to classify interorganizational forms based on level of interaction.

Table 2-6: *A typology of interorganizational interaction adapted from Alter and Hage (1993)*

Dimensions		Extent of Interorganizational Interaction		
Form of Interdependence	# of Interacting Organizations	Limited Cooperation	Moderate Cooperation	Broad Cooperation
Competitive	Dyadic / Triadic	Descriptors of Interorganizational forms such as: joint ventures, partnerships, contractual relationships, social networks, systematic production networks,		
	Multisectoral			
Symbiotic	Dyadic / Triadic			
	Multisectoral			

Empirical research on interorganizational interaction is challenging because interorganizational forms evolve considerably with time and many organizational behaviors are affected by social constructions (Ansel & Gash, 2007; Lincoln, 1985). Many of the typologies reviewed attempt to classify interorganizational forms into categories based on simple characteristics with qualitative values (e.g. network strength as “high” or “low”), yet network strength may vary considerably over time, or may be measured in different ways by different observers. Such inconsistencies diminish the empirical utility of the early interorganizational interaction arrays.

Later efforts by McNamara (2012), Williams (2010), and Keast et al. (2007) for example, include mixes of objective organizational characteristics in addition to more general qualitative dimensions. These interorganizational interaction arrays, in effect, provide “snapshots” of complex and dynamic interaction processes and give reasonable indicators about the level of interaction, without overly specifying structural details. In reality, the particular choice of name for an interorganizational form—whether “cooperation” or “collaboration”—is largely arbitrary; what is important is how the dimensions change for that particular form, and what this signifies for an organization.

While the arrays do not spell out these implications in detail, they provide a starting point.

The most developed interorganizational interaction array to date is McNamara (2012), from her Ph.D. dissertation (McNamara, 2008) building on prior work by Fagan (1997), Mattessich et al. (2001), Diehl (2005); Edmondson (2006); Thatcher (2007). McNamara defines three levels of interaction—cooperation, coordination, and collaboration—and ten dimensions: design of administrative structures supporting the collective efforts; formality of the agreement determining roles and responsibilities; organizational autonomy; key personnel who have responsibility for implementing the partnership; information sharing; decision making; the extent to which there is a process for resolution of turf issues; resource allocation; systems thinking; and trust.

Some scholars use characteristics of the context or situation in which interorganizational interaction takes place to define the extent of interaction. For example, the McNamara (2008) typology has additional dimensions over her later 2012 version, including: duration of interaction (time); difficulty of task; and impetus for collective action. Moore and Koontz (2003) create a typology based on the type of participant to the interaction: agency, citizen, or mixed. While these dimensions have descriptive utility, using them to define the interorganizational form is a logical fallacy—equivalent to defining a river by the presence of a valley: a valley is a sufficient condition for a river, but it is not necessary. Similarly, those typologies that incorporate antecedents and outcomes of interorganizational interaction suffer from the same logic error. For example, the Margerum typology discriminates interorganizational forms on the basis of whether the goal of participating organizations is to act directly, change organizations' policies about a collective problem, or change government policy concerning the problem area. It stands to reason that any collective effort could have all three or none of these goals. A more rigorous approach may involve restricting definitions to those dimensions relating to the interorganizational form itself, and those relating to the organizations involved in the partnership.

Comparing the interorganizational interaction arrays reviewed, it is possible to classify the various dimensions used into three categories: dimensions relating to the context or environment in which the interorganizational interaction occurs; dimensions relating to the interacting organizations; and dimensions relating to the actual interorganizational form itself. For example, the dimensions of “organizational autonomy” and “key personnel” are clearly from the perspective of the organization, whereas “formalized agreements” relates only to the interorganizational form. Table 2-7 arranges the dimensions in the interorganizational interaction arrays reviewed according to these three categorizations. In effect, Table 2-7 lays out all the various dimensions by which any interorganizational form such as collaboration *could be* defined.

Conclusions – Interorganizational Interaction Arrays

Several conclusions can be drawn from this review of interorganizational interaction arrays. First, as observed in the comparison in Table 2-8 the terms chosen for various forms of interorganizational interaction are arbitrary and their acceptance is a matter of convention. This explains, for example, how Himmelman (2002) considers networking as the most informal and limited interorganizational interaction, whereas Mandell and Steelman (2003) define it almost oppositely as the most intense and comprehensive interaction.

Table 2-7: *Summary of interorganizational interaction array dimensions arranged in three categories*

Dimensions Relating to Context, Situation, Antecedents or Outcomes	Dimensions Relating to Structural and Behavioral Aspects of Participating Organizations[A]	Dimensions Relating to Interorganizational Interaction (II)[B]
Time required for problem solution Length of time problem has existed Complexity of problem domain Antecedents to collective action (e.g. extent of history of prior work together; extent to which an organization is well-known in problem domain) Function of II (e.g. information exchange, production, resolving conflict, planning, analysis, evaluation) Type of goods produced by II (public, private, common-pool) Intended outcomes of II (e.g. policy change, rule change, direct action) Type of organization involved (e.g. government, nonprofit, private company, coalition, charity)[D] Number of participating organizations	Level of staff participating in II (e.g. leadership, junior, working level) Type of interdependence between organizations (e.g. organizations could achieve goals without II, or require II to achieve goals) Organizational autonomy Authority over goals, resources Key personnel *Decision making*[C] *Resource allocation* Systems thinking Incentives Commitment Willingness to change Trust Risk taking *Culture*	Time duration of II Frequency of II Differential of level of staff engaged in interaction (e.g. manager-manager; CEO-manager; CEO-CEO) Design of interorganizational infrastructure Formality of interorganizational agreement Extent of information sharing *Decision Making* *Resource allocation* Resolution of turf issues *Culture*

A. Organization is understood in a conventional "rational" perspective with boundaries defined by the hierarchical structure (i.e. org chart).

B. The dimensions belonging under the II column are those that *emerge* out of the interaction, and are not something that can be measured meaningfully in the participating organizations.

C. Italic text denotes that the dimension can be categorized under two columns, depending on how it is defined.

D. This dimension is not placed in the "organization" column as it is not a structural or behavioral characteristic. That is, while different types of organization will vary in structural forms, the impact of organization type on II is minimal or random.

Apart from the recent exceptions of McNamara (2008), Thatcher (2007) and Thomson et al. (2009), definitions created by dictionary writers and many scholars are generally conceptually constructed by thinking, rather than taxonomically generated from categorization based on empirical observations (Bailey, 1994; Smith, 2002). What is more important is understanding how the various dimensions pair together in certain combinations and what effects these have on outcomes. It is useful for future research, however, to create standardization in the usage of terms.

Second, a repeated notion is that interorganizational interactions exist on a "continuum" characterized by both increasing magnitude of implications for partnering organizations and increasing formalization and interdependence of the emergent interorganizational form. In most cases, however, this continuum is "quantized" such that, with some exceptions, dimensions have a discrete number of values. While some continuum approaches have used the term "maturity" to describe the increasing interorganizational interactions that occur from cooperation to collaboration (Alberts & Hayes, 2007; NATO, 2006), "maturity" suggests both elements of quality and superiority and implies that moving up the scale of interaction is preferable. Many studies suggest, however, that operating at the highest level is not appropriate for all situations (Chisholm, 1992; Mattessich et al., 2001). Although the term magnitude can be misconstrued to imply quantity, this is not the intent. Interaction magnitude is meant to convey that the magnitude of the *impact* on partnering organizations will be greater at higher levels of interaction.

Table 2-8: *Comparison of terminology used for interorganizational forms in typologies*

Author	Terminology Used for Interorganizational Forms (presented in order of lower to higher intensity)	Discriminating Dimensions
Alter and Hage (1993)	Limited cooperation Moderate cooperation Broad cooperation	Form of interdependence (competitive or symbiotic); number of partnering organizations (2 – 3 or >3 “multisectoral”); objectives; power; resources
Mattessich et al. (2001)	Cooperation Coordination Collaboration	Vision and relationships; structure, responsibilities and communication; authority and accountability; resources and rewards
Himmelman (2002)	Networking Coordinating Cooperating Collaborating	Formality of relationship; qualitative description of characteristics; resources
Mandell and Steelman (2003)	Intermittent coordination Temporary task force Permanent / regular coordination Coalition Network structure	Extent to which problem orientation is individual or shared; commitment to goal (common or separate); intensity of linkages (loose or tight); breadth of effort (narrow or comprehensive); complexity of purpose; scope of effort
Gajda (2004)	Networking Cooperating Partnering Merging Unifying	Purpose; strategies and tasks; leadership and decision making; interpersonal and communication. Note – Gajda consider all these levels as *forms* of collaboration
Frey et al. (2006)	Coexistence Communication Cooperation Coordination Coalition Collaboration Coadunation	Not specified; the spectrum of interaction is used to compare a several other typologies (cite).
Keast et al. (2007)	Cooperation Coordination Collaboration	Goals of interaction; perspectives of participants about these goals; stability of structural linkages; formality of connections; risks and rewards of participation

Author	Terminology Used for Interorganizational Forms (presented in order of lower to higher intensity)	Discriminating Dimensions
Carrasco (2009)	Cooperation Coordination Collaboration	Reciprocity; extent of interaction between organizations; purpose of interaction; decision making format; types of relationships between organizations and individuals; action; skills; participation (nature of leadership); mechanism of leadership; technology of communications
Cross et al. (2009)	Networking Alliance Partnership Coalition Collaboration	Purpose; structure; process
Williams (2010)	Conflicted interactions Deconflicted interactions Coordinated interactions Collaborative interactions	Organizational structure; communications; information sharing; decision making; operating procedures; authority and accountability; culture and values; planning and evaluation
McNamara (2012)	Cooperation Coordination Collaboration	Design of administrative structures; formality of agreements; organizational autonomy; key personnel; information sharing; decision making; resolution of turf issues; resource allocation; systems thinking; trust

Third, an observation unexamined in the literature is that interorganizational arrays represent a *morphological field*, that is, a way of displaying all the possible combinations of dimensions that could occur (Ritchey, 2006, 2011). Continuums of interaction lead to the conclusion that cooperation is defined by the occurrence of *all* the dimensional indicators at that level, yet this may not be the case. Many situations could occur where dimensions A and B indicate a *high* level of interaction (i.e. collaboration), but dimensions C and D indicate a *low* level of interaction (i.e. coordination). The interorganizational interaction arrays do not tell us how to define this state. Furthermore, the evolution of an interorganizational interaction through time may see ebbs and flows of interaction intensity, a fact not captured by arrays.

While arrays represent a useful abstraction or conceptual tool, they mask the complex reality of interorganizational interaction, as hinted at by the framework literature. Other research has suggested that cross-level combinations are indeed possible. In an emerging field of research on interorganizational team working, scholars have developed a theory of *knotworking*—a combination of networks and tight collaborative "knots"—in which collaboration exists but only for short timescales and with fragmentary ties between participants (Engestrom, 2005). In other research using a network perspective, Herranz defines a typology of "network coordination" (Herranz, 2008, 2009, 2010a). He shows that depending on the "strategic orientation" of network actors (the extent to which actors prefer collective action to be conducted bureaucratically, entrepreneurially, or community-focused), the form of "coordination" displays differing combinations of dimension, which do not correspond with the levels of interaction reviewed thus far. Further research is needed about the possible combinations that could occur in reality, versus those that are theoretically or logically excluded (McNamara, 2012).

The final conclusion concerns the paradigm of interorganizational interaction arrays. Given the basic purpose of an array is to classify concepts and generate rigorous definitions for terms, all the arrays assume an objective functionalist paradigm. They aim to give descriptive indicators or "snapshots" of how various levels or forms of interorganizational interaction are operationalized in terms of key organizational dimensions, in addition to some emergent characters of the interorganizational form.

Typologies and continuums of interaction cannot be considered as "theory" per se, as they say little about the particular level of analysis—although most seem to cover multiple levels—and cannot be easily classified as rational or natural systems. They provide a starting point, however, for the organization of key variables and suggest some important hypotheses, when examined with the collaboration framework literature in mind.

Comparing Frameworks and Arrays

The main body of this literature review has focused on interorganizational interaction frameworks and definitional arrays from contemporary public administration scholarship and antecedent works in organizational science. For this chapter, three questions guided the review: how is interorganizational interaction defined and conceptualized; which theoretical perspectives inform these conceptualizations; and how are different interorganizational forms distinguished from each other? The following conclusions first compare the literature on frameworks and typologies, then reflect on the broader aspects of the definitional questions by applying organizational and network lenses.

As the mainstay of contemporary interorganizational interaction research in public administration relies either on frameworks or arrays, a comparison between the two is pertinent. This comparison, which is summarized in Table 2-9, highlights the strengths and limitations of each approach. It is not intended to be evaluative as both the framework and typological approaches have theoretical and practical utility depending on the circumstances and particular research questions.

Table 2-9: *Comparison of conclusions from review of frameworks and arrays*

Interorganizational Interaction Frameworks	Interorganizational Interaction Arrays
Illustrate the complexity of collective action: chaotic, nonlinear processes, with action irreversibility	Portray linear steps between stages or levels of interaction; assumes collaboration or other levels are repeatable or standard forms of interaction
Postulate causal relationships between levels of analysis, and between multiple variables	Causality is not directly specified Dimension indicators for each stage of interaction are correlated as a result of the typology structure
Interorganizational interaction processes adapt to context and lead to broader impacts	Adaptation is not considered
Definition of interorganizational interaction levels remain ambiguous	Very specific about definitions of interaction terms, though the choice of term is ultimately arbitrary Present a “quantized” continuum of interaction, but in reality represent a morphological field with multiple possible combinations
Ambiguous about the extent to which frameworks can be applied at different organizational levels (e.g. leadership level or street level), or in different contexts (e.g. for policy change, implementation, temporary emergencies)	Very specific, in certain cases, about applicability to different organizational levels and contexts

First, as a basic consequence of systems-based construction with feedback loops and adaptation, frameworks emphasize the complexity of collective action. While certain patterns in interorganizational interaction processes can be observed and predicted, emergent behavior and the fact that each case of interorganizational interaction is slightly different makes theoretical generalizability and conceptual operationalization challenging. In contrast, many arrays assume that stable—and thus presumably repeatable—characteristics of interorganizational interaction exist. Furthermore, while frameworks stress the dynamic, iterative and adaptive nature of interorganizational interaction, arrays say little about adaptation, nor the conditions under which a shift from one level of interaction to another would occur. This does not intend to imply that developers of arrays fail to recognize this important point, but simply that arrays are limited by their structure in what can be represented.

Second, frameworks and arrays differ in the extent to which they capture relationships between interorganizational interaction input, process and output variables. Arrays suggest relationships between variables in the sense that “collaboration” or other interaction terms are defined by the simultaneous presence of disparate indicators of variables (i.e. dimensions) at the same level of interaction. In contrast, frameworks hypothesize specific relationships between variables, often at different levels of analysis. Frameworks offer descriptions of process, while in general, arrays cannot capture the process aspect of interorganizational interaction particularly well.

Third, frameworks are ambiguous about the extent of their applicability to different organizational levels (from the leadership level where interorganizational interaction is governed, to the “street-level” where implementation actually happens), or in different contexts such as situation type or the purpose of interorganizational interaction (e.g. for policy change, implementation, temporary emergencies). In contrast, arrays clearly specify the level of applicability in organizational terms, and often build context into the construction of the array—even though this creates situations of non-mutually exclusive distinctions between different levels of interaction.

Finally, while arrays offer definitional operationalizations of interaction terms as a result of their intrinsic purpose, frameworks have less utility in this area. Many of the frameworks specify processes that span multiple levels of interaction, meaning they apply equally to coordination and collaboration. Furthermore, some frameworks imply dynamically varying combinations of dimensions across interaction terms that are undefined by the arrays, such a combination of several dimensions of cooperation with several of collaboration.

A Sidebar on Networks

The Theoretical findings developed so far in this literature review permit a short diversion, which, while not explicitly related to the main aim of this research, is important enough in the grand scheme of the literature to consider. One of the major difficulties in scholarly research on interorganizational interaction in general, and collaboration in particular, is that a significant parallel literature exists on networks. This parallel literature develops many of the same conclusions and employs similar research tools, yet often creates confusion due to overlapping perspectives on interorganizational interaction and general use of terminology. A further difficulty is that both network and collaboration literatures draw from organizational theory. One of the guiding questions presented at the start of this literature review asked how different forms of interorganizational or collective interaction can be distinguished from one another. The analysis presented so far allows us to consider how “network” can be reconciled with the continuum of interaction, focusing on collaboration first. This analysis will be reflected upon again later, in the conclusions for the overall study.

Differentiating between collaboration and network is challenging: both concepts share an intertwined development with significant interchange of terminology in the literature (Börzel, 1998; Rethemeyer & Hatmaker, 2008). Similarly, the underpinning paradigmatic and theoretical perspectives of both collaboration and networks overlap considerably. Networks can be defined and characterized by the same set of dimensions presented in Table 2-7, however, additional characteristics are required, such as whether connections are between different levels of government (federal, state, local), organizational hierarchy (leadership, management, working level), sectors (private, nonprofit, government), or policy domain (T. E. Hall & O'Toole, 2004). To distinguish fully between network and collaboration concepts in a rigorous manner would require another analysis of similar length to the present study; nevertheless, some key conceptual overlaps can be observed. It should be noted that given the lack of synthesis of collaboration and network perspectives in the literature, the following is primarily an exercise in conceptual scoping; an effort to identify some basic conceptual similarities.

Recently, several reviews have summarized the literature from the perspective of networks and presented several categories of approaches to network research (Borgatti & Foster, 2003). In one approach, networks are viewed as *structure*: a framework of connections between actors, either organizations or individuals, often in the context of a particular policy domain such as water or climate policy (Ingold, 2011). Network topology is examined as an explanatory variable in how actors, groups and the network overall behaves (Coleman, 1990). Another approach emphasizes the *connections* between network actors by focusing on the resources, both physical and social that flow within the network, as an explanatory factor (Borgatti & Cross, 2003). In collaboration, or interorganizational interaction more generally, both structural and connectionist perspectives are important and are required as an intrinsic part of collaboration frameworks and associated theory.

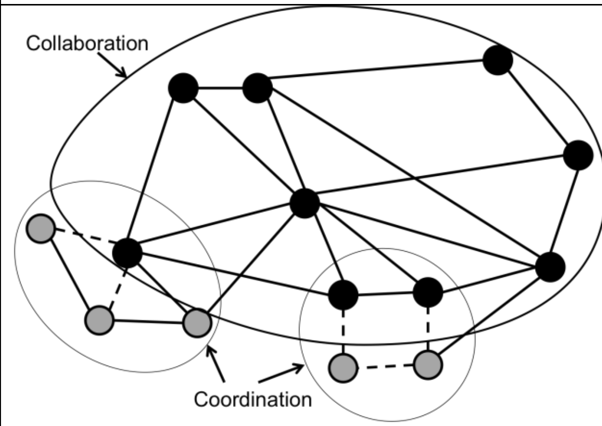
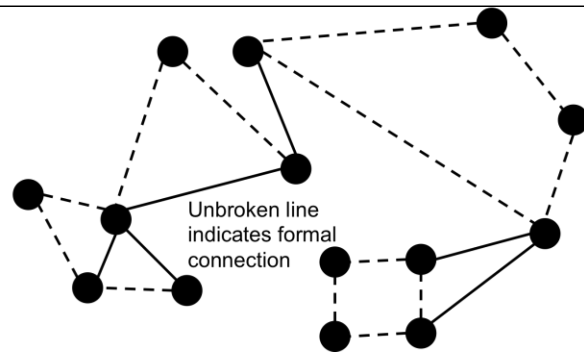
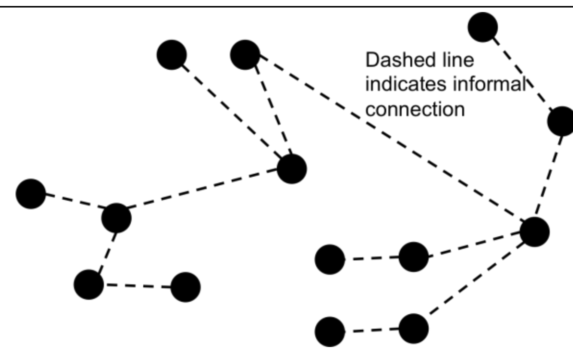
It is possible to characterize the continuum of interorganizational interaction covered in this chapter in terms of structural and connectionist network parameters, with an important caveat. Given the inherent construction of interorganizational interaction arrays, descriptors such as “coordination,” “cooperation” and “collaboration” cannot be applied to networks in the same way as *averaged* network parameters such as centrality, density or complexity. Interorganizational interaction arrays and the terms that they define are applicable either from the perspective of a single actor (i.e. how any given organization views dyadic relationships with other organizations), or generally to a collectivity of *first-degree* network connections. They do not describe the general behavior of a total network, and thus apply only to a specific part of a network—the part engaging in collaboration, cooperation, or otherwise. Unfortunately, network scholars often confuse this issue by using “collaborative network” to refer to both a group of first degree connected network actors engaging in collaboration, and the broader web of n^{th}-degree connected actors (For examples of this usage see: Agranoff, 2006; Rethemeyer, 2005; Rethemeyer & Hatmaker, 2008).

In any given policy domain, a “latent” (Heilman et al., 1994) or “serendipitous” (Herranz, 2010b) network may be present in which actors with a variety of functional specialties are connected via first, second and third degree ties, but without centralized organizing forces such as formalized relationships or common problems. For any given group of first-degree network actors, this state can be viewed as a lower level of interorganizational interaction such as cooperation, where actors are not necessarily “working together” but are in “informal networks” that exchange resources such as information, without identifying common problems or losing independence (Isett et al., 2011). This situation is illustrated by the bottom cell in Figure 2-3. Structurally, this situation is characterized by an average low centrality and density across the network.

If network actors begin to be affected by a common problem, the latent network may “activate” to produce a higher degree of interaction such as coordination, characterized by increasing formalization of relationships, more regular contacts, involvement of leadership and some joint decision making. As the density and strength of network ties increases, varieties of network governance emerge. Provan and Kenis (2008) describe three different forms: participant, lead organization, and network organization-governance. Participant-governed networks do not have a separate governance entity, but instead rely on decentralized and individual actors to coordinate collective action in small groups in the network. In general, participants are equal in terms of power and are connected by trust. This state corresponds to the level of coordination in Figure 2-3, where structurally, the network is characterized by low centrality, but high density.

Lead organization network governance occurs when a single organization—often a government department or nonprofit—acts as a decision focal point for the network. Provan and Milward (1995), for example, describe the concept of “core agency centrality,” in which a central government agency, a community mental health center in their study, “coordinates” all services of actors in a network. While a lead organization may provide overall network “coordination” as an output, they will likely engage in collaboration with first-order network actors. This network state, characterized by high centrality and high density corresponds with collaboration in Figure 2-3.

Figure 2-3: *Comparison of network types and levels of interaction*

Level of Interaction	Network Characteristics	Pictoral Representation of Network
Collaboration	High centrality High density (formal and informal connections) Common problem affecting all actors Formalized governance system among first degree network ties	
Coordination	Low centrality High density (mainly informal connections) Common problem affecting all actors Informal governance systems	
Cooperation	Low centrality Low density of informal connections Common problem may affect all actors, but no collective approach is present	

In certain cases, first degree network actors may decide to form an entirely new organizational structure to govern the activities of the network, often called a "network administration organization" (NAO) (Provan & Kenis, 2008; Saz-Carranza & Ospina, 2011). In terms of network structure, the NAO-governed network is analogous to the lead organization-governed network with high centrality and density, however, the NAO can be interpreted as the maximum level of interorganizational interaction, which several scholars define as “integration” (Gajda, 2004; NATO, 2010).

The concept of governance is especially important in the NAO-governed and lead organization-governed networks that display collaborative activities, which echoes the concern of governance in study of collaboration (Ansel & Gash, 2007; Emerson et al., 2012). Network scholars have created various qualifier terms to attach to “network” to describe these states. Provan and Kenis (2008, p. 231) define “goal-directed” networks as “three or more legally autonomous organizations that work together to achieve not only their own goals but also a collective goal.” They contend that such networks require centralized governance, whether by lead organization or NAO, to ensure that actors “engage in collective and mutually supportive action, that conflict is addressed, and that network resources are acquired and utilized efficiently and effectively” (231), in other words, that collaboration occurs.

Similarly, Isett et al. (2011, p. 162) describe “formal networks” as “multiactor arrangements *explicitly* constituted by public managers to produce and deliver public services.” Formal networks are governed by a variety of formalized mechanisms including contracts, legislation, memoranda of understanding, or joint agreements. In descriptive terms, it is challenging to differentiate between a collaboration and a formal network as described by Isett et al.

While collaboration can be used to describe a structural configuration of actors bounded by a common problem situation, it is inherently a process. One possible way to integrate collaboration and network terminology is to view collaboration as a process between a subset of first degree actors embedded in a network. Labeling networks as "collaborative" as many scholars have done (Agranoff, 2006; Isett et al., 2011; Milward & Provan, 2006) should be discouraged, as collaboration can only occur in a small subset of a network (first degree ties) rather than more generally. If we permit the notion of "collaborative networks," then presumably "cooperative networks" or "coordinative networks" should also be permitted: a terminological situation that could hardly be described as parsimonious.

Terminology aside, collaboration and network literature draw identical findings when considering the connectionist approach to network analysis. Certain features of networks "generate" the conditions for collaboration recognized in the literature such as a previous history of working relations or the development of trust between actors. As Isett et al. (2011) note, in certain cases such as mandated interactions or emergency crisis situations, collaboration can occur in the absence of a network, yet in most cases, collaboration will have emerged from an existing network structure.

In conclusion, collaboration can be interpreted as an organization in a state of organizing overlain on a network. In other words, collaboration occurs *in* a network, but is not a characteristic *of* a network. As the level of interaction increases between network actors and collective activity moves from cooperation to collaboration, organization within the network becomes more defined, though not necessarily in terms of hierarchy. The lead organization or NAO governance concepts described by Provan and Kenis (2008), or the formal networks of Isett et al. (2011), reflect this increasing "organization" at higher levels of interaction, exhibited in stronger governance mechanisms requiring increased trust between participants. Lower down the level of interaction, the network is less centralized and dense. There is a pleasing symmetry with Scott's (2003) definition of organizations as consisting of social structure, participants, technology, goals and environment. Cooperation in informal networks has all the elements in some form, with the exception of a shared goal. At the other end of the spectrum, collaborations or lead-organization networks require shared goals, thus can be conceptually equated with an organization.

Summary – Review of Frameworks and Arrays

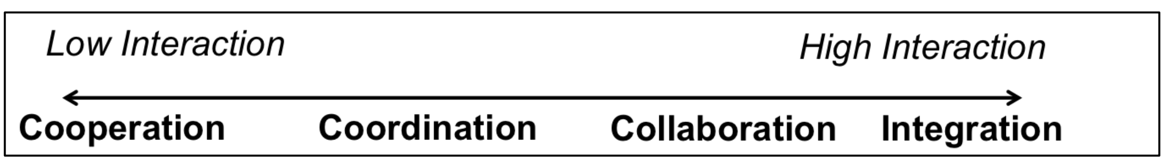
This literature review focused on how interorganizational interaction can be defined and conceptualized. The review highlighted the basic problems of defining interaction terms, then analyzed two main bodies of literature in public administration: frameworks, which emphasize input-process-outcome relationships and process dynamics; and interorganizational interaction arrays—typologies of interorganizational forms and scales or continuums of interaction—which describe specific construct and operationalizations of collaboration and interorganizational interaction more generally. A conclusion is drawn that while both literatures have strengths, the framework literature fails to incorporate the importance of context, while the array literature may oversimplify the true nature of interorganizational interaction. The review highlights the important facets of each literature and demonstrates the complexity and challenge of developing theory in this area.

The purpose was not to enumerate all the possible definitions and conceptualizations, but to establish a "meta-theoretical" language that underlies the various approaches in the literature. Using these tools and the various findings from the review, the main subject of research can now be addressed.

Development of an Interorganizational Interaction Array (IIA)

The overall purpose of this dissertation research is to investigate conceptualizations and operationalizations of common states of interorganizational interaction as described in the public administration literature, and to question the idea that interaction states lie on a "continuum of interaction" as presented in Figure 2-4. This requires the development and testing of an *interorganizational interaction array* (hereafter, IIA) that conceptualizes and operationalizes states of interaction. While the literature conceives of numerous possible conceptualizations of interaction states from two to nine distinct levels (Frey et al., 2006), this research addresses the most prevalent in the public administration literature, namely cooperation, coordination and collaboration. However, while the public administration literature uses the terminology of cooperation-coordination-collaboration relatively consistently, there is still great variation in how the constructs of those interaction levels are defined. This final section of this chapter derives the interorganizational interaction array (IIA) used to test the research questions.

Figure 2-4: *Example continuum of interaction*



There are four research questions addressed in this dissertation:

1. To what extent can the levels of interaction corresponding to the constructs of cooperation, coordination and collaboration be empirically observed?
2. Are other constructs observed?

3. Which dimensions of the interorganizational interaction array are most important for predicting an organization's level of interaction in a multiorganizational interaction?
4. To what extent can dimensions of the interorganizational interaction array be conceptualized as increasing along a continuum of interaction?

The first research question involves empirical testing of an IIA. The most developed IIA to date in the literature is by McNamara (2008, 2012), which is used as a starting point and refined based on findings from the literature review in this chapter. The McNamara IIA is refined into a *generalized interorganizational interaction array* or "GIIA." The McNamara IIA—and the GIIA refinement—specify constructs of three interorganizational interaction levels: cooperation, coordination, and collaboration. The analysis will determine whether observed clusters correspond with the interaction levels specified in the GIIA. In other words, will clusters corresponding to cooperation, coordination and collaboration be empirically observed? If the public administration literature is correct, then from a large sample of interorganizational interactions we would expect to see clusters appear as in Figure 2-5. If, however, other interaction states are possible, then we may see interaction states that do not correspond to the cooperation—coordination—collaboration continuum, as presented in Figure 2-6. Such a finding would call into the question the basic idea of a "continuum of interaction" that is so prevalent in the literature.

The second research question involves analyzing the extent to which other constructs of interaction levels emerge from the empirical data. In this case, an inductive approach will be taken to allow clustering to emerge freely from the data. The third research question asks to what extent certain dimensions of the GIIA are important in distinguishing clear constructs of interaction levels. Various sensitivity analysis techniques will be employed to the clustering solutions obtained in both research questions one and two. The final research question examines whether a "continuum of interaction" exists by reviewing clustering of dimensional indicators for each interorganizational interaction sampled.

This section is organized as follows. First McNamara's IIA—the "Multiorganizational Implementation Model" (MIM)—is described and evaluated. Second, the conceptual lens for the study is presented, which places the MIM in a wider systems context of interorganizational interaction. Finally, each dimension in the model is described justified.

Figure 2-5: *Expected clustering of interorganizational interactions assuming a continuum of interaction*

Dimensions (distinguishing characteristics)	Interorganizational Form		
	Coordination	Cooperation	Collaboration
Dimension 1	Indicator A1	B1	C1
Dimension 2	A2	B2	C2
Dimension 3	A3	B3	C3
Dimension 4	A4	B4	C4
Dimension 5	A5	B5	C5
Dimension 6	A6	B6	C6
Dimension 7	A7	B7	C7
Dimension 8	A8	B8	C8
Dimension 9	A9	B9	C9

Figure 2-6: *Potential configuration of an interorganizational interaction departing from the continuum*

Dimensions (distinguishing characteristics)	Interorganizational Form		
	Coordination	Cooperation	Collaboration
Dimension 1	Indicator A1	B1	C1
Dimension 2	A2	B2	C2
Dimension 3	A3	B3	C3
Dimension 4	A4	B4	C4
Dimension 5	A5	B5	C5
Dimension 6	A6	B6	C6
Dimension 7	A7	B7	C7
Dimension 8	A8	B8	C8
Dimension 9	A9	B9	C9

McNamara's Multiorganizational Implementation Model (MIM)

The starting point for the MIM, development by McNamara (2008), was a model developed in the health education literature by Intriligator (1994), called the *Interorganizational Arrangement Model* (IAM). The IAM is not strictly a "model," as specified by the criteria earlier in this literature review, but in fact an IIA that describes three levels of interaction (cooperative arrangement, coordinative arrangement, and collaborative arrangement) in terms of 15 dimensions arranged in three constructs (collaborative infrastructure, collaborative procedures, and collaborative leadership). The IAM has been employed in several case studies such as Thatcher (2007), however, the IAM was typically used as a framework of analysis for studying interorganizational interactions, rather than as the specific focus of study.

McNamara (2008) used the IAM as the basis for her dissertation work, and made several refinements in accordance with findings from the policy implementation and interorganizational literatures. The multiorganizational implementation model made some improvements on the IAM including clarifying terminology, refining the operationalizations of dimension, and organizing dimensions into constructs more appropriate for interorganizational public administration literature. In McNamara's study, the MIM was the object of analysis, and was developed and tested in a single case study of 15 federal and state agencies, local governments, and nongovernmental organizations, implementing the Virginia Seaside Heritage Program. The MIM, which is displayed in full in Appendix A, contends that four constructs impact the level of interaction between organizations on the continuum of interaction between cooperation, coordination and collaboration.

The *interorganizational policy objective* construct describes the collective policy goal that organizations work together to achieve. Four dimensions are used to operationalize this construct: time, difficulty, role of single organizations, and the impetus for collective action (McNamara, 2008; Thatcher, 2007). The *interorganizational infrastructure* construct describes the manner by which organizations structure and formalize relationships in the interorganizational interaction. Five dimensions operationalize this construct: design, the formality of the agreement, organizational autonomy, policy authority, and key personnel (McNamara, 2008; Thatcher, 2007). The *interorganizational procedures* construct describes the various procedures used to support operations of the collective group and sustain interorganizational relationships during collective action. Five dimensions are used to operationalize the construct:

information sharing, decision making, resolution of turf issues, resource allocation, and systems thinking (McNamara, 2008; Thatcher, 2007). Finally, the *organizational management* construct describes key factors which organizational management would need to develop to support interorganizational relationships. This construct was originally operationalized by five dimensions: incentives, commitment, trust, risk taking, and willingness to change; however, after testing the MIM, the risk-taking dimension was removed as it was not supported by empirical findings (McNamara, 2008; Thatcher, 2007).

While the MIM represents a good example of cumulative Theory development and the most detailed IIA to date, several issues can be identified in the light of the literature review on frameworks and IIAs carried out in the previous sections. The following issues are addressed in the refinement of the MIM into a revised IIA called the *generalized interorganizational interaction array* (GIIA), which will be the object of testing in this dissertation to examine the research questions posed earlier.

First, the reason for the choice of the four MIM constructs (interorganizational policy objective, infrastructure, and procedures, and organization management) is not fully explained, nor are we sure about how to interpret the MIM in terms of interaction process and the wider system context. The literature review in this chapter identifies that a general deficiency in the way IIAs are formulated is their lack of ability to be set in a wider systems context—a pitfall that the MIM has not avoided. Thus we are unsure of how system-wide input and output variables could affect the MIM. One refinement to the MIM, therefore, will be additional “input” variables that allow a better understanding of the impact of contextual and environmental factors, and better appreciation of the range of applicability of the MIM.

Second, as the MIM is an incremental development from the IAM, the choice of MIM constructs and dimensions is restricted by the original formulation of the IAM. As the IAM has been employed successfully in several studies, this is not a major criticism, but a review of other IIAs from the literature sheds light on alternative ways to operationalize interaction states using different dimensions and indicators. A second modification to the MIM, therefore, is refinement of dimensions through either deleting, combining, separating out, or adding new dimensions, based on recent IIA literature (Bedwell et al., 2012; Cross et al., 2009; D'Amour et al., 2008; Woodland & Hutton, 2012). Furthermore, the grouping of dimensions into the four constructs will be revisited, using recent research on the internal processes of interorganizational interaction and collaboration frameworks (Thomson & Perry, 2006; Thomson et al., 2009).

Finally, while the MIM contains detailed operationalized indicators of the dimensions, there is room for improvement. Some dimensions appear to have duplicate indicators across levels, while others have highly composite descriptions or rely on particulars combination with indicators of other dimensions, rather than unique indicators.

At the end of this process of refinement, a new version of the MIM is produced, which is named the *Generalized Interorganizational Interaction Array* (GIIA). Note that that McNamara’s original work sought to use the MIM to recast the top-down / bottom-up debate in the policy implementation literature, hence the “I” stands for the “implementation,” and her empirical case study focused on an implementation setting. I choose the more general term "interaction," to allow the GIIA to apply to other purposes of collective action such as policy formulation or joint evaluations (Andersen & Broegaard, 2012; Beck & Buchanan-Smith, 2008; OECD, 2005). The process to move from the MIM to the GIIA is described in Table 2-10. The final version of the GIIA is presented at the end of this chapter in Table 2-11.

Table 2-10: *Derivation process of the GIIA*

Analysis Process	Description
Selection of Interorganizational Interaction Arrays (IIA)	The process began with McNamara (2008; 2012), which is the greatest effort to date to develop an IIA. This study was based on three main sources (Thatcher 2007; Keast et al 2007; and Mandell et al 2003). Reference lists were consulted from these sources, in addition to the wider literature review in Chapter 2.
	A review process gathered a core set of IIA, and eliminated duplications from the list. The process overall was cross-checked with the original dissertation literature review, described in Table 2-1.
Define dimensions	The core set of IIAs were transcribed into Excel tables and each dimension defined. In some cases, authors provided their own definitions of dimensions, in other cases they did not and definitions had to be inferred from the article. This is identified by noting [*Author* Definition] or [Inferred Definition] in each dimension.
Construct analysis	The four constructs from the McNamara IIA were reviewed in light on the more recent literature on interorganizational interaction (namely Thomson et al., 2009; Emerson et al., 2012; Ansel and Gash, 2007). Several of the original McNamara constructs could be revised, and additional constructs added.
	While this change has little effect on the way in which interaction levels are defined, it may be important during the analysis phase when necessary and sufficient conditions for levels of interaction are identified.
Dimensional analysis	The set of IIA were reviewed to identify, in particular, contextual dimensions that were omitted in the original McNamara IIA. This is important because many other IIAs use contextual dimensions as part of the definition of interaction levels.
Modification of dimensions	In many cases, IIA dimensions described more than one component of an organization or interorganizational form. Such dimensions were decomposed into two or more new dimensions, and dimensional indicators were adjusted as necessary.

Analysis Process	Description
Modification of interaction levels	Many of the IIAs reviewed used more than three levels of interaction. As the purpose of the dissertation research is to examine primarily the three level continuum, IIAs with greater than three levels were inspected to determine if they could be 'collapsed' into three levels. This process was aided by the dimensional decomposition stage.
	Three criteria showed that interaction levels could be collapsed: first, dimensions with duplicate indicators across levels; second, dimensions with composite descriptions; third, dimensional indicators relying on a particular combination with indicators of other dimensions, rather than unique indicators.
Classification of dimensions	Dimensions were classified into 3 categories:
	1) Contextual dimensions: Antecedent factors, inputs or outcomes that belong to, or originate directly from, the surrounding context or environment in which the interorganizational interaction is set.
	2) Organizational dimensions: Factors relating to structural or behavioral aspects of participating organizations, understood in a conventional "rational" perspective with boundaries defined by the hierarchical structure.
	3) Interorganizational dimensions: Factors that emerge out of the interaction, and are not something that can be measured meaningfully in the participating organizations.
Refinement from survey instrument development	A final set of refinements were made during the process of operationalizing the GIIA into a survey instrument. This process revealed areas in which the understandability of wording was challenging, and where indicators were not mutually exclusive.

Conceptual Lens for Refinement of MIM

As discussed earlier in this chapter, a downfall of the IIA approach is its inability to link to wider systems contexts and dynamic, adaptive processes. An IIA shows "snapshots" of particular interaction states. Using the findings from the systems framework and IIA literature, an approach to reformulating the MIM is presented: first focusing on the system nature of frameworks, and second on the specific "black box" processes of interorganizational interaction.

The framework literature shows, in general, that interorganizational interactions are set in complex adaptive systems. Input conditions drive interaction processes that produce outcomes, which then change the original system state and lead to positive or negative feedback, such as reinforcing trust between participants as a result of stable institutions of interaction (Ansel & Gash, 2007; Emerson et al., 2012). The original MIM describes how four constructs determine the position on the continuum of interaction, but does not provide any rationale for the choice of these constructs or how they should link to the wider system context. Using Emerson et al., (2012) as guide, the MIM—or the reformulated GIIA—can be placed in the center of the "collaborative[3] governance regime," thus showing how the GIIA constructs link in systems terms. For example, as shown in Figure 2-7, the *Interorganizational Policy Objective* construct spans the "system context" area, the "inputs" box and the "process box" to show that it shares elements with these three components as described by Emerson et al. (2012).

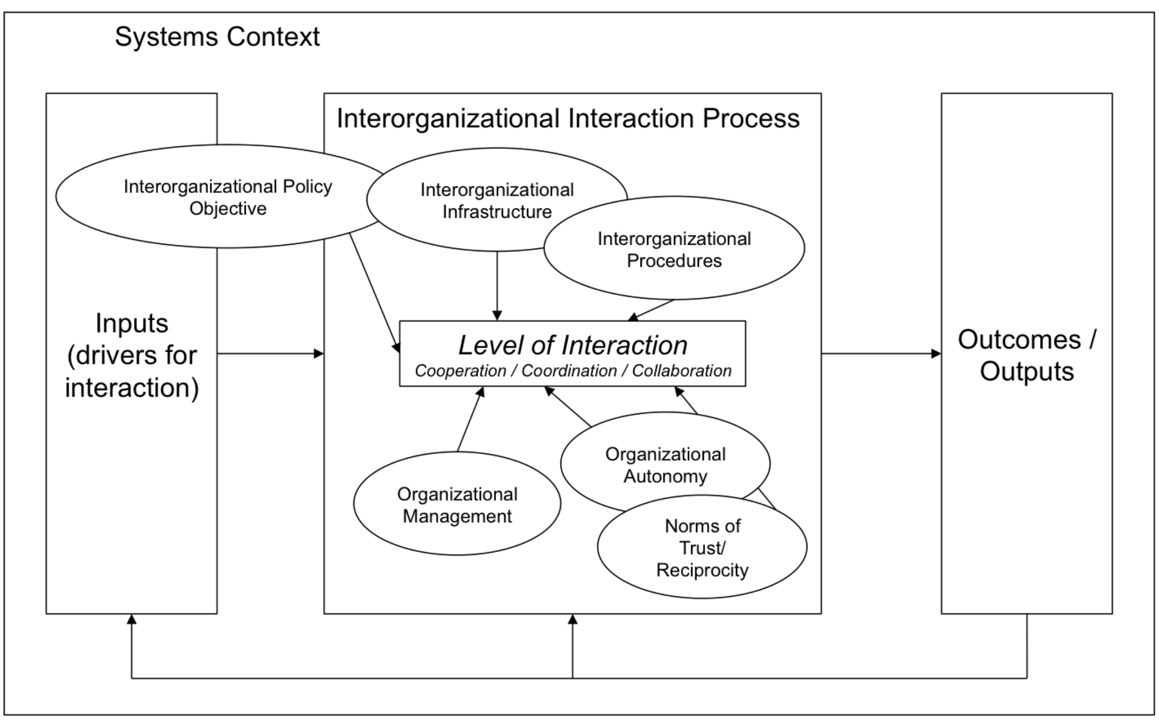
The implication of this simple linkage is to justify inclusion of more contextual variables in the GIIA, as the framework literature demonstrates the importance of contextual variables on the interorganizational interactive process. In terms of the level of interaction and IIA literature, however, there is logical ground for avoiding using contextual variables as necessary components of a defining interaction states. This underlines the importance of empirical testing of contextual variables on the observed levels of dimensions in interorganizational interactions. If inclusion of contextual variables allow interaction states to be discerned, then this shows convergence between the framework and IIA literature and support the utility of the idea of a continuum of interaction. If, however, discernable interaction states cannot be observed with the inclusion of contextual variables, then this shows that the continuum of interaction is not

[3] While Emerson et al. use the term "collaboration," their framework is much broader that the definition of collaboration presented in the GIIA and thus can apply across the continuum of interaction.

meaningful, as variation across dimensions in any interorganizational interaction process is strongly context-dependent.

The second part of the conceptual lens looks inside the interorganizational interaction process. In recent work, Thomson (2001); Thomson and Perry (2006); Thomson et al. (2009) undertook a major effort to go inside the "black box" of collaborative process, and from an empirical survey of over 400 organizations, defined a higher-level construct of collaboration. The construct, however, is arguably broader than just collaboration and most likely covered lower level states of interaction. The higher-order construct is composed of five higher-level (latent) factors: governance, administration, mutuality, norms of trust and reciprocity, and autonomy. Thomson contends that these five factors constitute the interorganizational interactive process.

Figure 2-7: *GIIA constructs (ovals) overlain on a systems framework (rectangles)*



A review at the indicator level of both the MIM and Thomson's construct show that there is significant overlap between dimensions, thus allowing some of the original MIM constructs to be recast in terms of the Thomson factors (lower level constructs). As the MIM constructs and dimensions were reformulated, not all MIM constructs were required to be recast. For example, the interorganizational infrastructure and interorganizational procedure construct definitions of the MIM strongly overlap with the governance and administration factors in the Thomson construct, thus there is no requirement to change them. Some of the lower level operationalizations, however, were rearranged. The major difference between the MIM and the GIIA at the construct level is the inclusion of norms of trust and reciprocity, and organizational autonomy, as separate constructs. The purpose of this change is to ensure closer consistency with the current interorganizational interaction literature.

The Generalized Interorganizational Interaction Array (GIIA)

In this section, the constructs and dimensions of the GIIA are defined. While grouping the dimensions into constructs is primarily for organizing purposes, both McNamara (2008) and Intriligator (1994) believed that each construct would independently impact the level of interorganizational interaction. A similar finding was replicated by Thomson (2001), who found five independent constructs. Identifying separate constructs will facilitate further empirical testing focusing on individual constructs.

Constructs consist of one or more dimensions, which form the main objects of the analysis in the research. Each dimension is assigned a label of contextual, organizational, or interorganizational. Contextual dimensions are not properties of the organization or interorganizational interaction, but instead relate to the context or environment in which the interorganizational interaction occurs. Organizational dimensions refer to properties of the organization or an organizational perspective on the interaction. Interorganizational dimensions refer to the emergent properties of the interorganizational interaction; such properties cannot exist independently in a single organization. These dimension labels are not variables in the analysis process, but will help in the interpretation of results.

Interorganizational policy objective construct

The interorganizational policy objective construct characterizes the external system conditions in which the multiorganizational interaction is set. While McNamara (2008) limited this construct to the policy goal that organizations work together to achieve, the GIIA broadens the construct to include the wider systems variables that affect the policy goal. The dimensions in this construct are defined as follows; their category (contextual, organizational, or interorganizational) is given in brackets after the name:

Purpose of interorganizational interaction. (Contextual). The overall purpose of the interorganizational interaction. This dimension is adapted from Mandell & Steelman (2003) and Keast et al. (2007).

Time. (Contextual). The length of time that the interorganizational interaction is expected to work together to accomplish the policy objective. This definition is adapted from McNamara (2008).

Difficulty. (Contextual). The complexity of tasks that the interorganizational interaction undertakes to accomplish the policy objective. This definition is adapted from McNamara (2008).

Role of single organization. (Contextual). The roles individual organizations assume to accomplish the policy objective (McNamara, 2008)

Impetus for collective action. (Contextual). The reason for developing the interorganizational interaction and the way in which it was developed. This dimension is adapted from McNamara (2008).

Numbers of participating organizations. (Contextual). The number of organizations with first degree network ties participating in the interorganizational interaction. The inclusion of this dimension is justified from recent research indicating that the complexity—and thus governability—of an interorganizational interaction is affected by the number of direct participants (T. Scott & Thomas, 2013). It is important to distinguish cases where organizations involved in a partnership do not actually interact at all. This is the reason for the level of interaction called "deconfliction" in Williams (2010) where organizations are simply aware of one another rather than directly interacting. This dimension should capture first-degree network ties only, which relates to the choice of unit for the study (interorganizational-organizational dyad).

Category of participating organizations. (Contextual). The sector and/or type of organization: federal government, state government, local government, international organization, intergovernmental organization, nongovernmental organization, private sector, academia, think tank, and so forth. The inclusion of this dimension is warranted by observations that the type of organization may affect the governance and administrative procedures of the interorganizational interaction (Ansel & Gash, 2007; Thomson, 2001).

Organizational management construct

This construct describes key factors which organizational management would need to develop to support interorganizational relationships. In the original McNamara (2008) MIM this construct included the additional dimensions of “commitment” and “willingness to change,” however, they were removed in the GIIA as they overlapped considerably with other dimensions. “Trust” was also included in the MIM, however, this was separated out into its own construct. The dimensions are as follows:

History of previous interaction in the problem domain. (Contextual). The extent to which organizations and participants from those organization have worked previously together on other projects in the problem domain. This dimension is included as previous history of working together is indicated as predictor of effective interaction in the future (Bronstein, 2003; Bryson et al., 2006; Simo, 2009). This definition adapted from Mattesich et al. (2001).

Participant's Problem Orientation. (Organizational). This dimension reflects the degree to which members of interorganizational interaction view the problem from a shared or individual perspective. This has to do with members' values and perceptions. This dimension is adapted from Mandell & Steelman (2003).

Resource allocation. (Organizational). The contributions allocated by individual organizations to the interorganizational interaction in support of the policy objective. This dimension is adapted from McNamara (2008).

Incentives. (Organizational). The intrinsic and extrinsic rewards provided to individuals and participating organizations to encourage support for the interorganizational interaction. This dimension is adapted from McNamara (2008).

Interorganizational infrastructure construct

This construct captures the manner by which organizations structure and formalize relationships in the interorganizational interaction. In the original MIM, this construct included the dimension “autonomy,” which is separated out in the GIIA into a new construct. Another dimension, “policy authority” was deleted due to overlaps with other dimensions. The dimensions of this construct are as follows.

Time to establish multiorganizational arrangement. (Contextual). The length of time, relative to the time for implementation of the interaction, that the partnership takes to establish. This dimension is adapted from Keast et al. (2007).

Key personnel. (Organizational). Personnel who are responsible for bringing together and implementing the interorganizational interaction. This dimension is adapted from McNamara (2008).

Orientation of policy objective. (Interorganizational). The agreed and comprehensive nature of goals between interacting organizations. This dimension is adapted from D'Amour et al. (2008).

Design. (Interorganizational). The administrative structure emerging from the interorganizational interaction. This dimension is adapted from McNamara (2008).

Formality of the agreement. (Interorganizational). The way in which individual organizations agree on their roles and responsibilities within the interorganizational interaction. This dimension is adapted from McNamara (2008).

Interorganizational procedures construct

This construct describes the various features that emerge out of the interorganizational interaction, namely information sharing and communications, decision making and conflict resolution processes. In the original MIM, this construct contained dimension such as “systems thinking” and “resource allocation.” Systems thinking was deleted due to strong overlap with the “information sharing and communication” dimension, and “resource allocation” was moved to the organizational management construct. The dimensions in this construct are as follows:

Information sharing and communications. (Interorganizational). The ways in which personnel within the interorganizational interaction use information and communication processes to attain the policy objective. This dimension is adapted from McNamara (2008).

Decision making. (Interorganizational). The ways in which the organizations within the interorganizational interaction make implementation decisions pertaining to the policy objective. This dimension is adapted from McNamara (2008).

Resolution of turf issues. (Interorganizational). The process used for solving conflicts between organizations within the interorganizational interaction. This dimension is adapted from McNamara (2008).

Organizational autonomy construct

This construct is composed of a single dimension (organizational) in the GIIA and is defined as the degree to which each partnering organization independently operates, in terms of the extent that their operating procedures and policies are adapted by the interorganizational interaction, and the extent of authority given to the interorganizational interaction to develop policies that guide operations of the collective. This dimension is adapted from McNamara (2008). McNamara originally had this dimension as part of the interorganizational infrastructure construct, however, Thomson (2001) found evidence that it existed as an independent factor, which supported other theoretical perspectives concerning the tension between individual and collective interests in interorganizational relationships (Wood & Gray, 1991).

Norms of trust and reciprocity construct

This construct consists of one dimension (organizational) defined as the extent to which trustworthy relationships between organizations within the interorganizational interaction are built. This dimension is adapted from McNamara (2008). As explained in the earlier review of framework literature, this dimension is separated out into its own construct because it is a fundamental component underlying the mechanisms of the development of interorganizational relationships (Ostrom, 1990).

Table 2-11: *The Generalized Interorganizational Interaction Array (GIIA)*

Dimensions	Constructs	Type	Meaning	Cooperation	Coordination	Collaboration
Purpose of Interorganizational interaction	Interorg. Policy Objective	Context	The overall purpose of the interorganizational interaction [Adapted from Mandell & Steelman (2003), and Keast et al. (2007)]	Create an informal network of communication among stakeholders Generate support for an initiative To explore interests	Joint work with other organizations to ensure tasks are done Leverage or raise money Organizations remain autonomous but support something new To reach predetermined mutual goals together	Share material, personnel or financial resources to address common issues Commit for a year or more to achieve short- and long-term outcomes Create institutional and system change in a policy area
Time	Interorg. Policy Objective	Context	The length of time that the interorganizational interaction is expected to work together to accomplish the policy objective [modified from McNamara, 2008]	Short-term	Longer-term	Long-term, evolutionary nature Indefinite duration
Difficulty	Interorg. Policy Objective	Context	The complexity of tasks that the interorganizational interaction undertakes to accomplish the policy objective [modified from McNamara, 2008]	Simple tasks that are low in number, very similar, known and clearly defined, independent from each other, routine, agreed by all participants	Multifaceted tasks Repeatable	Complex tasks that are high in number, very different, ambiguous and undefined, interdependent, irregular, highly contested by participants, or Situations of crisis

Dimensions	Constructs	Type	Meaning	Cooperation	Coordination	Collaboration
Role of single organization	Interorg. Policy Objective	Context	The roles individual organizations assume to accomplish the policy objective [McNamara, 2008]	Organizations are independent; it is possible for them to accomplish the objective individually	Organizations require some assistance from other organizations to accomplish the policy objective	No organization can achieve the objective independently; organizations are interdependent; each organization is one element of the larger system
Numbers of participating organizations	Interorg. Policy Objective	Context	The number of organizations with first degree network ties participating in the interorganizational interaction [Author definition]	Unknown	Unknown	Unknown

Dimensions	Constructs	Type	Meaning	Cooperation	Coordination	Collaboration
Impetus for collective action	Interorg. Policy Objective	Context	The reason for developing the interorganizational interaction and the way in which it was developed [modified from McNamara, 2008]	Typically voluntary (initiated by working level staff) Organizations initiate collective action because it is helpful to their world of work and it builds capacity that serves the individual organization	Voluntary, or mandated (directly tasked by a higher authority or law to participate, or where not participating would result in either severe loss of reputation or an inability to meet organization goals) Linkages are mobilized because compatible mission areas mutually increase abilities to achieve same goal An interagency liaison or boundary spanner may forge these relationships to meet resource needs or shared interests Legislative mandate or grant contracts may enhance cohesion or minimize duplication	Voluntary (initiated by senior leadership or management) or mandated (directly tasked by a higher authority or law to participate, or where not participating would result in either severe loss of reputation or an inability to meet organization goals) Organizations with mutual or complementary interests come together because they cannot achieve the desired goal or address the identified problem without working together Organizations share responsibility for tasks that are connected or cannot be accomplished individually A lead agency or convening organization brings relevant stakeholders together and legitimizes collective action

Dimensions	Constructs	Type	Meaning	Cooperation	Coordination	Collaboration
Category of participating organizations	Interorg. Policy Objective	Context	The sector and/or type of organization: federal government, state government, local government, international organization, intergovernmental organization, nongovernmental organization, private sector, academia, think tank, etc.	Unknown	Unknown	Unknown
History of previous interaction in the problem domain	Organizational Management	Context	The extent to which organizations and participants from those organization have worked previously together on other projects in the problem domain [definition adapted from Mattesich et al., 2001]	Unknown	Unknown	Unknown
Participant's Problem Orientation	Organizational Management	Org	Reflects the degree to which the members view the problem from a shared or individual perspective. This has to do with members' values and perceptions [Mandell & Steelman, 2003]	Mainly individual perspectives dominate	Individual and shared perspectives coexist	Mainly shared perspectives dominate

Dimensions	Constructs	Type	Meaning	Cooperation	Coordination	Collaboration
Resource allocation	Organizational Management	Org	The contributions allocated by individual organizations to the interorganizational interaction in support of the policy objective [modified from McNamara, 2008]	Organization's discretionary funds may be used to contribute to the collective action, in the pursuit of individual goals Resources are not pooled, information is the main resource that is shared Staff contribute to the interorganizational interaction outside of their regular duties	Organizations exchange resources to increase each organization's abilities to achieve individual goals; the time and expertise of personnel is the main resource shared Partner organizations allocate resources from core operating/annual budgets to finance collective action Mandates or grant arrangements may provide resources Resource needs may be satisfied by a preexisting program within an individual organization; staff contribute to the interorganizational interaction as part of ongoing projects internal to their organization that are leveraged for the benefit of the group	Pooled resources; allocation is based on balancing evolving needs of the collective group with individual constraints Organizational resources are allocated to support the activities of the collective unit Independent operating budget, based on shared financial contributions, may be established for collective action Staff contribution to the interorganizational interaction is considered as part of their regular duties

Dimensions	Constructs	Type	Meaning	Cooperation	Coordination	Collaboration
Incentives	Organizational Management	Org	The intrinsic and extrinsic rewards provided to individuals and participating organizations to encourage support for the interorganizational interaction [modified from McNamara, 2008]	Opportunities for synergistic benefits are realized based on the desire to avoid negative impacts resulting from changes in external factors Staff involved receive intrinsic rewards from participation in the interaction	Grant contracts may provide funding or resource incentives to support the collective effort Leaders identify benefits in working together and emphasize the importance of these benefits to subordinates Staff involved receive intrinsic and extrinsic rewards from participation in the interaction	Incentives are provided by the collective group and individual organizations to encourage individuals to stay involved in the collective effort Leadership and staff in participating organizations receive extrinsic rewards for participation in collective action Staff responsibilities begin to change based on participation in collective action
Time to establish multiorganizational arrangement	Interorg. Infrastructure	Context	The length of time, relative to the time for implementation of the interaction, that the partnership takes to establish. [Inferred from Keast et al., 2007]	Short term	Medium term	Longer term

Dimensions	Constructs	Type	Meaning	Cooperation	Coordination	Collaboration
Key personnel	Interorg. Infrastructure	Org	Personnel who are responsible for bringing together and implementing the interorganizational interaction [Modified McNamara, 2008]	Organizational leadership is not involved in decisions to work together Interaction occurs through lower levels of organizations	Leadership establish commitment by stressing the importance of collective action Mid-level management implement and administer organization's involvement in interaction A facilitator may be identified to coordinate actions at the local level	Although no one is typically in charge, a lead organization may propose policies/rules to which the collective group must mutually agree to implement Organizational leadership is openly supportive AND is involved in planning contributions to the interorganizational interaction Membership, role definitions, and responsibilities adapt to the task at hand Each role is considered equally important
Orientation of policy objective (Goals)	Interorg. Infrastructure	Interorg	The agreed and comprehensive nature of goals between interacting organizations [Adapted from D'Amour et al., 2008]	Conflicting goals or absence of shared goals	Some shared goals, in addition to individual organizational goals	Shared goals agreed between all participants

Dimensions	Constructs	Type	Meaning	Cooperation	Coordination	Collaboration
Design	Interorg. Infrastructure	Interorg	The administrative structure emerging from the interorganizational interaction [Modified McNamara, 2008]	Individuals work independently within existing organizational structures, without changes to their job description or administrative procedure (rules, policies, hierarchy)	Each organization's hierarchical structure is used to centrally manage specialized roles and responsibilities relating to interorganizational interaction An organization's centralized control of participation in the interorganizational interaction may involve reorganization or consolidation of programs/activities	Partner organizations jointly develop shared power arrangements to support mutually beneficial interests, by creating new governance structures such as leadership boards or executive steering committees New program structures (within each organization) are developed based on the needs of a specific policy/goal An administrative staff element is present to sustain collective efforts. This staff may work full time on the interaction, either virtually, through regular meetings, or in a co-located office

Dimensions	Constructs	Type	Meaning	Cooperation	Coordination	Collaboration
Formality of the agreement	Interorg. Infrastructure	Interorg	The way in which individual organizations agree on their roles and responsibilities within the interorganizational interaction [modified from McNamara, 2008]	Individual organizations informally agree to work together to achieve individual or mutually-beneficial goals	Mechanisms, such as contractual or nonfinancial agreements, formalize relationships between organizations Agreements, clearly identifying each organization's roles and responsibilities, are often developed and/or reviewed by a higher authority	Key stakeholders, often leadership, jointly draft a shared purpose and develop a course of action based on mutually agreed upon roles and responsibilities, rules, goals, and organizational members Formalized agreements are supported by extensive informal agreements between interacting staff members
Information sharing and communications	Interorg. Procedures	Interorg	The ways in which personnel within the interorganizational interaction use information and communication processes to attain the policy objective [modified from McNamara, 2008]	Information is shared through informal channels and relationships between participants (e.g. staff email)	Formal (official documents) and informal communication channels are used Interorganizational communication is formalized, with staff given mandate to share information Formalized communications infrastructures begin to develop (group email lists, shared web-based information repositories etc.)	Open and frequent communication through formal and informal channels Interorganizational communication is institutionalized in organizational policies and processes (e.g. policy requirements to share information with partner organizations) Understanding enhanced by a willingness to share information about individual organizations and what can/cannot be offered to the collective group

Dimensions	Constructs	Type	Meaning	Cooperation	Coordination	Collaboration
Decision making	Interorg. Procedures	Interorg	The ways in which the organizations within the interorganizational interaction make implementation decisions pertaining to the policy objective [modified from McNamara, 2008]	Decisions are made independently by each organization; rules that guide collective decision making are not necessary	Centralized decision making is practiced; a lead organization(s) dominates the decision making process Senior leadership may conduct collective decision making about the interorganizational interaction	Participative decision making based on consensus and compromise; generates rules to govern activities and relationships between organizations Organizational representatives have latitude to negotiate rules and deliberate agreements to identify common ground Joint decision making occurs at all levels of organization
Resolution of turf issues	Interorg. Procedures	Interorg	The process used for solving conflicts between organizations within the interorganizational interaction [modified from McNamara, 2008]	Turf issues between participating organizations are avoided based on organizational tendencies to function independently	A neutral facilitator, outside convener, or full-time coordinator is employed to resolve turf issues	Conflicting roles based on incongruent demands from individual organization and group A formalized conflict resolution process occur to adjust policies and procedures to reduce conflict while maximizing common ground

Dimensions	Constructs	Type	Meaning	Cooperation	Coordination	Collaboration
Organizational autonomy	Autonomy	Org	The degree to which each partnering organization independently operates, in terms of the extent that their operating procedures and policies are adapted by the interorganizational interaction, and the extent of authority given to the collective to develop policies that guide operations of the collective. [Modified from McNamara, 2008]	Organizations are fully autonomous No interorganizational policy decisions are made; policies to govern the collective arrangement are not developed Preexisting policies, established by the individual organizations are followed	Organizations are semi-autonomous; Organizations maintain individual authority over the policies that govern their respective organizations Policies pertaining to the collective arrangement may be developed by higher authorities, but they are compatible with the policies already established within the individual organizations	Organizations are not autonomous; Partner organizations jointly develop policies and procedures that govern the collective arrangement Interorganizational policies and procedures include working rules that specify which stakeholders can make decisions, who will guide collective actions, and the distribution of cost/benefits
Trust	Norms of trust and reciprocity	Org	The extent to which trustworthy relationships between organizations within the interorganizational interaction are built [modified from McNamara, 2008]	Trust relationships are not required	Leaders work closely to create relationships based on trust Trust is based on reciprocal behaviors	Trust between organizations is necessary; in all levels of staff Partners reinforce trust in each other by sharing information through open communication A history of supportive interactions sustains and legitimizes relationships; reciprocal trust is institutionalized as a norm

CHAPTER 3:

METHODOLOGY

Chapter 1 presented an introduction to the research area, described the problem statement, and provided justification for the importance of this dissertation research. Chapter 2 reviewed relevant scholarship on interorganizational interaction in the social sciences, emphasizing the public administration literature. The generalized interorganizational interaction array (GIIA) was introduced as the object of analysis for this research. This chapter recaps the research purpose and research questions, then presents the research design, methodology, data collection and analysis, and finally evaluates the limitations, reliability and validity of the study.

Research Purpose and Framework

Research Purpose

The overall purpose of this research is to investigate conceptualizations and operationalizations of common states of interorganizational interaction as described in the public administration literature. There are two specific objectives: 1) develop and improve the interorganizational interaction array that conceptualizes and operationalizes states of multiorganizational interaction (such as cooperation, coordination and collaboration); and 2) test the interorganizational interaction array from a survey sample of multiorganizational interactions to determine if interaction states can be empirically observed and distinguished from one another.

Research Questions

There are four research questions addressed in this dissertation.

1. To what extent can the levels of interaction corresponding to the constructs of cooperation, coordination and collaboration be empirically observed?
2. Are other constructs observed?
3. Which dimensions of the interorganizational interaction array are most important for predicting an organization's level of interaction in a multiorganizational interaction?
4. To what extent can dimensions of the interorganizational interaction array be conceptualized as increasing along a continuum of interaction?

Conceptual Framework

The conceptual framework for this study is a combination of a systems-based framework derived from the "collaborative governance regime" of Emerson et al. (2012) and precursor frameworks, and the interorganizational interaction array developed by McNamara (2008). The systems framework implies that interorganizational interaction is affected by inputs and leads to outcomes. The inputs (the "context" dimensions in the GIIA) reflect the basic environment in which the interaction takes place, in addition to certain characteristics about the policy problem that brought organizations together in the first place. The outcomes are not the focus of this research, but several dimensions capture basic indicators about impact of the interaction on participating organizations.

The interorganizational interaction array—the GIIA in this case—focuses on the process of interorganizational interaction and can be considered as a way to take a "snapshot" at a given time. The GIIA is located at the center of the systems framework (as illustrated in Figure 2-7). The GIIA characterizes the level of interaction for any one particular organization involved in the interaction. Furthermore, the status of the inputs affects the level of interaction, which in turn affects outcomes. In addition to observing the levels of interaction from the sample, the research will also examine the relationship between level of interactions and outcomes—a feature that is not well-studied in the literature (Thomson et al., 2009).

Research Design

Research Philosophy

A key but often overlooked requirement in any research is to identify the researcher's assumptions and beliefs about the fundamental nature of reality and of knowledge production, as these fundamentals dramatically affect the methodological approach (Neuman, 2003; Raadschelders, 2011). Organizational scholars use many possible theoretical and paradigmatic lenses to study and understand organizations (Lincoln, 1985). Each lens focuses on very different elements of organizations and incorporates very different explanatory frameworks.

This research begins by assuming an explicitly realist ontology, where an objective reality "out there" can be discovered through empirical study. This reality is relatively independent of the observer. The corresponding epistemological assumption is that of researcher-object duality, in which the object of research is external to and free from influence of the researcher (Guba & Lincoln, 1989). A counter-argument to this position is that any interorganizational interaction is ultimately dependent upon individual perceptions and transient common perspectives that are co-created through interactions between members of the various organizations, implying that study of "objective" organizational elements is misleading (Guba & Lincoln, 1989). Indeed, a substantial body of knowledge examines organizations as socially constructed entities and considers how individual perceptions are critical in how organizations operate and how organizational reality is constructed (Burrell & Morgan, 1979; Weick, 1995).

While there is reason to support this view (Huxham & Vangen, 2005), even basic systematic study using a constructivist approach requires a consistent set of terminologies and meanings to be established. The identified construct and terminology problems in the public administration collaboration literature may result in disparities and ambiguities being concealed by inconsistent and interchangeable terminology, thus preventing theory building (Imperial, 2005). Furthermore, extensive research using institutionalist logic tells us that individual perspectives are shaped greatly by objective structures such as organizational design, policies, processes, resources and cultural rules (J. P. Olsen, 2007). Thus understanding the phenomenon of interaction between organizations can legitimately start by examining "objective" organizational structure.

Some may argue that objectivist and epistemological assumptions are akin to "universal" values held by a researcher, which should apply to all areas of social inquiry. Yet others suggest there are different levels of reality that lend themselves to different approaches, and that depending on the type of understanding required, different approaches are valid. As Gioia and Pitre (Gioia & Pitre, 1990, p. 587) observe:

> Approaches to theory building that are grounded in appropriate paradigmatic assumptions are better suited to the study of those organizational phenomena that are consistent with such ground assumptions (e.g., attempts to describe the efficacy of one production process over another are better represented by theories

grounded in objectivist/functional assumptions, whereas attempts to describe the social construction of cultural norms are better represented by theories rooted in subjectivist/interpretive assumptions).

While there are many limitations to a functionalist approach, explored later in the chapter, adopting this paradigm is key to the development of an interorganizational array, which affirms that interorganizational interactions can be objectively described by observable indicators.

These ontological and epistemological assumptions lead to a primarily quantitative methodology using a web-based survey of individuals, representing their organizations, involved in multiorganizational projects. This research is both “exploratory” and “descriptive” in that it aims to explore the clustering of interaction states and describe an empirical taxonomy of interaction terms (Bailey, 1994; Neuman, 2003).

Justification of Research Design

As highlighted in chapters 1 and 2, the basic research problem stems from the fact that while the terminology of cooperation, coordination, and collaboration is widely used, the underlying constructs to these terms are not well-specified. Furthermore, there are few attempts in the literature to create rigorous construct definitions of these interaction terms. An appropriate way to fill this knowledge gap is to conduct studies of multiple different cases of interorganizational interaction and determine the extent to which interaction states can be observed. While a qualitative research design using interviews and document analysis would certainly lead to rich comparative data set, this approach is very time consuming and cross-case comparison is challenging (Yin, 2009). A survey of approach offers the possibility to scrutinize interaction states across many hundreds of samples thus supporting the search for generalized interorganizational interaction constructs, providing attempts are made to ensure reliable and valid survey procedures.

Unit of Analysis

The "units of analysis" refers to the unit with which data are directly attached, sometimes called the "level of measurement" (Hitt et al., 2007). In this research, the unit is the *interorganizational-organizational dyad* (Graddy & Chen, 2009; Klein, Palmer, & Conn, 2000). Typically, units of analysis are a whole organizational unit, a group, a department in the organization, or an individual. In the case of interorganizational relationships, however, defining standard units is challenging as a result of two problems (Klein & Kozlowski, 2000).

The first problem is that for interorganizational relationships the extent to which a boundary of an "interorganizational unit" can be defined depends on the type of research problem. If the problem is simply to map structural connections, then a distinct boundary could be drawn around an interorganizational unit. If, however, the research problem considers how the collective unit operates, then typically different organizations are likely to experience the interorganizational interaction in different ways. Thus we cannot assume homogeneity across an interorganizational unit, without expecting some loss of information when the characteristics of the collective unit—"supplied" by the contributing organizations—are averaged across the group. Choosing the interorganizational unit for unit of analysis would require that a fully representative sample of all participating organizations is gathered—*and then averaged* for the interorganizational unit. This implies that "level of interaction" is an averaged property of the collective unit. It is for this reason that the interorganizational-organizational dyad is chosen, which allows for variations in level of participation across different organizations. The implication of this choice is that placement along the continuum of interaction is from each organization's perspective.

The second problem is that with the exception of highly integrated levels of interaction, individuals involved in interorganizational interactions are likely to be representative of their organizations first, rather than the interorganizational unit. A survey question outlined later, for example, tests the extent of "shared perspective," which captures the extent to which an individual (as representative of their organization) takes an organizational view or a collective view. The implication is that interorganizational research is dominated by the perspective of single organizations' experiences in the interaction, rather than a collective view.

In the context of this research, the unit of analysis is neither the individual organization nor the interorganizational unit; it is the "dyad," which captures the experience of the interaction from the perspective of one organization. As highlighted in chapter 2, a full characterization of an interorganizational interaction relies on many dimensions, some of which "belong" to the contributing organizations, and some of which "emerge" from the interaction. The extent to which the emergent properties appear, however, depends on the level of interaction. Thus if the unit was restricted to either an organization or the interorganizational unit, attempting to study the level of interaction across a large sample would result in loss of information. Table 3-1 captures the various possible choices of unit and their implications on how "level of interaction" is understood.

Table 3-1: *Implications of choice of units of analysis in interorganizational studies of levels of interaction*

Unit of Analysis	Implication for Level of Interaction (LOI)	Implication for choice of sample and inferences made
Interorganizational unit	LOI is a property of the unit Different LOIs across different units can be directly compared	Sample is unrestricted Averaged values of dimensions of the LOI cannot be applied to individual organizations; some dimensions of the GIIA cannot be applied Contextual dependencies need to be controlled
Interorganizational unit (with restriction that all organizations operate at the same level)	LOI is a property of the unit LOIs across units can only be compared if *all* organizations across all units are at the same LOI	Sample must be carefully designed to stratify organizations across LOI, and to ensure that all organizational representatives refer to the same timeframe (as features about the interorganizational interaction may vary significantly with time) Averaged values of dimensions of the LOI do apply directly to individual organizations
Organizational unit	LOI is a property of the organization Emergent features of the collective unit cannot be analyzed	Sample is unrestricted Conclusions about LOI cannot be generalized to interorganizational units
Interorganization-organization dyad	LOI is a property of the organization Emergent features of the collective unit can be analyzed, with the caveat that they are from the perspective of one organization	Sample is unrestricted Conclusions about LOI can be generalized to interorganizational units in some cases (dimensions relating to emergent properties)

A related problem that must be addressed in the survey instrument reliability and validity, is that *individuals* represent their organization in the interorganizational interaction. In some cases, only one individual from an organization is involved, in other cases a team or several individuals from different departments are involved (Huxham & Vangen, 2005). The implication is that attempting to collect data on an organization's experience in the interorganizational interaction assumes that the individual is representative of the whole organization and is able to answer a survey question as such.

Level of Analysis

The level of analysis at which inferences at the construct level are made is the *interorganizational field* (Benson, 1975; Hjern & Porter, 1981; Warren, 1967), which emphasizes relationships between organizations, rather than organizational or individual attributes. Interorganizational interaction is an emergent phenomenon with a set of characteristics distinct from the participating organizations and individuals. This is analogous to the idea that the social network in which an individual is embedded—what one might call the "inter-individual" field—can be characterized by emergent properties such as centrality, complexity or differentiation, which are not attributes of an individual. As a multilevel construct, however, interorganizational interaction features lower level constructs at the structural and individual levels of analysis.

Research Approach

The research approach is a nonexperimental nonprobability quantitative design, featuring self-administered survey-based data collection and employing clustering analysis with follow on statistical testing to profile and validate cluster solutions. Cluster analysis is a primarily exploratory procedure that identifies and creates classifications in data, although it can be used in confirmatory approaches. Cluster analysis empirically forms clusters of highly similar entities by maximizing within group similarity and minimizing between group similarity (Aldenderfer & Blashfield, 1984). Follow on statistical testing can then determine if cluster membership predicts certain dependent variables not used to create the clusters, or to compare the means of variables used in the solutions (Romesburg, 2004). Cluster analysis relies heavily upon researcher interpretation of the clusters and inspection of the original underlying data. As such, cluster solutions are strongly dependent on dimensions used to calculate similarity measures and the data set (Hair, Black, Babin, Anderson, & Tatham, 2006).

The selected sample was surveyed using the instrument described below. The objective of the survey was to rate—across the dimensions specified in the GIIA—a sample of organizations' experiences in participating in an interorganizational interaction. Cluster analysis grouped similar cases with the aim to determine if clustered groups exhibited averaged dimensional values that correspond to the three-level of interaction description in the GIIA. A second analysis allowed a range of cluster solutions to emerge freely to determine of other possible forms of interaction are possible, outside the expected cooperation-coordination-collaboration scale. ANOVA and MANOVA tests checked the criterion and predictive validity of cluster solutions by profiling clusters against continuous and interval data variables not used in the cluster solutions. Chi-square tests conducted similar profiling using nominal variables. Finally, multiple discriminant analysis further examined cluster distinctiveness and evaluated which dimensions had the greatest impact on cluster membership.

Research Methods

In this section, the research methods are presented. First, the survey instrument is described and operationalization of GIIA dimensions into survey items is explained. Second, the data selection and collection is described. Finally, the data analysis procedures are explained. Reliability and validity issues are addressed at each stage and summarized in the last section of this chapter.

Overview of Survey Instrument

The survey instrument contained 35 questions including three open response questions and 32 closed response questions using a mixture of Likert scales, multiple choice and forced choice. The survey opened with the necessary statements about informed consent, followed by instructions to the respondent to answer all questions from an organizational perspective rather than their own individual perspective, in order to be consistent with the interorganizational-organizational unit of analysis. Furthermore, respondents were asked to answer all survey questions with the same familiar multiorganizational interaction in mind, in which their organization participated in the past five years. The time criteria was given to reduce bias caused by variations in the effects of information communications technology (such as virtual meetings, social media etc.) on interorganizational interaction (Madlberger & Roztocki, 2009; Sanders, 2007; Vaccaro, Parente, & Veloso, 2010).

The survey was "self-administered" using a commercially available online software package, Questions Pro. Online surveys solicited by email are a preferable choice over mailed surveys due to the convenience, multinational sample of respondents, and to facilitate ease of data capture and analysis (Ritter & Sue, 2007a). There were no foreseen issues with respondents' accessibility to computers (Fowler, 2009). The use of professional software also ensures that the questionnaire is well-designed and presented and confirms to recognized best practice (Ritter & Sue, 2007b). The survey required users to answer all items on the page in order to proceed. The survey closed with a final open question asking respondents to give any further information they feel relevant, and then thanked respondents for their time and gave contact information for the researchers.

Only limited data about the organization and multiorganizational interaction was collected to comply with confidentiality requirements. Limited demographic data (gender, nationality, years of professional experience) was collected to check the sample for response biases. No email tracking or IP address data was collected to ensure that questionnaire responses are not attributable back to respondents.

The questions was organized in terms of constructs and dimensions of the GIIA, although this was not apparent to the respondent. Where possible, responses were randomized in the order that they appear on the screen to minimize primary bias (picking earlier options first), learning bias (e.g. realizing that responses matching "collaboration" go together), and fatigue bias (not fully reading the entire responses) (Choi & Pak, 2005). A full description of the survey is presented in Appendix A.

Survey instrument development process

Start point – GIIA. The first stage of survey development began with the GIIA framework developed as part of chapter 2. The GIIA is the object of analysis for the research and the primary objective of the survey instrument is to test the GIIA.

Literature search for previously developed scales. The second stage involved a literature search for previously developed scales. In most cases these were already attained in the chapter 2 review, but some scales required additional searches. The primary materials gathered included the following:

- A 56-item collaboration survey developed by Thomson (2001), of which 17 items were determined to be valid. Five additional "outcome" items were also included. The 17-item collaboration survey plus the five outcome items were used by

Thomson et al. (2008) and Chen (2008, 2010), and were shown to be reliable in those cases.

- A 45-item scale developed by Fleishman (2009) assessing the motivations for collaboration.
- The 40-item "Wilder Collaboration Factors Inventory" developed by Mattessich et al. (2001) to assess factors contributing to the success of collaborative groups.
- The 45-item "Interorganizational Arrangement Model Partnership Survey" developed by Intriligator (1994) and used by Thatcher (2007).
- A 26-item "Team Collaboration Assessment Rubric" developed by Woodland and Hutton (2012).
- A 32-item survey developed by Alter and Hage (1993) developed to study interorganizational networks.
- An interview protocol developed by McNamara (2008) in development of her Multiorganizational Implementation Model—the precursor to the GIIA.
- An interview protocol developed by D'Amour et al. (2008) to construct a typology of collaboration between professionals in healthcare organizations.
- An interview protocol development by Gajda and Koliba (2007) to evaluate interorganizational collaboration.

The surveys and interview protocols above feature a mix of organizational-unit and individual-unit data items, and are not uniform with respect to their use of terminology such as collaboration. Appropriate care was taken when the surveys and interviews were reviewed and compared with the GIIA to determine any opportunities to use the previously developed items. The results of this matching are explained in the following main section.

Turn GIIA dimensional indicators into questions. The next stage involved systematically moving through the GIIA and either using a pre-existing item or creating a new question based on the dimensional indicators in the GIIA. In some cases, more than one item is used for each dimensional indicator for reliability and validity purposes. An unintended benefit of this process was additional refinements to the GIIA, as the process of trying to turn the GIIA into a survey revealed areas of ambiguity. In some cases, the dimensions of the GIIA were not mutually exclusive and overlapped. Either the dimensions were refined, or the opportunity was used to eliminate a survey question as the information for that dimension was already captured elsewhere. A detailed mapping of GIIA dimensional indicator to survey item was produced, to facilitate post-survey analysis.

Distribute first draft of survey. A first draft of the survey was given to dissertation committee members who made recommendations for changes. Several rounds of corrections and revisions occurred.

Develop into Question Pro survey. Once a final draft was agreed by the dissertation committee, the survey was entered into the Question Pro software and tested several times.

Pilot testing. While the survey contains some previously tested items, much of the content is new. For this reason a pilot testing process was necessary. Several personal connections, family members, faculty, and fellow PhD students were recruited to pilot test the survey. The subjects recruited all had either relevant experience working in an organization and/or relevant theoretical knowledge in the field of collaboration or organizational science. Their responses are not included in the main analysis of this dissertation. The pilot testing consisted of three stages.

- Stage 1: The survey was sent to 20 subjects with a deadline for completion and some basic instructions and explanation about the project in the email.
- Stage 2: Within one week of taking the survey, five subjects were interviewed for one to two hours about their experience of taking the survey and any misunderstandings in wording was discussed. Subjects were offered a paid meal or beverage, depending on the time of day and location.
- Stage 3: Five subjects were sent the revised survey and questioned about the improvements made. The dissertation committee also made several recommendations for changes at this stage.

Submission to Institutional Review Board. Once the survey development was completed and following a final check by the dissertation committee, the survey and relevant information were sent to the Old Dominion University, College of Arts and Letters review committee for research involving human subjects.

Operationalization of Dimensional Indicators – Scale Development

In this section, the survey items used to measure the dimensions of the GIIA are described, and the initial analysis process used for each item is explained. Detailed explanations of the calculations made are presented in chapter 4.

Interorganizational policy objective construct

Purpose of interorganizational interaction. (Contextual). This dimension is measured by a single multiple choice question that uses the indicators in the GIIA as items in the multiple choice list; respondents can check all purposes that apply to their case of interorganizational interaction. The GIIA allocates indicators to levels of interaction, thus a minimum criteria stepped cumulative scale was used to calculate a score for this item. For a respondent to indicate that their case is at a level of collaboration, for example, they would have to select only one item from the list at that level, regardless of other choices made. Any additional items selected at the level of collaboration would cumulatively add one point to the scale. This dimension is further corroborated by a free-text field earlier in the survey asking the respondent to state the purposes of the multiorganizational interaction. This free text field allowed better inspection of outliers and interpretation of results.

Time. (Contextual). This dimension is measured in months; the respondent could also select “indefinitely.”

Difficulty. (Contextual). The complexity of tasks that the interorganizational interaction undertakes to accomplish the policy objective. A six-item scale of organizational task complexity was developed from the work of Liu and Li (2012); Xia, Becerra-Fernandez, Gudi, and Rocha-Mier (2011). As no survey instrument was developed in these previous studies, the items for this dimension were tested for reliability using Cronbach’s Alpha, followed by an factor analysis to check the dimensionality of the scale. The scale failed the dimensionality check and had low reliability scores, thus each item was retained for individual analysis. The results are explained in detailed in chapter 4.

Role of single organization. (Contextual). The roles individual organizations assume to accomplish the policy objective (McNamara, 2008). This dimension is measured by a single multiple choice question that uses the indicators in the GIIA as items in the multiple choice list. Respondents can check select one of three choices, which correspond directly to one of three levels of interaction.

Impetus for collective action. (Contextual). The reason for developing the interorganizational interaction and the way in which it was developed. There are potentially many reasons under a variety of different contexts why an interaction started, thus this dimension is one of the more challenging to operationalize. A current focus in the literature is the difference between voluntary and mandated interorganizational interactions (Brummel, 2010; Ivery, 2008; Rodríguez et al., 2007), thus a survey item captures this essential point. Respondents select from a multiple choice list that describes the particular circumstances under which an interaction was mandated or voluntary.

A second survey item presents a list of seven reasons and asks respondents to rate the importance of each one to their organization. This scale is taken from Fleishman (2009) and Thomson (2001). As the various reason are too diverse to suggest an underlying set of factors, a cumulative composite metric added the Likert score from each of the seven items. This is justified from the literature, which tends to recognize that more complex underlying problems will require higher levels of interaction (Gray, 1989).

Numbers of participating organizations. (Contextual). The number of organizations with first degree network ties participating in the interorganizational interaction. This dimension is captured by a single whole unit number of organizations.

Category of participating organizations. (Contextual). The sector and/or type of organization. Respondents selected all that apply from a list adapted from Thomson (2001).

Organizational management construct

History of previous interaction in the problem domain. (Contextual). The extent to which organizations and participants from those organization have worked previously together on other projects in the problem domain. This dimension is captured by two items taken from Mattesich et al. (2001), who recommended creating an averaged composite metric.

Participant's Problem Orientation. (Organizational). This dimension reflects the degree to which members of interorganizational interaction view the problem from a shared or individual perspective. This has to do with members' values and perceptions. This dimension is captured by two items taken from Mattesich et al. (2001), who recommended creating an averaged composite metric.

Resource allocation. (Organizational). The contributions allocated by individual organizations to the interorganizational interaction in support of the policy objective. This dimension is measured by a three multiple choice questions that use the indicators in the GIIA as items in the multiple choice list. Respondents could select one of three choices for each of the three questions, which correspond directly to one of three levels of interaction. The GIIA allocates indicators to levels of interaction, thus a minimum criteria stepped cumulative scale was used for analysis.

Incentives. (Organizational). The intrinsic and extrinsic rewards provided to individuals and participating organizations to encourage support for the interorganizational interaction. This dimension requires capturing an organizational-level description of intrinsic and extrinsic rewards, which can only be attained by a statistically representative sample of individuals for that organization. As only one individual from each organization answers the survey, it was not possible to capture this data. However, the GIIA specifies that leadership give incentives, thus a single survey item asked respondents to rate the extent to which leadership recognized the benefits of participating.

Interorganizational infrastructure construct

Time to establish multiorganizational arrangement. (Contextual). The length of time, relative to the time for implementation of the interaction, that the partnership takes to establish. Respondents enter a whole number of months.

Key personnel. (Organizational). Personnel who are responsible for bringing together and implementing the interorganizational interaction. This dimension is measured by a three multiple choice questions that use the indicators in the GIIA as items in the multiple choice list. Respondents could select one of three choices for each of the three questions, which correspond directly to one of three levels of interaction. The GIIA allocates indicators to levels of interaction, thus a minimum criteria stepped cumulative scale was used for analysis.

Orientation of policy objective. (Interorganizational). The agreed and comprehensive nature of goals between interacting organizations. This dimension is measured by a single multiple choice question that uses indicators in the GIIA as items in the multiple choice list. Respondents could select one of three choices, which correspond directly to one of three levels of interaction.

Design. (Interorganizational). The administrative structure emerging from the interorganizational interaction. Respondents were presented with a list of six possible options derived from the GIIA and could select all that apply. A minimum criteria cumulative scale calculated a score.

Formality of the agreement. (Interorganizational). The way in which individual organizations agree on their roles and responsibilities within the interorganizational interaction. This dimension is measured by a single multiple choice question that uses the indicators in the GIIA as items in the multiple choice list. Respondents could select one of three choices, which correspond directly to one of three levels of interaction.

Interorganizational procedures construct

Information sharing and communications. (Interorganizational). The ways in which personnel within the interorganizational interaction use information and communication processes to attain the policy objective. Respondents were presented with a list of six possible options derived from the GIIA and could select all that apply. A minimum criteria cumulative scale calculated a score.

Decision making. (Interorganizational). The ways in which the organizations within the interorganizational interaction make implementation decisions pertaining to the policy objective. Respondents were presented with a list of six possible options derived from the GIIA and could select all that apply. A minimum criteria cumulative scale calculated a score.

Resolution of turf issues. (Interorganizational). The process used for solving conflicts between organizations within the interorganizational interaction. This dimension is adapted from McNamara (2008). This dimension is not tested in the survey as it is not thought to occur in the sample.

Organizational autonomy construct

Organizational autonomy. (Organizational). The degree to which each partnering organization independently operates, in terms of the extent that their operating procedures and policies are adapted by the interorganizational interaction, and the extent of authority given to the interorganizational interaction to develop policies that guide operations of the collective. This dimension is measured by a three item reliable scale developed by Thomson (2001) and also found to be reliable in Thomson et al. (2008) and Chen (2008, 2010). Scale reliability was checked using Cronbach's Alpha and Guttman's lower bound (Sijtsma, 2009). As these items were already shown by Thomson (2001) to represent a single autonomy factor, factor analysis confirmed the dimensionality of the scale.

A further single multiple choice question was added that uses the indicators in the GIIA as items in the multiple choice list. Respondents could select one of three choices, which correspond directly to one of three levels of interaction. Using this nominal variable, a one-way ANOVA with planned contrasts further checked the reliability of the autonomy scale.

Norms of trust and reciprocity construct

Trust. This construct consists of one dimension (organizational) defined as the extent to which trustworthy relationships between organizations within the interorganizational interaction are built. The trust dimension is the same as the autonomy, using a three-item reliable scale from Thomson (2001) coupled with a three choice multiple choice question directly taken from the GIIA, and analysis methods were the same.

Sampling Procedure

A cross-sectional sample was selected that consists of organizations involved in multiorganizational interactions convened in a NATO context. Examples include multiorganizational groups formed between the various NATO headquarters, commands, and agencies, and between national defense and academic organizations within NATO nations who work under a NATO forum, such as the many nation-nation projects under the NATO Science and Technology Organization. This sample was chosen primarily for convenience and access: at the time of writing, the author is an NATO international civilian employed of NATO Headquarters Supreme Allied Commander Transformation, Norfolk, VA. A stratified purposeful sampling strategy was used, which involved selecting respondents based on specific criteria to ensure that the three “strata” of cooperation—coordination—collaboration in the GIIA are covered approximately by the sample.

As clustering analysis is not a statistical method and does not make assumptions about sample distributions, the sample does not have to representative in statistical sense—i.e. that variance introduced by confounding uncontrolled variables is averaged out by selecting a sample representative of the entire population. Thus there is no concern about typical problems with surveys such as response, sampling and coverage biases. Instead, clustering analysis requires that samples are representative across the dimensions used for the clustering analysis (Aldenderfer & Blashfield, 1984). Nevertheless, data was profiled for response bias according to gender, organization and years of experience, with null results.

There are also no mathematical or statistical reasons that specify a number of required cases for a sample, other than the obvious limitation that the number of sample cases cannot be less than the number of dimensions used for clustering. Estimates of appropriate sample size range from $5n$ to 2^n, where n is the number of clustering dimension (Mooi & Sarstedt, 2011). The survey resulted in 206 usable cases, which falls within the range of 50 – 1024 range for ten clustering variables.

The procedure used to select the sample consisted of three steps. First, using a combination of personal knowledge, public information and internal NATO project management databases, a list of multiorganizational projects in the NATO arena was created. Second, each project was rated according to several criteria (presence of formal decision making committee or boards; presence of project initiation documents from senior leadership; or Microsoft Sharepoint site established for the project or unclassified internet website). Whether these features are present for each project gives some indication about the placement of the project on the GIIA. The aim was to select a sample that is equally distributed across the GIIA; however, this stratification is quite limited as different organizations may be involved in different ways, and the accuracy of this scale is fairly crude. Furthermore, as respondents were not identifiable, there was no way to determine if the sample did actually meet the original selection criteria.

The third step involved identifying people working on the projects and selecting those most likely to answer the survey. For consistency of the sample, mid-level career staff were targeted (e.g. officer ranks OF2 (captain) – OF5 (colonel) in the military, NATO civilian grades A2 – A5, or national equivalent[4]). This data was easily accessible through the organization's IT systems or through personal contacts and knowledge. Starting from February 1st 2015, emails were sent out to the identified sample with a link to the survey. With each survey sent out, the recipient was asked to send on the survey

[4] According to NATO Standardization Agreement 2119, dated 1992, military officer ranks run from OF1 (second lieutenant) to OF9 ("4 star" general). An OF10 "General of the Army" category exists in some NATO members, but typically this is reserved for wartime positions. The NATO civilian grading system runs from A1 (a junior entrant) to A7 (head of an organization). An A5 grade is roughly equivalent to a colonel OF5 rank in the military and is usually a branch or division head.

other people involved in the multiorganizational interaction, provided that they worked for another organization. Two follow-up emails were sent periodically, before the survey was closed on March 16th 2015.

Data Analysis Procedures

Data processing. Once the allotted survey response time was over; data was visually inspected using the Question Pro graphical interface, then downloaded into SPSS version 20.0 for processing. Incomplete responses were filtered out data was inspected for outliers or unusual cases. Composite variables were calculated and *Z*-standardized variables were created using the SPSS. Composite variables were also transformed into nominal categorical variables based on the three levels of interaction specified in the GIIA. This process is explained in detail in chapter 4.

Selection of clustering variables. Unlike other dimensional reduction techniques such as factor analysis, cluster analysis has no inbuilt process to make evaluations about the relevant variables—i.e. GIIA dimensions—to include in the analysis. Thus only theoretical reasons and *post-hoc* sensitivity analysis of the cluster solutions can guide the selection of dimensions. Obviously, running clustering on every possible combination of dimensions is unfeasible, so ideally the *ex-ante* considerations should select variables that "characterize the objects being clustered and…relate specifically to the objectives of the cluster analysis" (Hair et al., 2006, p. 490).

The GIIA is divided into six separate constructs: interorganizational policy objective, interorganizational infrastructure, interorganizational procedures, organizational management, organizational autonomy, and norms of trust and reciprocity.

Each dimension within these constructs is classified as either contextual, organizational, or interorganizational. All the dimensions in the interorganizational policy objective construct are classified as contextual, meaning they are not intrinsic properties of the organization nor emergent interorganizational form, but are related to the systems context or situation. Thus the interorganizational policy objective construct was not used for clustering, but was used instead used to profile cluster solutions in criterion validity tests.

The remaining organizational- and interorganizational-type dimensions were examined using descriptive analyses. Variables were checked for correlations, as highly correlated variable ($r > 0.9$) are likely to reduce the differentiation in clusters and should not be used for clustering. No highly correlated variables were found.

Detecting outliers. Cluster analysis is highly sensitive to outliers, which can distort the cluster structure. Outliers may be aberrant observations that are not "real," such as someone who just clicked the first answer on the survey instrument for every question; or they may be an undersampling of an actual group in the population (Hair et al., 2006). In the former case, outliers should be eliminated from the data set; in the latter case they should be included. Cluster analysis is unique among multivariate techniques in that it describes similarity of objects only in a sample, and is not concerned about the extent to which extreme outliers may skew a distribution away from normality (Romesburg, 2004). Profile plots were inspected, which plot the standardized value of each case in the sample across selected dimensions.

Clustering Analysis. Following the recommendation of Hair et al. (2006) a two-step approach was used. First a hierarchical, agglomerative method using Ward's algorithm and a squared Euclidean distance similarity measure was used, setting the output range for cluster solutions from two to eight. This initial set of cluster solutions was then inspected and a smaller set of solutions was selected to be used as seed points for a second step using a nonhierarchical k-means procedure. Hierarchical methods calculate all possible inter-case similarities then begin clustering the closest cases into clusters, without allowing cases to change clusters once joined. The advantage is that the full range of cluster solutions can be examined in a single run. K-means clustering, on the other hand, permits cluster membership to switch as the algorithm is run in order to minimize within cluster variance. The disadvantage is that, in contrast to hierarchical clustering, the solution is sensitive to initial starting conditions. Thus by providing a "rough cut" of cluster solutions from a hierarchical analysis, k-means is thought to refine the solutions and produce more homogeneous clusters (Hair et al., 2006).

For the hierarchical clustering, Ward's method was selected as this algorithm works by minimizing within-cluster sum of squares across the complete set of clusters (Everitt, Landau, Lesse, & Stahl, 2011) and avoids small sized clusters, which would be difficult to interpret given the number of clustering dimensions. The recommended similarity measure for Ward's method is the Euclidean Squared. The range of output was set from a two-cluster solution to an eight-cluster solution, a range which provides room for interpretation of additional solutions to the expected three-cluster solution. More than an eight-cluster solution would be challenging to interpret meaningfully. Given the different measurement scales, all clustering variables were standardized as z-scores.

Cluster profiling and interpretation. Cluster solutions were profiled in four ways. First, in order to determine cluster stability, the K-means produced cluster solutions were compared against the Ward's method clusters and randomly generated seed-point K-means clusters. Also, cluster solutions were compared against randomly generated cluster data. Second, clusters solutions were compared by running ANOVAs to determine how the mean of clustering dimensions differed across clusters. Second, criterion validity tests using one-way ANOVAs and MANOVAs (for the multi-item dimensions) were conducted to determine if cluster means differed significantly across contextual variables as specified by the GIIA. Chi-square analysis was performed on contextual variables in their nominal form. Third, predictive validity of cluster solutions was assessed in by running a MANOVA across the five outcome variables and conducing follow-up ANOVA. Statistically significant Lambda's and *F*-tests indicate that clusters have predictive ability. This process was conducted first for the three-cluster solutions (research question one) then for the other cluster solutions produced (research question two).

For research question three, a discriminant function analysis with calculation of a "potency index" for each dimension (Hair et al., 2006) was run to determine dimensions that most strongly predict cluster membership. Finally, research question four was evaluated by using the full results and the descriptive analysis to make a qualitative assessment about the extent to which dimensions and the interaction state as a whole can existing on a "continuum of interaction". Table 3-2 describes the approach taken for each research question in more detail.

Table 3-2: *Research questions and analysis methods*

Research Question	Methodology	Contribution to knowledge
(1) To what extent can the level of interaction corresponding to the constructs of cooperation, coordination and collaboration be empirically observed?	Confirmatory 2-step (hierarchical / k-means) cluster analysis with three solutions Profiling by ANOVA and MANOVA on continuous input and outcome variables; Chi-square for nominal variables	First large scale survey of multiorganizational interactions to determine if commonly used and theoretically postulated interaction terms are actually observed
(2) Are other constructs (levels of interaction) observed?	Exploratory 2-step cluster analysis without restricting cluster number, followed by intensive qualitative interpretation of cluster solutions ANOVA / MANOVA and Chi-square profiling if necessary	Generation of an alternative taxonomy of interaction forms that departs from the traditional cooperation / coordination / collaboration form.
(3) Which dimensions of the interorganizational interaction array are most important for predicting an organization's level of interaction in a multiorganizational interaction?	Confirmatory: Using the optimal cluster solutions from the previous analysis, perform a multiple discriminant analysis to determine dimensions that most strongly predict cluster membership	Using data to justify narrowing down list of dimensions to describe interorganizational interaction. Providing data supported evidence for priority variables for focus on in future research
(4) To what extent can dimensions of the interorganizational interaction array be conceptualized as "increasing" along a continuum of interaction?	Exploratory: review individual distributions of dimensions Review descriptive analysis and interpret previous cluster solutions and discriminant function analysis	Challenge a basic idea that underpins much of the interorganizational and public administration ideas

Evaluation of Reliability and Validity

This section evaluates the strategies to enhance reliability and validity of research design.

Reliability

Reliability is the dependability or consistency of an instrument in measuring whatever it measures (Neuman, 2003). As the research instrument is a self-administered survey, several aspects of reliability must be considered. First, the instrument's *stability*—the extent to which the survey results are consistent over time (Neuman, 2003). This was not quantitatively evaluated during pilot testing but instead, the test-retest stability assessment reflected more the readability and comprehensibility of the instrument by determining whether the same respondent is likely to answer in the same way over a time interval. To avoid error due to the time evolution of organization features, pilot survey testers were asked to refer to a historical case rather than a currently ongoing interaction. Pilot testers were also be divided into those that answer the survey based on specific experiences of an interorganizational interaction, and those that simply answer the survey to evaluate comprehensibility. A potential limitation with this approach is that the pilot testing group were not representative of the research sample.

The second aspect of reliability concerns the *representativeness* of the instrument such that it is consistent across subpopulations (Neuman, 2003). The survey instrument captured basic demographic data to be used for a subpopulation reliability analysis. Again, as the unit of analysis is the interorganizational-organizational dyad, not an individual, survey representativeness is of limited importance to the overall reliability.

The third aspect of reliability concerns the measurement error or *response error*, which is the difference between a survey response and the "true" value (Franklin & Walker, 2003). Several strategies were be adopted to minimize this error. First the *internal consistency* of the instrument was be evaluated using Cronbach's Alpha and

Guttman's lower bound (Field, 2013). As several different constructs are evaluated in the survey instrument, applying Cronbach's Alpha to the entire test is likely to inflate the value (Schmitt, 1996), thus only the dimensions that are known to be represented by an underlying factor and assessed by multiple items were evaluated for this form of reliability.

Second, the *alternate forms reliability*—the extent to which the structure of the instrument affects responses—was considered. Several types of bias may be introduced by the instrument structure: the tendency to focus on the first or last items in a list (primary bias) or to not read all items in a list (fatigue bias); and the tendency for respondents discern patters of responses in the answers (learning bias) (Choi & Pak, 2005). These categories of bias were mitigated by randomization of the order in which multiple choice lists are presented, and randomization of question order where appropriate in the entire survey.

The final aspect of response error concerns the general understandability and comprehensibility of question wording. Five to seven pilot testers were recruited for in-depth cognitive interviews following the initial pilot test in order to review question wording an identify areas of ambiguity.

There are a number of other reliability issues concerning sampling that affect the eventual validity of statistical conclusions: nonresponse error, sampling error and coverage error. Given the nonprobabilistic nature of the clustering analysis technique selected, it is not necessary to address these reliability issues. Clustering analysis does not require the sample distribution to meet certain criteria nor does the sample have to be statistically representative. The technique requires instead that samples are representative across the dimensions used for the clustering analysis (Aldenderfer & Blashfield, 1984). The stratification process used to select the sample will attempt to ensure that cases are roughly distributed across dimensions used in the clustering.

Validity

Validity refers to generally to the extent to which evidence supports the truth of an inference. Shadish, Cook, and Campbell (2002) define four types of validity: internal, external, statistical conclusion, and construct validity. Internal and external validity are relevant only in experimental designs thus are not considered here; however, the broader question about generalizability—a type of external validity—is considered in the limitations section. Statistical conclusion validity refers to the extent to which accurate decisions can be made from the results of statistical tests. While this is of concern when evaluating differences between experimental treatment groups, for example, some of the post-cluster analysis techniques rely on statistical tests to determine if clusters are distinct. As the statistics only relate to differences between samples, rather than some *a priori*-defined population, this concern can only be addressed after data is gathered and confirmation is made that the test assumptions are met by the data.

The primary validity concern lies with *construct validity*, which is the extent to which an instrument measures what it is designed to measure, or how well the measure captures the true reality of the abstract construct (Neuman, 2003). There are several facets of construct validity. First, face and *content validity* consider whether indicators are reasonable representations of constructs from the perspective of experts, and from the perspective of the literature evidence base. The GIIA framework represents a cumulative derivation from prior frameworks: this derivation process is fully documented in chapter

2 of this dissertation and Appendix A. From the standpoint of the current literature base, content validity of the GIIA is considered to be fairly high. A question that will ultimately be considered in this research, however, is whether the literature base is actually valid as to this date there has been no large scale empirical survey of the array / typology literature addressed in chapter 2.

Another important facet of construct validity is termed *criterion validity,* which assesses the extent to which indicators used agree with pre-existing measures. While a large number of previous survey instruments were retrieved most do not rigorously specify the relationship between survey items and underlying constructs, with the exception of Thomson (2001). Bearing the constraints of survey length in mind, criterion validity was addressed by including some repeated measures in the survey and use of multiple measures in conjunction with proven valid measures used by Thomson (2001). Even with these measures in place, an evaluation of the criterion validity of the survey instrument is not possible without further testing of the survey instrument on other samples and research contexts.

The final aspect of construct validity concerns the extent to which similar measures converge and dissimilar measures diverge. Part of the data processing will evaluate correlations between variables to confirm expected theoretical relationships, for example, whether the level of interaction is correlated with increasing trust.

Limitations

There are several threats to the reliability and validity of this research, which may limit the strength of inferences and conclusions made, and the extent to which results can be generalized to other case. These criticisms, however, are raised in light of the fact that this is exploratory research and the first time such a survey instrument has been used.

A key limitation of the research design is the choice of unit of analysis. The unit of interorganizational-dyad means that inferences and conclusions made about the level of interaction—or observed clusters of cases across dimension—can only be made from the perspective of an individual organization. While there is nothing theoretically wrong with this approach and this research is the first stepping stone, the literature on interorganizational relations and particularly the study of collaboration tends to seek generalized knowledge about the "collaboration" as a whole, rather than one organization's experience in the collaboration. It should be pointed out, however, that most collaboration studies in the public administration literature fail to adequately address the necessary sampling and units of analysis issues.

A second limitation of the research design is the restricted sample, which may limit generalizability to other cases. The NATO/defense sector sample is fairly unique: defense policy issues typically engage with a different range of concerns than the majority of organizations typically studied in public administration. The GIIA framework and the concept of levels of interaction are expected to be applicable and interpretable in this particular sample; however, the particular clusters identified or the dimensions found important may vary with policy sector or organizational type. Thus the generalizability of this research is expected to be low.

CHAPTER 4:

DESCRIPTIVE ANALYSIS

This chapter presents descriptive results of the empirical data analysis. First, the survey respondents are profiled and the survey is evaluated for demographic bias. Second, descriptive univariate results are presented for each of the Generalized Interorganizational Interaction Array (GIIA) dimensions and associated variables. This includes explanation of calculations for composite variables, in addition to factor analysis dimensionality and reliability checks for certain variables. Finally, the preparations for cluster analysis are reviewed. The actual results of the cluster analysis and research questions are presented in chapter 5.

Survey Respondent Profile

Survey Statistics

From 324 individuals directly contacted via email and an estimated 100 additional respondents from snowball sampling, 331 respondents started the survey, with 208 (62.9%) completed responses recorded. Two of these completed responses were discarded due to corrupted data, leaving an analysis sample of 206 responses. The mean response time was 26.6 minutes (*SD* = 15.9 min; range: 7.7-108.25 min). This response time, coupled with the encouraging free text answers, gives some indication that respondents thoughtfully answered the questions. From hereon, all data and analysis refers only to the 206 complete responses.

Survey Respondents

As expected, the largest respondent groups are NATO civilian employees (30.7%) and uniformed military (36.6%). The largest nationality groups are British (24.4%), American (20.5%) Dutch (8.3%), German (7.3%) and Canadian (6.8%). No data is available about whether this is representative generally of staff in NATO offices and national defense organizations. In any case, this is not relevant to the research questions, as the sample was profiled only by type of project and that the fact that it was in a NATO context. While respondent's language ability could have foreseeably affected their understanding of the survey questions, this is not expected to be an issue as typically NATO staff officers have very high fluency in English. No significant differences in responses were observed between nationality groupings.

From the 205 who chose to answer the gender question, the majority of respondents were male (182, 88.8%)) compared to female (23, 11.2%). As a comparison, females account for 14.6% of the active duty U.S military personnel, and 36.2% of civil servants in the U.K. Ministry of Defence.[5] No demographic data on gender is available for NATO organizations. On average, respondents have 24.6 years of professional work experience (*SD* = 9.68). This indicates that the survey was successful in targeting the desired seniority level of respondent (NATO civilian grade A2 to A5, and military ranks from OF2 to OF5).

Evaluation of Respondent Bias

In order to evaluate whether the survey sample was subject to systematic bias, three demographic variables were examined for effects: gender, years of professional

---

[5] https://www.dmdc.osd.mil/appj/dwp/dwp_reports.jsp ; https://www.gov.uk/government/statistics/mod-civilian-personnel-bulletin-2014

experience, and the employing organization of the respondent. A series of independent sample *t*-tests were run to compare the difference in means across genders, and one-way ANOVAs for difference in means across organizational status groups, for eight continuous variables collected in the survey: Task_Complexity_Sum, Autonomy2_Sum, Trust2_Sum, and Outcome1 to Outcome5. Pearson's correlation coefficient was calculated for respondents' years of experience (Yrs_Experience) against the eight continuous test variables. The values indicate very little relationship between the test variables. In summary, the results indicate no systematic bias in the survey sample.

Descriptive Statistics and Univariate Analysis

This section covers each dimension of the GIIA as captured by the survey data and provides descriptive univariate analysis. First, the different types of variables used in the analysis are presented. Second, survey variables are mapped to their respective dimensions in the GIIA. Finally, the full descriptive analysis broken out by dimension is presented.

Instead of displaying a summary overview of descriptive analyses for the survey variables, for several key reasons each variable requires its own separate analysis. In comparison to much social science survey research, which often features multiple items combined in a scale that aims to identify an underlying latent factor, the majority of survey items in this research relate to "tangible" aspects of an organization or interorganizational interaction and thus require individualized and separate analysis. Furthermore, additional explanation is required as some variables are combined as linear sums, logarithmic sums, and other weighted composites to allow testing of the level of interaction questions. Cluster solutions are interpreted on a variable by variable basis and require specific descriptive information. The descriptive analysis is also used to select the variables most appropriate to perform the cluster analysis.

Overview of Survey Variables

This section reviews the different types of survey variables, explains the naming convention, and describes how they are analyzed descriptively and used in further analyses towards answering the main research questions.

Nominal categorical data

The first group of variables are those with nominal categories. Survey respondents were asked to select an option—usually from three options corresponding to the three levels of interaction in the GIIA—that best corresponded to their multiorganizational interaction. Nominal variables are denoted by an "N" at the end of the name, e.g. "Goals_N." For the descriptives, a frequency analysis counts the number of cases in each level. Cluster analysis is run using nominal variables, but also by transforming the nominal variables into an scale (from one to three), which assumes a level of interaction. In some cases, weighted sums are calculated using the nominal variables by adopting this level of interaction assumption and treating the nominal categories as ordinal levels.

Another type of nominal variable are multiple response questions in which survey respondents were asked to "select all that apply" from a list of options. Each option is treated as a separate binary variable (0 = not selected, 1 = selected). A multiple response frequency analysis is used that counts the total number of each option across all cases, and then compares this total count to the total number of cases (N =206). No special naming convention is used for these variables.

Ordinal Likert data

Many of the survey questions are Likert items from one to seven, and are initially treated as ordinal data. In most cases, the Likert items are combined in some way and then treated as a scale. Likert items and their sums are presented with conventional descriptive statistics: mean, standard error of the mean, bias corrected accelerated bootstrap confidence intervals at 95%[6], standard deviation and variance. Providing they meet reliability criteria, only summed and composite scales from multiple Likert items are used for clustering.

Linear and logarithmic summed scales

When nominal or ordinal variables have been combined into a composite computed new variable, according to convention the new variable is treated as a scale. In the case where a linear sum is used, variable are appended with “Sum”. For more complex composites such as logarithm weighted sums, the variables have “Comp” in their name. Where items are combined into summed scales that represent an underlying factor, conventional scale-item analyses are performed such as inter-item correlations, factor analysis and reliability analyses. In some cases, however, combined items are a means to indicate a “position” on the GIIA framework, and should not be interpreted as an underlying factor.

When appropriate, scale sums and composites are transformed back into categorical data according to the level of interaction specified in the GIIA. These dimensions will be employed in cluster analysis using association metrics rather than

[6] Bootstrapping is a way to estimate computationally a parameter confidence interval directly from sample data by collecting thousands of sub-samples and empirically determining the percentage that fall within a specified bound of the parameter. “Bias corrected and accelerated” refers to corrections made to improve accuracy (Wright, London, & Field, 2011).

distance metrics requiring ordinal or scale data. Variables are appended with an "LOI," e.g. Purpose_Comp_LOI. "LOI" is used rather than "N" to separate those variables that were allocated into categories based on composite sums (LOI), versus those that were directly allocated by survey respondents (N). In the cases where scale sums were translated into categories, correlation analysis showed that as expected, in all cases the correlation between the two was very high.

GIIA Dimension—Survey Variable Mapping

Table 4-1 shows how survey variables map to the overall GIIA framework dimensions. The column denoted "Type" categorizes dimensions by whether they are: contextual or related to the situation (context); a feature of the participating organization (Org), or a feature of the emergent interorganizational form (Interorg). In general, only "Org" and "Interorg" are used for clustering analysis. Context and outcome variables are used for profiling cluster solutions.

Table 4-1: *Mapping of survey variables and questions to GIIA dimensions*

Dimensions	Type	Meaning	Survey Q's	Survey Variables
Purpose of Interorganizational interaction	Context	The overall purpose of the interorganizational interaction [Adapted from Mandell & Steelman (2003), and Keast et al. (2007)]	Q1 Q4	Purpose1, Purpose2, …Purpose7 Purpose_Sum Purpose_Comp Purpose_Comp_LOI
Time	Context	The length of time that the interorganizational interaction is expected to work together to accomplish the policy objective [modified from McNamara, 2008]	Q5	Time_Dur_Indef Time_Dur_Mths

Dimensions	Type	Meaning	Survey Q's	Survey Variables
Difficulty	Context	The complexity of tasks that the interorganizational interaction undertakes to accomplish the policy objective [modified from McNamara, 2008]	Q6	Task_Complexity1, …Task_Complexity6 Task_Complexity_Sum
Role of single organization	Context	The roles individual organizations assume to accomplish the policy objective [McNamara, 2008]	Q7	Role_Single_Org_N
Impetus for collective action	Context	The reason for developing the interorganizational interaction and the way in which it was developed [modified from McNamara, 2008]	Q8 Q9	Impetus_N Mandated Reason1, ..Reason7 Reason_Sum Reason_Sum_LOI
Numbers of participating organizations	Context	The number of organizations with first degree network ties participating in the interorganizational interaction [Author definition]	Q10	Num_Orgs Num_Orgs_Outlier_Gone
Category of participating organizations	Context	The sector and/or type of organization.	Q11	Org_Type1, Org_Type2, …Org_Type7
History of previous interaction in the problem domain	Context	The extent to which organizations and participants from those organization have worked previously together on other projects in the problem domain [definition adapted from Mattesich et al., 2001]	Q12	History_Org History_Indv History_Sum
Participant's Problem Orientation	Org	Reflects the degree to which the members view the problem from a shared or individual perspective. This has to do with members' values and perceptions [Mandell & Steelman, 2003]	Q13	Problem_Orient1 Problem_Orient2 Problem_Orient_Sum Problem_Orient_Sum_LOI

Dimensions	Type	Meaning	Survey Q's	Survey Variables
Resource allocation	Org	The contributions allocated by individual organizations to the interorganizational interaction in support of the policy objective [modified from McNamara, 2008]	Q14 Q15 Q16	Resource_Alloc1 Resource_Alloc2_N Resource_Alloc3_N Resource_Alloc_Comp Resource_Alloc_Comp_LOI
Incentives	Org	The intrinsic and extrinsic rewards provided to individuals and participating organizations to encourage support for the interorganizational interaction [modified from McNamara, 2008]	Q17	Incentives Incentives_LOI
Time to establish multiorganizational arrangement	Context	The length of time, relative to the time for implementation of the interaction, that the partnership takes to establish. [Inferred from Keast et al., 2007]	Q18	Time_Interact
Key personnel	Org	Personnel who are responsible for bringing together and implementing the interorganizational interaction [Modified McNamara, 2008]	Q19 Q20 Q21	Leadrshp_Forming_N Staff_Forming_N Key_Personnel_Sum Key_Personnel_Sum_LOI Org_Lead_N
Orientation of policy objective (Goals)	Interorg	The agreed and comprehensive nature of goals between interacting organizations [Adapted from D'Amour et al., 2008]	Q22	Goals_N Goals_S
Design	Interorg	The administrative structure emerging from the interorganizational interaction [Modified McNamara, 2008]	Q23	Design1, Design2, …Design6 Design_Comp Design_Comp_LOI

Dimensions	Type	Meaning	Survey Q's	Survey Variables
Formality of the agreement	Interorg	The way in which individual organizations agree on their roles and responsibilities within the interorganizational interaction [modified from McNamara, 2008]	Q24	Formality_N Formality_S
Information sharing and communications	Interorg	The ways in which personnel within the interorganizational interaction use information and communication processes to attain the policy objective [modified from McNamara, 2008]	Q25	Info1, Info2, …Info6 Info_Comp Info_Comp_LOI
Decision making	Interorg	The ways in which the organizations within the interorganizational interaction make implementation decisions pertaining to the policy objective [modified from McNamara, 2008]	Q26	Decision1, Decision2, …Decision6 Decision_Comp Decision_Comp_LOI
Resolution of turf issues	Interorg	The process used for solving conflicts between organizations within the interorganizational interaction [modified from McNamara, 2008]	Not testetd	N/A
Organizational autonomy	Org	The degree to which each partnering organization independently operates, in terms of the extent that their operating procedures and policies are adapted by the interorganizational interaction, and the extent of authority given to the collective to develop policies that guide operations of the collective. [Modified from McNamara, 2008]	Q27 Q28	Autonomy1_N Autonomy2a Autonomy2b Autonomy2c Autonomy2_Sum

Dimensions	Type	Meaning	Survey Q's	Survey Variables
Trust	Org	The extent to which trustworthy relationships between organizations within the interorganizational interaction are built [modified from McNamara, 2008]	Q29 Q30	Trust1_N Trust2a Trust2b Trust2c Trust2_Sum
Outcomes	N/A	Perceptions of the outcomes of the multiorganizational interaction	Q31 – Q35	Outcome1 Outcome2 Outcome3 Outcome4 Outcome5

Descriptive Analysis for GIIA Dimensions

This section presents the descriptive analysis for GIIA dimensions and the five outcome variables. As only fully completed survey responses are included in the analysis, the number of respondents for all variables is always equal to 206, thus *N* is not listed in the tables. Whenever a parameter of interest is stated, namely means and correlation coefficients, a bias corrected and accelerated 95% confidence interval is calculated from 1000 bootstrapped samples, abbreviated as BCa 95% CI[7].

Purpose of the interorganizational interaction

This dimension of the GIIA captures the overall purpose of the interorganizational interaction by specifying several distinct purposes for each level of interaction. These purposes were combined into seven possible choices on the survey question, from which

[7] Ideally, confidence intervals would be presented for all parameter estimates such as standard deviation, standard error, and effect sizes; however, for the purposes of space, intervals are not presented for measures of spread such as standard deviation as they do not feature prominently in the analysis. They are easily calculated from the data. Unfortunately, SPSS v20.0 does not support calculation of effect sizes nor their confidence intervals.

the respondent could select all that apply. Each of the seven choices created a new binary variable: Purpose1, Purpose2, …Purpose7. Descriptive results are presented in Table 4-2.

Table 4-2: *Multiple response frequencies for Purpose variables*

Purpose for joining interorganizational interaction	Assumed level of Interaction	Total count across all respondents	% (out of 206)
Purpose1: Create an informal network of communication among stakeholders	Cooperation	81	39.3
Purpose2: Generate support for an initiative	Cooperation	63	30.6
Purpose3: Conduct joint work with other organizations to ensure tasks are done, but each organization remains mainly autonomous	Coordination	119	57.8
Purpose4: Reach predetermined mutual goals together, while remaining autonomous	Coordination	82	39.8
Purpose5: Share material, personnel or financial resources to address common issues	Collaboration	91	44.2
Purpose6:Commit for a year or more to achieve short- and long-term outcomes	Collaboration	94	45.6
Purpose7: Create institutional and system change in a policy area	Collaboration	64	31.1

A composite variable was calculated, Purpose_Comp = Log_2([Purpose1 x 2^1] + [Purpose2 x 2^2]+ [Purpose3 x 2^3] + … + [Purpose7 x 2^7]). This variable has the property that Purpose(n) is always greater than any sum of the Purpose(n-i) where $i < n$. For example, if a respondent only selected Purpose7, the score of Purpose_Comp would be slightly greater than a respondent that selected all from Purpose1 to Purpose6. This intends to convey the increasing scale of interaction. Table 4-3 shows the descriptives for the Purpose_Comp variable. A further variable, Purpose_Comp_LOI was calculated, which segments the Purpose_Comp score into three “levels of interaction” as specified by the GIIA. The descriptives are shown in Table 4-4, demonstrating that, according to the

GIIA, collaboration is the majority (72%) level of interaction in the respondent sample when using purpose of the interorganizational interaction as a measure.

Table 4-3: *Purpose_Comp descriptives*

		BCa 95% CI for Mean		Std. Error of		
	Mean	Lower	Upper	Mean	Std. Deviation	Variance
Purpose_Comp (Range 1.00 – 7.99)	5.819	5.572	6.047	.122	1.743	3.038

Table 4-4: *Purpose_Comp_LOI descriptives*

Purpose_Comp_LOI Level	Frequency	Percent	Cumulative Percent
1.00 = Cooperation	7	3.4	3.4
2.00 = Coordination	49	23.8	27.2
3.00 = Collaboration	150	72.8	100.0
Total	206	100.0	

Time Duration of Multiorganizational Interaction

This dimension captures the length of time that the multiorganizational interaction is expected to exist. Out of 206 respondents, 105 (51%) indicated that their interaction lasted "indefinitely," and the other 101 (49%) cases specified a whole number of months (Time_Dur_Mths) as shown in Table 4-5. The median value is two years, and 80% of cases fell within three years or less.

Table 4-5: *Time_Dur_Mths descriptives*

	N	Minimum	Maximum	Mean	Median	Std. Deviation	Variance
Time_Dur_Mths	101	1	156	29.57	24.00	29.584	875.187

Difficulty

This dimension captures the complexity of the tasks that the interorganizational interaction undertakes. The dimension was specified by six Likert item questions in the survey: the number of distinct tasks, similarity, clarity, interdependence, routineness, and the level of agreement about the tasks amongst participants in the interaction. The items were captured as six different variables: Task_Complexity1 to Task_Complexity6, and a simple linear summed Likert scale was computed (Task_Complexity_Sum). The descriptive statistics for these variables are presented in Table 4-6.

Table 4-6: *Task_Complexity descriptives*

Variable Name	Mean	BCa 95% CI for Mean Lower	Upper	Std. Error of Mean	Std. Deviation	Variance
Task_Complexity1: number of distinct tasks (1=low, 7=high)	5.01	4.77	5.24	.119	1.714	2.936
Task_Complexity2: similarity (1=very similar, 7=very different)	3.87	3.67	4.09	.109	1.567	2.456
Task_Complexity3: clarity of tasks (1=known and clearly defined, 7=ambiguous, undefined)	3.59	3.35	3.83	.114	1.641	2.691
Task_Complexity4: interdependence (1=independent, 7=interdependent)	5.10	4.90	5.29	.099	1.428	2.039
Task_Complexity5: routineness (1=routine, 7=irregular, atypical)	4.19	4.00	4.38	.104	1.497	2.242
Task_Complexity6: level of agreement amongst participants (1=agreed by all, 7=highly contested)	3.24	3.05	3.42	.100	1.430	2.046
Task_Complexity_Sum	24.995	24.299	25.698	.341	4.892	23.927

Reliability Analysis For Task Complexity. Given that these six variables purport to capture a single factor of "task complexity," a reliability analysis was conducted that found Cronbach's alpha = .477, and Guttman's lower bound, λ_2 = .506. This is well below the recommended .8 for a reliable scale (Field, 2013); however, Cronbach's alpha is dependent on the number of items in scale in addition to the inter-item correlations. There are only six items in the Task Complexity scale. Furthermore, the inter-item (Table 4-7) and item-total correlations were low (Table 4-8), indicating lack of relationship between the different items.

Table 4-7: *Task Complexity Inter-Item Correlations; Pearson's r (Significance) [Bias corrected and accelerated bootstrap 95% Confidence Intervals]*

Task Complexity (TC)	TC1	TC2	TC3	TC4	TC5	TC6
TC1	1					
TC2	.340 (.000) [.197, .466]	1				
TC3	.119 (.087) [-.025, .250]	.180 (.010) [.042, .313]	1			
TC4	.067 (.336) [-.085, .214]	.051 (.462) [-.100, .195]	-.077 (.273) [-.217, .066]	1		
TC5	-.041 (.562) [-.184, .104]	.223 (.001) [.086, .359]	.240 (.001) [.100, .381]	.042.553 [-.108, .187]	1	
TC6	.109 (.121) [-.041, .250]	.055 (.430) [-.091, .200]	.324 (.000) [.191, .450]	.161 (.021) [.014, .293]	.172 (.013) [.037, .305]	1

Table 4-8: *Item-Total Statistics for task complexity reliability analysis*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TC1	19.99	17.839	.218	.147	.446
TC2	21.13	17.194	.329	.183	.381
TC3	21.40	17.295	.289	.179	.403
TC4	19.90	20.853	.079	.052	.508
TC5	20.81	18.752	.226	.123	.439
TC6	21.76	18.185	.303	.154	.400

These results indicate that Task_Complexity4 has the lowest correlations—close to zero—with the other items, and also Cronbach's alpha increases to .508 when this item is deleted. This is still not enough indication that even if Task_Complexity4 was removed, the remaining items would constitute a reliable scale.

Looking at the correlations for which $r > .3$, Task_Complexity1 (the number of distinct tasks) is significantly correlated with Task_Complexity2 (the similarity of tasks), $r = .340$ [95% BCa CI: .197; .466] ($p < .0001$). This result seems reasonable—the more numerous the tasks, the more likely they are different. Task_Complexity3 (the clarity of tasks) is significantly correlated with Task_Complexity6 (the level of agreement amongst participants), $r = .324$ [95% BCa CI: .191, .450]. Again, this is a sensible finding that confirms a basic tenet of a “wicked problem”—less clarity results in greater disagreement between participants (Head & Alford, 2013).

A principal axis factoring was conducted on the six Task_Complexity items. The Kaiser-Meyer-Olkin (KMO) measure showed poor sampling adequacy for this factor analysis, KMO = .520, and individual item KMO values for Task_Complexity1 and Task_Complexity4 were below the recommended .5 (Field, 2013). The other four individual item KMO values, however, were only slightly greater than .5. The determinant of the correlation matrix was .527, indicating that multicollinearity is not present. When the two items failing the KMO test were removed, a single factor had an eigenvalue over Kaiser’s criterion of 1 and explained 21.9% of variance.

In summary, there is limited evidence to support an underlying Task Complexity factor among the six items, or even when the two problematic items are removed. Thus in the cluster and discriminant analysis to follow, individual Task Complexity items can be used, rather than the full composite sum.

Role of a single organization

This dimension captures the role individual organizations assume to accomplish the policy objective, and was coded as a single variable: Role_Single_Org_N. Table 4-9 shows the descriptive result for this variable.

Table 4-9: *Role_Single_Org_N descriptives*

Role_Single_Org_N Values	Assumed Level of Interaction	Frequency	Percent	Cumulative Percent
1: If required, my organization could achieve the goals independently without support from other organizations	Cooperation	23	11.2	11.2
2: My organization requires some assistance from other organizations to accomplish the goals	Coordination	58	28.2	39.3
3: No organization can achieve the goal independently. My organization is interdependent with other organizations	Collaboration	125	60.7	100.0
Total		206	100.0	

Impetus for Collective Action

This dimension captures the way in which the interorganizational interaction was developed, and was coded as a single categorical variable Impetus_N. A further binary categorical variable (Mandated) was calculated, which captured whether participation in the interorganizational interaction was voluntary. The results show that 130 (63.1%) interorganizational interaction are mandated, whereas 76 (36.9%) are voluntary. Table 4-10 shows the descriptives for the Impetus_N variable.

A further variable captures the reasons, measured by importance, why a particular organization is participating. Note this is different from the earlier Purpose dimension, which captures the overall policy purpose of the interorganizational interaction. This dimension was measured by an importance ranking between one and seven for each of seven reasons (variables Reason1 to Reason7). A linear composite sum variable, Reason_Sum was calculated. Reason_Sum represents the overall ‘stakes’ an organization has in an interorganizational interaction. It is not meaningful to interpret Reason_Sum as an underlying latent factor, as there is no common “source” of the reasons and the importance of each reason to each organization is highly contextual. Thus it is not expected that Reason1 to Reason7 variables are highly correlated with each other and no scale reliability analysis is required.

The results in Table 4-11 show that on average, Reason2 (build relationships), Reason4 (enhance reputation), and Reason5 (create common vision), were rated as the most important. Reason6 (contingent funding) and Reason7 (resolve conflicts) were much less important. This is expected given the large proportion of respondents working in governmental organizations, who generally are already funded regardless of specific participation in multiorganizational projects. For example, 70% of the respondents working in International Organizations (e.g. NATO or the United Nations) marked Reason 6 as low in importance.

Table 4-10: *Impetus_N descriptives*

Impetus_N Values	Frequency	Percent	Cumulative Percent
1: Directly tasked by a higher authority or mandate to participate (e.g. a higher command, organizational policy or mission, organization leader decision, legal requirements)	130	63.1	63.1
2: No direct tasking, but not participating would result in either a loss of reputation or an inability to meet organizational goals.	36	17.5	80.6
3: Participation is voluntary and was initiated primarily by senior management.	16	7.8	88.3
4: Participation is voluntary and was initiated primarily by the staff level.	24	11.7	100.0
Total	206	100.0	

Table 4-11: *Reason(n) and Reason_Sum descriptives*

Variable	Mean	BCa 95% CI for Mean Lower	Upper	Std. Error of Mean	Std. Deviation	Variance
Reason1: Take advantage of partner organizations' resources (for example: money, information, expertise, physical property) to help my organization achieve its goals	4.59	4.34	4.83	.123	1.769	3.130
Reason2: Build relationships with partner organizations because we expect to interact with them again in the future	5.51	5.30	5.71	.102	1.471	2.163
Reason3: Enhance my organization's reputation by working with partner organizations that have strong reputations.	4.46	4.21	4.70	.122	1.752	3.069
Reason4: Enhance my organization's reputation by demonstrating commitment to resolving important problems	5.18	4.96	5.39	.105	1.505	2.265
Reason5: Create a common vision among organizations for solving problems too complex for my organization to solve alone	5.05	4.81	5.28	.118	1.693	2.866
Reason6: Receive funding or grants that are contingent upon participation	2.69	2.41	2.99	.142	2.036	4.147
Reason7: Resolve conflicts that have occurred between my organization and partner organizations	3.08	2.82	3.35	.138	1.987	3.949
Reason_Sum	30.558	29.626	31.524	.460	6.600	43.555

A further variable, Reason_Sum_LOI was calculated, which segmented the Reason_Sum score into three “levels of interaction” as specified by the GIIA. The descriptives are shown in Table 4-12. This demonstrates that, according to the GIIA, coordination is the majority (72%) level of interaction in the respondent sample when using purpose of the interorganizational interaction as a measure.

Table 4-12: *Reason_Sum_LOI descriptives*

Reason_Sum_LOI		Frequency	Percent	Cumulative Percent
1.00 = Cooperation		18	8.7	8.7
2.00 = Coordination		139	67.5	76.2
3.00 = Collaboration		49	23.8	100.0
	Total	206	100.0	

Number of Participating Organizations

This dimension captures the number of organizations with first degree network ties participating in the interorganizational interaction. Inspection of the data revealed nine outliers with the number of organizations set as greater than or equal to 100. Closer inspection of the other responses for these cases revealed that the intent of the question was misunderstood, and the outliers were removed from the descriptive calculations. Descriptive results are shown in Table 4-13.

Category of Participating Organizations

This dimension captures the categories of participating organizations involved in the multiorganizational interaction. As would be expected for the defense environment, governmental defense organizations are the most prevalent.

Table 4-13: *Number_Orgs descriptives with outliers removed*

				BCa 95% CI for Mean		Std. Error of	Std.	
	N	Median	Mean	Lower	Upper	Mean	Deviation	Variance
Num_Orgs (Outliers removed	197	10.000	12.812	11.437	14.161	.796	11.176	124.898

Table 4-14: *Category of participating organizations descriptives*

Category of Participating Organization	Total count across all respondents	% (out of 206)
1. International intergovernmental organization	160	77.7
2. Government defense organization (Military service or civilian department)	182	88.3
3. Government organization (non-defense)	98	47.6
4. Educational organization (civilian university or college)	84	40.8
5. Nonprofit organization	55	26.7
6. For-profit business / corporation	70	34.0
7. Other	13	6.3

History of Previous Interaction in the Problem Domain

This dimension captures the extent to which organizations and participants from those organizations have worked previously together on other projects in the problem domain. From the two survey questions in this dimension, two variables were created: History_Org and History_Indv. History_Org is significantly correlated with History_Indv, r =.360 [95% BCa CI: .212; .502] (p <.001). Descriptive results are presented in Table 4-15.

Table 4-15: *History_Org, History_Indv and History_Sum descriptives*

Variable Name	Mean	BCa 95% CI for Mean Lower	Upper	Std. Error of Mean	Std. Dev.	Variance
History_Org - to what extent organizations involved in the multiorganizational interaction have worked together on previous initiatives? (1=Not at all; 7=to a great extent)	5.09	4.88	5.30	.110	1.573	2.474
History_Indv - to what extent you have previously worked with individual staff from the organizations involved? (1=Not at all; 7=to a great extent)	4.19	3.92	4.46	.135	1.940	3.764
History_Sum	9.282	7.025	9.852	.202	2.905	8.437

Participant's Problem Orientation

This dimension reflects the degree to which members of an interorganizational interaction view the problem from a shared or individual perspective. From two survey questions two variables were created: Problem_Orient1 and Problem_Orient2. Problem_Orient1 is significantly and highly correlated with Problem_Orient2, r =.569 [95% BCa CI: .433; .690] (p <.001), suggesting that the items do measure an underlying factor of problem orientation. A third variable, Problem_Orient_Sum created a simple linear summed scale of the Likert scores. Descriptive results are presented in Table 4-16.

Table 4-16: *Problem_Orient1 & 2, and Problem_Orient_Sum descriptives*

		BCa 95% CI for Mean		Std. Error of		
Variable Name	Mean	Lower	Upper	Mean	Std. Deviation	Variance
Problem_Orient1: Generally, people in this multiorganizational interaction are dedicated to the idea that we can make this project work (1=strongly disagree, 4=neutral, 7=strongly agree)	6.00	5.83	6.14	.080	1.146	1.312
Problem_Orient2: My ideas about what we want to accomplish with this multiorganizational interaction seem to be the same as the ideas of others (1=strongly disagree, 4=neutral, 7=strongly agree)	5.32	5.14	5.49	.096	1.380	1.905
Problem_Orient_Sum	11.311	10.995	11.602	.156	2.240	5.015

A further variable, Problem_Orient_Sum_LOI was calculated, which segmented the Problem_Orient_Sum score into three "levels of interaction" as specified by the GIIA. The descriptives are shown in Table 4-17. This demonstrates that, according to the GIIA, collaboration is the majority (72.8%) level of interaction in the respondent sample when using purpose of the interorganizational interaction as a measure.

Table 4-17: *Problem_Orient_Sum_LOI descriptives*

Problem_Orient_Sum_LOI	Frequency	Percent	Cumulative Percent
1.00 = Cooperation	10	4.9	4.9
2.00 = Coordination	46	22.3	27.2
3.00 = Collaboration	150	72.8	100.0
Total	206	100.0	

Resource Allocation

This dimension describes the contributions allocated by individual organizations to the interorganizational interaction in support of the policy objective. Three survey questions were coded into the variables Resource_Alloc1, Resource_Alloc2_N and Resource_Alloc3_N. Descriptive results are shown in Table 4-18 and Table 4-19. These variables are combined into a weighted composite sum: Resource_Alloc_Comp = Resource_Alloc1 + (Resource_Alloc2 *x* 2) + Resource_Alloc3. The double weighting for Resource_Alloc2 is to account for the fact that these three possible values strongly discriminate between different types of interaction. There were no significant correlations between the three Resource_Alloc variables. A further variable, Resource_Alloc_Comp_LOI segments the Resource_Alloc_Comp variable into the three levels of interaction as specified by the GIIA. Descriptives are shown in Table 4-20 and Table 4-21 .

Table 4-18: *Resource_Alloc1 descriptives*

Variable Name and Description	Mean	BCa 95% CI for Mean Lower	BCa 95% CI for Mean Upper	Std. Error of Mean	Std. Dev.	Variance
Resource_Alloc1: My contribution in the multiorganizational interaction is considered part of my “regular duties” by my organization (1=Strongly disagree; 7= Strongly agree)	5.96	5.74	6.19	.107	1.538	2.364

Table 4-19: *Resource_Alloc2_N and Resource_Alloc3_N descriptives*

Resource_Alloc2_N Values	Assumed Level of Interaction	Frequency	Percent	Cumulative Percent
1: My organization's financial resources are not involved	Cooperation	28	13.6	13.6
2: My organization allocates (or has received) funding specifically for participation in the multiorganizational interaction	Coordination	163	79.1	92.7
3: My organization pools financial resources with other organizations into an independent operating fund for the multiorganizational interaction	Collaboration	15	7.3	100.0
Total		206	100.0	
Resource_Alloc3_N Values	**Assumed Level of Interaction**	**Frequency**	**Percent**	**Cumulative Percent**
1: Information	Cooperation	44	21.4	21.4
2: The time and expertise of personnel	Coordination	148	71.8	93.2
3: Financial and material assets	Collaboration	10	4.9	98.1
4: Logistical and administrative support to the multiorganizational group	Collaboration	4	1.9	100.0
Total		206	100.0	

Table 4-20: *Resource_Alloc_Comp descriptives*

Variable Name and Description	Mean	BCa 95% CI for Mean Lower	Upper	Std. Error of Mean	Std. Dev.	Variance
Resource_Alloc_Comp (Range = 3 – 14)	11.704	11.456	11.961	.132	1.893	3.585

Table 4-21: *Resource_Alloc_Comp_LOI descriptives*

Resource_Alloc_Comp_LOI Values	Frequency	Percent	Cumulative Percent
1 = Cooperation	5	2.4	2.4
2 = Coordination	117	56.8	59.2
3 = Collaboration	84	40.8	100.0
Total	206	100.0	

Incentives

This dimension captures the intrinsic and extrinsic incentives provided to individuals and participating organizations to encourage support for the interorganizational interaction. While the GIIA dimension has several different operationalizations of intrinsic and extrinsic incentives, due to a variety of survey-related issues, only the leadership factor is captured in a single survey item. Table 4-22 shows descriptives for the Incentives variable, and Table 4-23 shows the Incentives variable segmented into the _LOI version.

Table 4-22: *Incentives descriptives*

		BCa 95% CI for Mean				
Variable Name and Description	Mean	Lower	Upper	Std. Error of Mean	Std. Dev.	Variance
Incentives: select a number that indicates how much your organization's leadership recognizes the benefits of participating in the multiorganizational interaction (1=strongly disagree; 7=strongly agree)	5.981	5.797	6.160	.089	1.292	1.688

Table 4-23: *Incentives_LOI descriptives*

Incentives_LOI Values	Frequency	Percent	Cumulative Percent
1 = Cooperation	7	3.4	3.4
2 = Coordination	42	20.4	23.8
3 = Collaboration	157	76.2	100.0
Total	206	100.0	

Time Taken to Establish Multiorganizational Arrangement

This dimension captures the length of time in months, relative to the time for implementation of the interaction, that the partnership takes to establish. One survey question recorded the number of months, and is coded in the variable Time_Interact.

Understandably, the results displayed in show a high level of variance, with the standard deviation (15.9 months) greater than the mean (13.5 months), compared to the median and mode time of 6 months. While the GIIA assigns values for this dimension of “short term,” “medium term,” and “long term” to each level of interaction, it is not clear how these can be interpreted in the context of the real data, hence no attempt is made to segment the results into a “level of interaction” variable as done for other variables.

Table 4-24: *Time_Interact descriptives (months)*

			BCa 95% CI for Mean				
Variable Name and Description	Mean	Median	Lower	Upper	Std. Error of Mean	Std. Dev.	Variance
Time_Interact (months)	13.52	6.00	11.51	15.92	1.109	15.921	253.490

Key Personnel

This dimension captures the involvement of the key personnel who are responsible for bringing together and implementing the interorganizational interaction. The dimension was specified by two survey questions. The first captured the role of leadership in the forming and planning the interorganizational interaction (coded as variable Leadrshp_Forming_N); the second examined the role of staff in the organization (coded as variable Staff_Forming_N). Descriptive results are presenting in Table 4-25.

A weighted composite variable was created: Key_Personnel_Sum = $(\text{Leadrshp\_Forming\_N})^2 + (\text{Staff\_Forming\_N})^2$. The squared operation allows greater weighting to higher levels of interaction and increases discrimination between states in the combined sum. The variable is essentially a measure of the overall 'intensity' with which staff and leadership create the interaction. A Kendall's tau[8] correlation analysis revealed a weak but statistically significant relationship between the leadership and staff variables (τ = 0.193 [95% BCa CI: 0.048; 0.333], p = 0.003). Descriptive results for Key_Personnel_Sum are shown in Table 4-26.

Table 4-25: *Leadershp_Forming_N and Staff_Forming_N descriptives*

Leadrshp_Forming_N Values	Assumed Level of Interaction	Frequency	Percent	Cumulative Percent
1: Organizational leadership is not involved in decisions to work together	Cooperation	19	9.2	9.2
2: Organizational leadership is openly supportive, but isn't involved in detailed planning of contributions to a multiorganizational interaction	Coordination	127	61.7	70.9
3: Organizational leadership is openly supportive AND is involved in planning contributions to the multiorganizational interaction	Collaboration	60	29.1	100.0
Total		206	100.0	
Staff_Forming_N Values	**Assumed Level of Interaction**	**Frequency**	**Percent**	**Cumulative Percent**
1: Interaction occurs through lower levels of organizations	Cooperation	45	21.8	21.8
2: Mid-level management implement and administer organization's involvement in interaction	Coordination	67	32.5	54.4
3: The level of staff involved and their responsibilities adapt to the task at hand; each role is considered equally important	Collaboration	94	45.6	100.0
Total		206	100.0	

Table 4-26: *Key_Personnel_Sum descriptives*

Variable Name and Description	Mean	Median	BCa 95% CI for Mean Lower	Upper	Std. Error of Mean	Std. Deviation	Variance
Key_Personnel_Sum (Range: 2 – 18)	10.806	13.00	10.193	11.528	.319	4.577	20.947

[8] Kendall's tau was used as the data are nominal with very few categories, thus the number of tied ranks is expected to be high (Field, 2013)

As with the other survey variables, Key_Personnel_Sum was then segmented into the three levels of interaction as specified by the GIIA. The descriptive results presented in show that 51.9% of cases are rated as "collaboration."

Table 4-27: *Key_Personnel_Sum_LOI descriptives*

Key_Personnel_Sum_LOI Values		Frequency	Percent	Cumulative Percent
1 = Cooperation		41	19.9	19.9
2 = Coordination		58	28.2	48.1
3 = Collaboration		157	51.9	100.0
	Total	206	100.0	

A third survey question was included in the Key Personnel dimension. This question captured whether organizations were equal, or whether one or more organizations shared leadership of the group. Descriptives for this question, coded as variable Org_Lead_N are presented in Table 4-28.

Table 4-28: *Org_Lead_N descriptives*

Org_Lead_N Values	Assumed Level of Interaction	Frequency	Percent	Cumulative Percent
1: All organizations are equal partners	Cooperation	35	17.0	17.0
2: One organization leads the group	Coordination	82	39.8	56.8
3: A few organizations share leadership of the group	Collaboration	89	43.2	100.0
Total		206	100.0	

The Org_Lead_N variable was not included in the Key_Personnel_Sum variable because after consideration, it was realized that it does not add further information about the key personnel, but rather expresses something at a higher, interorganizational level of analysis. The variable will be used as an additional profiling for cluster solution in later analysis in chapter 5.

Orientation of Policy Objective (Goals)

This dimension describes whether policy objectives (or "goals") between interacting organizations are agreed and comprehensive in nature. A single survey question presented three options, which were coded into a variable Goals_N. Descriptives for Goal_N are shown in Table 4-29. A scale version of the variable was also computed for use in cluster analysis, Goals_S.

The frequencies show only one case at a level of cooperation, which when compared to the other variables appears to be an outlier. The free text responses for this case do not give any cause for concern and the case's responses on other variables were not problematic. The overall response for the Goals_N may indicate a poorly specified question. "Goals" were not defined in the question, and the notion expressed in the first possible response that "(t)here are no shared goals" goes against a normative belief about collective working. Thus it is likely that respondents answered this question with some optimism.

Table 4-29: *Goals_N descriptives*

Goals_N Values	Assumed Level of Interaction	Frequency	Percent	Cumulative Percent
1: There are no shared goals	Cooperation	1	0.5	0.5
2: Some shared goals, in addition to individual organizational goals	Coordination	124	60.2	60.7
3: Shared goals agreed between all participants	Collaboration	81	39.3	100.0
Total		206	100.0	

Design

This dimension captures the administrative structure that emerges in the interorganizational interaction. The survey presented six different multiple response options, coded in binary variables, Design1, Design2…Design6. Table 4-30 shows the total count across all respondents for each design option, and a percentage out of 206, which was the total number of possible positive responses for each variable.

A composite variable was calculated: Design_Comp = $\text{Log}_2([\text{Design1}\ x\ 2^1] + [\text{Design2 x } 2^2] + [\text{Design3}\ x\ 2^3] + \ldots + [\text{Design6}\ x\ 2^6])$. The properties of this composite variable are the same as for Purpose_Comp. Descriptive results for the Design_Comp variable are shown in Table 4-31.

Table 4-30: *Multiple response frequencies for Design variables*

Design of interorganizational interaction	Assumed level of Interaction	Total count across all respondents	% (out of 206)
Design1: Informal communications between staff	Cooperation	175	85.0
Design2: Official communications backed by organizational leadership	Cooperation	116	56.3
Design 3: Regular official meetings between working level staff	Coordination	176	85.4
Design4: Regular official meetings between organizational leadership	Coordination	94	45.6
Design5: Executive decision boards / committees created especially for the multiorganizational group in which leadership make decisions about the interaction	Collaboration	104	50.5
Design6: A new joint organization is created to implement the tasks of the multiorganizational interaction	Collaboration	46	22.3

A further variable, Design_Comp_LOI was calculated, which segmented the Design_Comp score into three “levels of interaction” as specified by the GIIA. The descriptives are shown in

Table 4-32. This demonstrates that, according to the GIIA, collaboration is the majority (62%) level of interaction in the respondent sample when using design of the interorganizational interaction as a measure.

Table 4-31: *Design_Comp descriptives*

			BCa 95% CI for Mean		Std. Error		
	N	Mean	Lower	Upper	of Mean	Std. Dev.	Variance
Design_Comp Range (1 to 6.98)	206	5.0635	4.857	5.244	0.100	1.429	2.041

Table 4-32: *Design_Comp_LOI descriptives*

Design_Comp_LOI Level	Frequency	Percent	Cumulative Percent
1.00 = Cooperation	10	4.9	4.9
2.00 = Coordination	72	35.0	39.8
3.00 = Collaboration	124	60.2	100.0
Total	206	100.0	

Formality of the Agreement

This dimension captures the way in which individual organizations agree on their roles and responsibilities within the interorganizational interaction. A single survey question presented three options, which were coded into a variable Formality_N. Descriptives for Formality_N are shown in Table 4-33. A scale version of the variable was also computed for use in cluster analysis, Formality_S.

Table 4-33: *Formality_N descriptives*

Formality_N Values	Assumed Level of Interaction	Frequency	Percent	Cumulative Percent
1: There are no shared goals Individual organizations informally agree to work together to achieve individual or mutually-beneficial goals	Cooperation	61	29.6	29.6
2: Policy documents (such as terms of reference or memoranda of understanding) identify each organization's roles and responsibilities, and are signed off by leadership	Coordination	98	47.6	77.2
3: Policy documents (such as terms of reference or memoranda of understanding) describe detailed implementation plans in addition to roles and responsibilities, and are signed off by leadership.	Collaboration	47	22.8	100.0
Total		206	100.0	

Information Sharing and Communications

This dimension captures the ways in which personnel within the interorganizational interaction use information and communication processes to attain the policy objective. The survey presented six different multiple response options, coded in binary variables: Info1, Info2…Info6. Table 4-34 shows the total count across all respondents for each Information Sharing and Communications option, and a percentage out of 206, which was the total number of possible positive responses for each variable.

A composite variable was calculated: Info_Comp = $\text{Log}_2([\text{Info1} \; x \; 2^1] + [\text{Info2 x } 2^2] + [\text{Info3} \; x \; 2^3] + \ldots + [\text{Info6} \; x \; 2^6])$. This variable has the same properties as Purpose_Comp and Design_Comp. Descriptive results for the Info_Comp variable are presented in Table 4-35. A further variable, Info_Comp_LOI was calculated, which segmented the Info_Comp score into three “levels of interaction” as specified by the GIIA. The descriptives are shown in Table 4-36. This demonstrates that, according to the GIIA, collaboration is the majority (77.2%) level of interaction in the respondent sample when using information sharing and communications methods of the interorganizational interaction as a measure

Table 4-34: *Multiple response frequencies for Info variables*

Information Sharing and Communications	Assumed level of Interaction	Total count across all respondents	% (out of 206)
Info1: Information is shared through informal channels and relationships between participants (e.g. staff email)	Cooperation	157	76.2
Info2: Formal (official documents) and informal communication channels are used	Cooperation	141	68.4
Info3: Interorganizational communication is formalized, with staff given mandate to share information	Coordination	79	38.3
Info4: Formalized communications infrastructures begin to develop (group email lists, shared web-based information repositories etc.)	Coordination	98	47.6
Info5: Open and frequent communication through formal and informal channels	Collaboration	140	68.0
Info6: Interorganizational communication is institutionalized in organizational policies and processes (e.g. policy requirements to share information with partner organizations)	Collaboration	66	32.0

Table 4-35: *Info_Comp descriptives*

			BCa 95% CI for Mean		Std. Error	Std.	
	N	Mean	Lower	Upper	of Mean	Dev.	Variance
Info_Comp Range (1 to 6.98)	206	5.278	5.032	5.495	.109	1.558	2.428

Table 4-36: *Info_Comp_LOI descriptives*

Info_Comp_LOI Level	Frequency	Percent	Cumulative Percent
1.00 = Cooperation	8	3.9	3.9
2.00 = Coordination	39	18.9	18.9
3.00 = Collaboration	159	77.2	100.0
Total	206	100.0	

Decision Making

This dimension captures the ways in which the organizations within the interorganizational interaction make implementation decisions pertaining to the policy objective. The survey presented six different multiple response options, coded in binary variables: Decision1, Decision2…Decision6. Table 4-37 shows the total count across all respondents for each decision making option, and a percentage out of 206, which was the total number of possible positive responses for each variable. A Decision_Comp variable, and a Decision_Comp_LOI variable were calculated in the same way as for the Information Sharing and Communications Dimension. The descriptive results are presented in Table 4-38 and Table 4-39.

Table 4-37: *Multiple response frequencies for Decision variables*

Decision making	Assumed level of Interaction	Total count across all respondents	% (out of 206)
Decision1: Decisions are made independently by each organization	Cooperation	50	24.3
Decision2: Centralized decision making is practiced; a lead organization(s) dominates the decision making process	Cooperation	58	28.2
Decision3: Senior leadership (chief executive or command group level) conducts collective decision making about the interorganizational interaction	Coordination	74	35.9
Decision4: Participative decision making based on consensus and compromise generates rules to govern activities and relationships between organizations	Coordination	105	51.0
Decision5: Organizational representatives have latitude to negotiate rules and discuss agreements to identify common ground	Collaboration	103	50.0
Decision6: Joint decision making occurs at all levels of organization	Collaboration	68	33.0

Table 4-38: *Decision_Comp descriptives*

	N	Mean	BCa 95% CI for Mean Lower	BCa 95% CI for Mean Upper	Std. Error of Mean	Std. Dev.	Variance
Decision_Comp Range (1 to 6.98)	206	4.943	4.679	5.154	.120	1.725	2.977

Table 4-39: *Decision_Comp_LOI descriptives*

Decision_Comp_LOI Level	Frequency	Percent	Cumulative Percent
1.00 = Cooperation	14	6.8	6.8
2.00 = Coordination	57	27.7	34.5
3.00 = Collaboration	135	65.5	100.0
Total	206	100.0	

Organizational Autonomy

This dimension captures the degree to which partnering organizations independently operate. A single survey question presented three options related to the compatibility of policies, which were coded into a variable Autonomy1_N. Descriptives for Autonomy1_N are shown in Table 4-40. Another set of three survey items were offered (Autonomy2a, Autonomy2b, Autonomy2c), which combine to form a scale that measures the extent to which an organization's autonomy is affected. Descriptives for the Autonomy2 items and an Autonomy2_Sum scale are presented in Table 4-41 .

Table 4-40: *Autonomy1_N descriptives*

Autonomy1_N Values	Assumed Level of Interaction	Frequency	Percent	Cumulative Percent
1: The multiorganizational group does not have policies	Cooperation	44	21.4	21.4
2: Policies developed for the multiorganizational group are compatible with my organizations policies	Coordination	100	48.5	69.9
3: Partner organizations jointly develop policies and negotiation is required when they conflict with individual organization policies	Collaboration	62	30.1	100.0
Total		206	100.0	

Table 4-41: *Autonomy2 and Autonomy2_Sum descriptives*

Variable Name and Item Description	Mean	BCa 95% CI for Mean Lower	Upper	Std. Error of Mean	Std. Dev.	Variance
Autonomy2a: The multiorganizational interaction hinders my organization from meeting its own organizational mission (1=Not at all; 7=to a great extent)	1.97	1.80	2.15	.094	1.356	1.838
Autonomy2b: My organization's independence is affected by having to work with partner organizations on activities related to the multiorganizational interaction (1=Not at all; 7=to a great extent)	2.90	2.62	3.17	.133	1.908	3.639
Autonomy2c: As a representative of my organization, I feel pulled between trying to meet both my organization's and the multiorganizational interaction's expectation (1=Not at all; 7=to a great extent)	3.33	3.07	3.57	.134	1.929	3.723
Autonomy2_Sum_S	2.731	2.549	2.909	.097	1.388	1.925

Reliability Analysis for Autonomy2. According to Thomson (2001), the three Autonomy2 items should form a single factor of "organizational autonomy," which constitutes the dimension in the GIIA. A reliability analysis was conducted that found Cronbach's alpha (N=206) = .704, and Guttman's lower bound λ_2 = .704. This is below the recommended .8 for a reliable scale; however, others note that for exploratory research lower values can be acceptable (Field, 2013). Furthermore, given that Cronbach's alpha is highly dependent on the number of items, in addition to inter-item correlation, the reliability of the Autonomy2 scale is likely affected by the low number of items. Results indicate moderate correlations between items (Table 4-42) and the highest value of Cronbach's alpha with all items present.

Table 4-42: *Autonomy2 Inter-Item Correlations; Pearson's r (Significance) [Bias corrected and accelerated bootstrap 95% Confidence Intervals]*

Autonomy2	Autonomy2a	Autonomy2b	Autonomy2c
Autonomy2a	1		
Autonomy2b	.527 (.000) [.419, .630]	1	
Autonomy2c	.504 (.000) [.399, .601]	.376 (.000) [.235, .496]	1

Table 4-43: *Item-total statistics for Autonomy2*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Autonomy2a	6.23	10.128	.621	.387	.546
Autonomy2b	5.29	8.198	.503	.294	.643
Autonomy2c	4.87	8.202	.489	.271	.664

A principal axis factoring test of the dimensionality of the Autonomy2 scale showed that a single factor is present, as expected from Thomson (2001, 2009). The Kaiser-Meyer-Olkin (KMO) measure verified a reasonable sampling adequacy for this factor analysis, KMO = .657, and KMO values for individual items were >.618 thus all above the recommended .5 (Field, 2013). The determinant of the correlation matrix was .527, indicating that multicollinearity is not present. A single factor had an eigenvalue over Kaiser's criterion of 1 and explained 48.6% of variance (Table 4-44).

Table 4-44: *Factor analysis results for the Autonomy2 scale*

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.941	64.689	64.689	1.457	48.576	48.576
2	.625	20.836	85.525			
3	.434	14.475	100.000			

Extraction Method: Principal Axis Factoring.

Relationship between Autonomy1_N and Autonomy2_Sum. The relationship between Autonomy1_N—a three-level categorical variable and Autonomy2_Sum—a continuous scale, provides a test of criterion validity of the Autonomy2_Sum scale. It is expected that the importance of organizational autonomy increases as the partnership develops joint policies, thus for each level of Autonomy1_N, Autonomy2_Sum should increase. This was tested using a one-way ANOVA with planned contrasts with the three Autonomy1_N levels as the grouping variable, and Autonomy2_Sum as the 'dependent' variable.

There is a significant effect of Autonomy1_N level on the value of Autonomy2_Sum, $F(2, 203) = 7.150$, $p = .001$, $\omega = .24$. The planned contrasts reveal that, compared to level 1 of Autonomy1_N, level 2 is significantly associated with an mean increase of 0.572 in Autonomy2_Sum, $t(203) = 2.345$, $p = .02$, $r = 0.16$. Compared to level 2 of Autonomy1_N, level 3 is significantly associated with a mean increase of .433 in Autonomy2_Sum, $t(203) = 1.986$, $p = .048$, $r = .14$. In other words, there is evidence to support the assertion that the impact of organizational autonomy (Autonomy2_Sum) increases as the partnership develops joint policies (Autonomy1_N). While the association is significant, the effect sizes are small, hence closer scrutiny is required.

First, differences in variances between groups were examined: Levene's test is not significant, indicating nonsignificant differences in variance between groups, $F(2, 203) = 1.482$, $p = .230$. Group sample sizes are different, however, so the Gabriel post-hoc test was used. Gabriel's test was only significant for the mean difference comparison = 1.004 (95% CI .367, 1.642) between level 3 and 1 of Autonomy1_N, $p = .001$. The mean difference between level 2 and 1 was significant at the .052 level.

In conclusion, given the presence of a single factor, the moderate inter-item correlations, the maximum scale value of Cronbach's alpha with all items included, and the criterion validity test, the analysis can proceed with the assumption that Autonomy2 constitutes a single factor and thus the Autonomy_Sum variable can be used as a single clustering dimension.

Trust

This dimension captures the extent to which trustworthy relationships between organizations within the interorganizational interaction are built. A single survey question presented three options, which were coded into a variable Trust1_N. Descriptives for Trust1_N are shown in Table 4-45. Another set of three survey items were offered (Trust2a, Trust2b, Trust2c), which combine to form a scale that measures the dimension. Descriptives for the Trust2 items and the Trust2_Sum scale are presented in Table 4-46.

Table 4-45: *Trust1_N descriptives*

Trust1_N Values	Assumed Level of Interaction	Frequency	Percent	Cumulative Percent
1: Trust relationships are not required	Cooperation	12	5.8	5.8
2: Trust relationships are useful, but must be based on reciprocal behaviors	Coordination	70	34.0	39.8
3: Trust between organizations is necessary; in all levels of staff	Collaboration	124	60.2	100.0
Total		206	100.0	

Table 4-46: *Trust2 and Trust2_Sum descriptives*

Variable Name and Item Description	Mean	BCa 95% CI for Mean Lower	Upper	Std. Error of Mean	Std. Dev.	Variance
Trust2a: The people who represent partner organizations in the multiorganizational interaction are trustworthy (1=Strongly disagree; 7=strongly agree)	5.78	5.60	5.96	.083	1.96	1.430
Trust2b: My organization can count on each partner organization to meet its obligations in the multiorganizational interaction. (1=Strongly disagree; 7=strongly agree)	4.94	4.70	5.15	.105	1.513	2.289
Trust2c: My organization feels it worthwhile to stay and work with partner organizations rather than leave or scale back commitments to the multiorganizational interaction (1=Strongly disagree; 7=strongly agree)	5.83	5.66	6.00	.086	1.232	1.517
Trust2_Sum	5.518	5.374	5.660	.071	1.015	1.030

Reliability Analysis for Trust2. According to Thomson (2001), the three Trust2 variables should form a single factor of "organizational trust," which constitutes the dimension in the GIIA. A reliability analysis was conducted that found Cronbach's alpha (N=206) = .653, and Guttman's lower bound λ_2 = .668. As was the case with the Autonomy scale, the value of reliability measures should be interpreted in the context of the low number of items. Results indicate (Table 4-47) moderate and significant correlations between Trust2a and Trust2b (r = .573 (p =.000) [.464, .675]), and low and significant correlations for the other item combinations. The highest value of Cronbach's alpha (.716) is attained with Trust2c removed (Table 4-48).

Table 4-47: *Trust2 Inter-Item Correlations; Pearson's r (Significance) [Bias corrected and accelerated bootstrap 95% Confidence Intervals]*

Trust2	Trust2a	Trust2b	Trust2c
Trust2a	1		
Trust2b	.573 (.000) [.464, .675]	1	
Trust2c	.312 (.000) [.142, .4.73]	.280 (.000) [.136, .427]	1

Table 4-48: *Item-total statistics Trust2*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Trust2a	10.77	4.850	.568	.353	.430
Trust2b	11.61	3.868	.523	.339	.476
Trust2c	10.72	5.791	.331	.113	.716

A principal axis factoring test of the dimensionality of the scale showed that a single factor is present as expected from Thomson (2001, 2009). The Kaiser-Meyer-Olkin (KMO) measure verified a reasonable sampling adequacy for this factor analysis, KMO = .599, and KMO values for individual items >.570, thus all above the recommended .5 (Field, 2013). The determinant of the correlation matrix was .596, indicating that multicollinearity is not present. A single factor had an eigenvalue over Kaiser's criterion of 1 and explained 43.4% of variance (Table 4-49).

Table 4-49: *Factor analysis results for the Trust2 scale*

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.794	59.791	59.791	1.303	43.441	43.441
2	.780	26.003	85.794			
3	.426	14.206	100.000			

Extraction Method: Principal Axis Factoring.

Relationship between Trust1_N and Trust2_Sum. The relationship between Trust1_N—a three-level categorical variable and Trust2_Sum—a continuous scale, provides a test of criterion validity of the Trust2_Sum scale. It is expected that the organizational trust factor score (Trust2_Sum) should increase as the relevance of trust in the multiorganizational interaction increases (Trust1_N), thus for each level of Trust1_N, Trust2_Sum should increase. This was tested using a one-way ANOVA with planned contrasts with the three Trust1_N levels as the grouping variable, and Trust2_Sum as the 'dependent' variable.

There is a significant effect of Trust1_N level on the value of Trust2_Sum, $F(2, 203) = 9.277$, $p = .000$, $\omega = .27$. The planned contrasts reveal that the difference in means between level 1 and level 2 of Trust1_N is not significant, ($t(203) = -.138$, $p = .890$, $r = .01$), and is found to be slightly negative, rather than positive as expected. The mean difference between level 2 and 3 is positive (.603) and significant, $t(203) = 4.130$, $p = .000$, $r = .28$. The mean difference between level 3 and 1 is positive (.561) but just fails the significance criteria, $t(203) = 1.900$, $p = .059$, $r = .13$.

Due to the low effect sizes and differences in group sizes, Gabriel's post-hoc comparison test was performed, indicating that the only significant difference is between level 3 and 2 (mean difference = .603 [95% CI: .255, .951], $p = .000$). Given the low sample size for level 1 (N = 12) and the fact that there may be a normative bias in this question—respondents may not have wanted to state that “trust is not required”—the results for this level will be discounted. The ANOVA and planned contrast tests support the assertion that the organizational trust factor score (Trust2_Sum) should increase as the relevance of trust in the multiorganizational interaction increases (Trust1_N), with the exception for when no trust relationships are required.

In conclusion, given the presence of a single factor, the moderate inter-item correlations, and the criterion validity test, the analysis can proceed with the assumption that Trust2 constitutes a single factor and thus the Trust2_Sum variable can be used as a single clustering dimension. Given the weak Cronbach alpha scores, however, the Trust2_Sum variable will be closely scrutinized when employing statistical based tests such as discriminant analysis.

Outcome Variables

In addition to the dimensions captured in the GIIA, the survey also included five interorganizational interaction “outcome” variables, which examined respondents perceptions about the overall effectiveness of the interaction, and whether participating in the interaction affected the quality of working relationships that developed, broadened the organization’s view about the original policy problem, improved the quality and quantity of interactions, and increased an organizations influence over others. The descriptives for the five outcome variables—Outcome1, Outcome2,…Outcome5—are presented in Table 4-50.

Table 4-50: *Outcome variable descriptives*

		BCa 95% CI for Mean		Std. Error		
Variable Name	Mean	Lower	Upper	of Mean	Std. Dev.	Variance
Outcome1: Overall, the multiorganizational interaction is effective in achieving expected outcomes. (1=strongly disagree, 4=neutral, 7=strongly agree)	5.46	5.28	5.63	.092	1.320	1.742
Outcome 2: Overall, high quality working relationships have developed between my organization and partner organizations as a result of this multiorganizational interaction. (1=strongly disagree, 4=neutral, 7=strongly agree)	5.30	5.09	5.48	.100	1.430	2.044
Outcome3: Overall, my organizations view of the issue(s)/problem(s) that brought the organizations together has broadened as a result of the interaction. (1=strongly disagree, 4=neutral, 7=strongly agree)	5.59	5.41	5.76	.089	1.284	1.648
Outcome 4: Overall, my organization has increased its interaction with partner organizations as a result of the multiorganizational interaction. (1=strongly disagree, 4=neutral, 7=strongly agree)	5.14	4.93	5.33	.110	1.576	2.483
Outcome 5: Overall, the multiorganizational interaction has helped to make partner organizations' influence on each other more equal. (1=strongly disagree, 4=neutral, 7=strongly agree)	4.64	4.45	4.83	.098	1.414	1.999

There are moderate, positive, significant correlations present between all Outcome variables. This indicates that the five variables are relatively concurrent, although there is not theoretical justification to support an underlying factor analysis as the operationalizations are somewhat crude (Thomson, 2001). The correlation results are presented in Table 4-51.

Table 4-51: *Outcome Variable Correlations; Pearson's r (Significance) [Bias corrected and accelerated bootstrap 95% Confidence Intervals]*

$Outcome_i$ Variable	Outcome1	Outcome2	Outcome3	Outcome4	Outcome5
Outcome1	1				
Outcome2	.471 (.000)	1			
	[.324, .605]				
Outcome3	.395 (.000)	.417 (.000)	1		
	[.250, .537]	[.250, .563]			
Outcome4	.297 (.000)	.540 (.000)	.470 (.000)	1	
	[.147, .450]	[.371, .680]	[.301, .618]		
Outcome5	.351 (.000)	.493 (.000)	.431 (.000)	.472 (.000)	1
	[.203, .502]	[.366, .626]	[.366, .626]	[.338, .601]	

Preparing for Clustering Analysis

As explained in chapter 3, several interrelated issues concerning the data, variables and the clustering method must be addressed before starting the analysis (Hair et al., 2006). The following issues are reported on in the last part of this descriptive analysis section:

- Assessing adequacy of the sample size
- Standardization of the data or variables
- Reviewing outliers
- Examining multicollinearity

Sample Size Adequacy

Given the $5n$ to 2^n range criterion for sample size (Mooi & Sarstedt, 2011), where n is the number of clustering variables, the required number of cases ranges from 55 to 2048, assuming $n = 11$ –the maximum number of variables that could be used for clustering in this research. For $n = 10$, the required number of cases ranges from 50 to

1024. The sample size of $N = 206$ is within the desired range. In addition this numerical criteria, Hair et al. (2006) recommend simply that the sample size should be large enough to ensure that all expected groups are adequately represented. This criterion is now reviewed by comparing the nominal counts of levels of interaction for each clustering variable.

As explained in the descriptive statistics, the 11 dimensions of the GIIA used for clustering can be represented by nominal variables with three levels corresponding to the three levels of interaction: cooperation, coordination and collaboration. Comparing basic frequency data for the nominal variables shows that, on average, the 11 clustering dimensions are 54.3% at the level of collaboration, 36.3% at the level of coordination, and 9.4% at cooperation Table 4-52. Five variables have counts at ten or less for the level of cooperation. This implies that, if a distinct level—or cluster—of "cooperation" can be discerned from the structure of the data, it is unlikely that these variables will contribute very strongly in determining the cluster solution.

The variables Resource_Alloc_Comp_LOI, Incentives_LOI, Info_Comp_LOI, and Problem_Orient_Sum_LOI were segmented into the three levels based on continuous scale variable, thus the low count of values at the level of cooperation actually represents an underlying range. This is not the case, however, for the Goals_N variable, which is based on a single survey question. Thus the single count at the level of cooperation means that only one case has a value of 1 in the Goals_S version of the variable. For this reason, the Goals dimension will not be used for clustering, and will instead be used as a profiling dimension.

This variable-averaged breakdown of cases across the three levels of interaction does not mean that the sample has more instances of collaboration than coordination, as often a particular multiorganizational interaction (case) exhibits some variables at a level of collaboration and some at coordination or cooperation. Furthermore, using a three level scheme may conceal underlying structures in between the overall levels of coordination and collaboration, for example, that can only be discerned by looking either at the continuous scale variables or with associative measures of similarity in the nominal variables.

Table 4-52: *Frequencies of levels of interaction for clustering variables*

	Count		
Potential Clustering Variables	Cooperation	Coordination	Collaboration
Problem_Orient_Sum_LOI	10	46	150
Resource_Alloc_Comp_LOI	5	117	84
Incentives_LOI	7	42	157
Key_Personnel_Sum_LOI	41	58	107
Goals_N	1	124	81
Design_Comp_LOI	10	72	124
Formality_N	61	98	47
Info_Comp_LOI	8	39	159
Decision_Comp_LOI	14	57	135
Autonomy1_N	44	100	62
Trust1_N	12	70	124
Total count for level (% of 2266)	213 (9.4)	823 (36.3)	1230 (54.3)
Mean count for each level	19.4	74.8	111.8

In summary, the sample size of 206 is suitable for clustering 11 dimensions (or ten with the Goals_S variable removed), and for most variables there is a adequate spread of values across expected levels. The difference in counts between levels may indicate that clusters of varying size will be discovered.

Standardization of data

As the clustering dimension variables are measured on difference scales, using them in an undstandardized form would give larger weighting to variables with numerically larger scales. There is no theoretical reason to retain the original scales, thus all variables are standardized as *z*-scores as recommended by Hair et al. (2006).

Outliers

Clustering solutions are potentially affected by outliers, especially hierarchical approaches (Aldenderfer & Blashfield, 1984). Data for all clustering dimensions was inspected for outliers, identified by *z* scores of |4| or greater, with none found. Given that all dimensions are constructed from Likert items with seven levels, the ranges of resultant composite scales are fairly limited and all variables are of the same order of magnitude.

Multicollinearity

Variables with high multicollinearity are weighted more in the development of cluster solutions, as the proportion of variance explained by a single variable decreases when other highly correlated variable are included (Hair et al., 2006). Thus it is important to inspect the overall correlations of cluster variables. The highest correlation is between Trust2_Sum and Problem_Orient_Sum, $r = .550$ [95% BCa CI: .429; .654] ($p < .0001$). Correlations between the continuous scale variables are displayed in Table 4-53. Given the medium to low correlations between variables, analysis will proceed under the assumption that multicollinearity is not an issue. The major impact of this is that conventional similarity measures can be used, rather than generalized distances that account for multicollinearity such as the Mahalanobis D^2 (Everitt et al., 2011).

Table 4-53: *Clustering variable correlations; Pearson's r (significance) [Bias corrected and accelerated bootstrap 95% Confidence Intervals]*

	1	2	3	4	5	6
1: Problem_Orient_Sum	1					
2: Resource_Alloc_Comp	.229 (.001) [.093, .368]	1				
3: Incentives	.091 (.191) [-.050, .245]	**.291** (.000) [.152, .414]	1			
4: Key_Personnel_Sum	.106 (.130) [-.028, .227]	.162 (.020) [.041, .290]	**.295** (.000) [.167, .419]	1		
5: Goals_S	.263 (.000) [.141, .377]	.169 (.015) [.043, .284]	.012 (.867) [-.123, .151]	.046 (.511) [-.088, .182]	1	
6: Design_Comp	.034 (.623) [-.121, .181]	.170 (.014) [.032, .315]	.111 (.111) [-.024, .255]	**.292** (.000) [.150, .426]	.022 (.753) [-.144, .177]	1
7: Formality_S	-.026 (.710) [-.162, .106]	.228 (.001) [.062, .370]	.124 (.076) [-.011, .249]	.261 (.000) [.119, .401]	.168 (.016) [.032, .292]	**.428** (.000) [.302, .550]
8: Info_Comp	.063 (.369) [-.076, .118]	.185 (.008) [.038, .347]	.290 (.000) [.147, .439]	**.315** (.000) [.201, .427]	.062 (.378) [-.086, .196]	**.390** (.000) [.252, .518]
9: Decision_Comp	.084 (.232) [-.046, .208]	.104 (.137) [-.033, .233]	.054 (.437) [-.061, .168]	.162 (.020) [.028, .285]	.078 (.266) [-.062, .212]	.194 (.005) [.046, .353]
10: Autonomy2_Sum	**-.337** (.000) [-.457, -.200]	-.004 (.950) [-.154, .143]	-.065 (.356) [-.217, .064]	.135 (.053) [.014, .259]	-.229 (.001) [-.347, -.109]	.180 (.009) [.054, .313]
11: Trust2_Sum	**.550** (.000) [.429, .654]	.273 (.000) [.144, .399]	.245 (.000) [.093, .388]	.048 (.493) [-.076, .156]	.250 (.000) [.129, .357]	.002 (.980) [-.119, .142]

	7	8	9	10	11
7: Formality_S	1				
8: Info_Comp	**.359** (.000) [.255, .463]	1			
9: Decision_Comp	.170 (.015) [.021, .306]	**.339** (.000) [.194, .464]	1		
10: Autonomy2_Sum	**.300** (.000) [.171, .410]	.035 (.613) [-.105, .159]	.072 (.302) [-.071, .218]	1	
11: Trust2_Sum	.064 (.363) [-.066, .183]	.116 (.097) [.000, .238]	.118 (.090) [-.003, .235]	**-.372** (.000) [-.500, -.239]	1

Correlations where $r > .25$ *and* the lower confidence bound > .15 are in **bold** for ease of reading

CHAPTER 5:

STUDY FINDINGS

This chapter discusses the main results of the empirical study and draws initial conclusions. First, the steps performed for clustering analysis are described and cluster solutions are presented. Subsequent sections address each of the four research questions in turn. Finally, conclusions are drawn and the Generalized Interorganizational Interaction Array (GIIA) is evaluated.

Clustering Analysis

This section presents the steps taken to arrive at a stable set of final cluster solutions that are used to address the research questions in the following sections. A cluster solution is the main result from the cluster analysis process, which assigns a cluster membership to each of the 206 cases in the sample. In a “three-cluster” solution, for example, each case is assigned a value of one, two or three, corresponding to membership in cluster one, cluster two or cluster three. The following steps in the cluster analysis are presented. First, initial cluster results from a hierarchical agglomerative cluster analysis are described and profiled. Other than ensuring cluster distinctiveness, no interpretation is made at this stage. Second, taking the optimal clusters from the hierarchical stage as seed points, the k-means cluster analysis results are presented and profiled. Finally, the k-means cluster solutions are validated for stability using a variety of approaches.

Hierarchical Analysis Results

Using the approach described in chapter three, a hierarchical cluster analysis with Ward's algorithm was run and the agglomeration schedule, dendrogram, and cluster membership tables were generated. The results were checked for outliers and for small or single member clusters. No single member clusters were observed. The five-, six-, seven- and eight-cluster solutions had a cluster of eight cases; however, this was combined with another by the four-cluster solution. No outliers such as single cases joining cluster solutions at later stages of the process were observed.

In order to determine the number of cluster solutions taken forward for analysis, the agglomeration schedule for the last ten stages was inspected and the percentage change in the agglomeration coefficient with each clustering stage was calculated (Table 5-1). Using the stopping rule of a five percent minimum change, the agglomeration schedule indicated that the five-, four-, three-, and two-cluster solutions were optimal. Inspecting the dendogram and cluster descriptives, however, showed that three clusters in the four-cluster solution were identical to three clusters in the five-cluster solution and that the small cluster of eight cases was simply combined with another.

This suggests that there is limited meaningful difference between the five- and four-cluster solution and only the four-cluster solution is taken forward. On the basis of this stopping rule analysis and the subsequent descriptive analysis, the two-, three-, and four cluster solutions are retained and provided as the seed points for the k-means clustering.

These cluster solutions were then profiled across each of the clustering variables to ensure that each cluster within a solution was distinct. For each of the ten clustering variables, the mean and standard deviation was calculated for each cluster. Using clustering membership as the independent variable and clustering variables as dependent variables, an ANOVA examined the differences between cluster means.

Table 5-1: *Agglomeration schedule for hierarchical cluster analysis*

	Hierarchical Process		Stopping Rule	
	Number of Clusters		*Agglomeration Coefficient*	
Cluster Stage	Before	After	Value	% Increase to Next Stage
197	10	9	1166.058	3.62
198	9	8	1208.268	3.92
199	8	7	1255.633	4.92
200	7	6	1317.372	4.99
201	6	5	1383.069	**6.10**
202	5	4	1467.383	**6.91**
203	4	3	1568.828	**11.42**
204	3	2	1748.035	**17.27**
205	2	1	2050	—

The results presented in Table 5-2, Table 5-3 and Table 5-4 show that with the exception of the two-cluster solution, there are significant differences across clusters for all clustering variables, indicating that all identified clusters are distinctive. The two-cluster solution was only nonsignifcant (at the .01 level) for V10: Autonomy2_Sum. Furthermore, no cluster contains less than ten percent of total cases, and from inspecting the means and the plots, each cluster is sufficiently distinct—in addition to significantly different[9]—thus they are all good candidates for seed points for the k-means analysis.

[9] Ward's algorithm maximizes differences between cluster means regardless of whether there are actually natural clusters, thus *p*-values cannot be interpreted in the same context as for 'natural' groups and only provide a descriptive indicator of cluster distinctiveness (Aldenderfer & Blashfield, 1984). The use of significance tests is appropriate, however, when profiling clusters against variables that were not used in the clustering algorithm.

Table 5-2: *Four-cluster solution using Ward's method*

	4-Cluster Sol. Ward Method								ANOVA*	
	1		2		3		4			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	*F*	η^2
V1	.554	.452	.369	.677	-.033	.675	-1.666	.984	80.755	.545
V2	.402	.635	-.308	1.070	.273	.741	-.695	1.299	13.516	.167
V3	.482	.501	-.426	1.322	.238	.705	-.559	.915	14.850	.181
V4	.314	.833	-.526	.879	.542	.793	-.634	1.054	22.650	.252
V6	.347	.695	-.645	1.101	.489	.701	-.374	1.005	21.464	.242
V7	.166	.876	-.717	.779	.563	.982	-.040	.827	21.825	.245
V8	.525	.529	-.731	1.126	.280	.745	-.147	1.039	23.009	.255
V9	.492	.543	-.670	1.189	.108	.851	.128	.901	16.972	.201
V10	-.618	.583	-.560	.674	.890	.735	.511	1.052	58.373	.464
V11	.498	.733	.209	.864	-.082	.905	-1.167	.909	27.538	.290
N	58		58		59		31			

*For all ANOVAs, $df_B = 3$, $df_W = 202$, $p < .001$

Table 5-3: *Three-cluster solution using Ward's method*

	3-Cluster Sol. Ward Method						ANOVA*	
	1		2		3			
	Mean	SD	Mean	SD	Mean	SD	*F*	η^2
V1	.258	.644	.369	.677	-1.666	.984	99.995	.496
V2	.337	.691	-.308	1.070	-.695	1.299	20.025	.165
V3	.359	.622	-.426	1.322	-.559	.915	21.112	.172
V4	.429	.818	-.526	.879	-.634	1.054	32.804	.244
V6	.419	.698	-.645	1.101	-.374	1.005	31.851	.239
V7	.366	.948	-.717	.779	-.040	.827	29.004	.222
V8	.401	.656	-.731	1.126	-.147	1.039	33.144	.246
V9	.298	.738	-.670	1.189	.128	.901	22.320	.180
V10	.142	1.005	-.560	.674	.511	1.052	16.507	.140
V11	.206	.871	.209	.864	-1.167	.909	32.474	.242
N	117		58		31			

*For all ANOVAs, $df_B = 2$, $df_W = 203$, $p < .001$

Table 5-4: *Two-cluster solution using Ward's method*

	2-Cluster Sol. Ward Method					
	1		2		ANOVA*	
	Mean	SD	Mean	SD	*F*	η^2
V1	.258	.644	-.339	1.256	99.995	.088
V2	.337	.691	-.443	1.163	20.025	.150
V3	.359	.622	-.472	1.193	21.112	.170
V4	.429	.818	-.564	.939	32.804	.243
V6	.419	.698	-.551	1.071	31.851	.232
V7	.366	.948	-.481	.855	29.004	.177
V8	.401	.656	-.527	1.126	33.144	.213
V9	.298	.738	-.392	1.157	22.320	.118
V10	.142	1.005	-.187	.967	16.507	.027
V11	.206	.871	-.270	1.096	32.474	.056
N	117		89			

*For all ANOVAs, $df_B = 1$, $df_W = 204$, $p < .001$, except V10 where $p = .02$

K-Means Nonhierarchical Analysis Results

Using the cluster centroids from the hierarchical analysis above, a k-means optimization cluster analysis was run for two-, three-, and four-cluster solutions. The k-means cluster solutions were profiled by in the same manner as the hierarchical solutions. The means and standard deviations per cluster were obtained for each of the ten clustering variables. Using clustering membership as the independent variable and clustering variables as dependent variables, an ANOVA examined the differences between cluster means for each variable. The results presented in Table 5-5, Table 5-6 and Table 5-7 show that with the exception of the two-cluster solution, clusters are significantly different across all clustering variables, indicating that all identified clusters are distinctive. As in the hierarchical analysis, the two-cluster solution was only nonsignifcant (at the .058 level) for V10: Autonomy2_Sum. Furthermore, no cluster contains less than ten percent of total cases, and inspection of the means and the plots shows that each cluster is sufficiently distinct—in addition to significantly different.

Table 5-5: *Four-cluster solution using k-means method*

	4-Cluster Sol. K-means method using seed points from hierarchical results									
	1		2		3		4		ANOVA*	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	*F*	η^2
V1	.494	.560	.245	.858	-.044	.770	-1.449	1.068	46.012	.406
V2	.259	.745	-.347	1.093	.364	.690	-.865	1.263	16.596	.198
V3	.391	.581	-.489	1.274	.282	.747	-.811	1.075	19.417	.224
V4	.030	.856	-.491	.973	.623	.800	-.635	.994	19.579	.225
V6	.140	.819	-.920	1.078	.625	.592	-.287	.900	30.625	.313
V7	-.137	.900	-.839	.722	.729	.822	.048	.851	30.659	.313
V8	.325	.558	-1.278	1.105	.513	.555	.009	.817	56.837	.458
V9	.427	.558	-1.032	1.142	.187	.846	.073	.909	28.674	.299
V10	-.737	.490	-.376	.760	.824	.720	.634	1.082	62.487	.481
V11	.525	.728	.086	.808	-.047	.884	-1.287	.890	34.936	.342
N	72		43		61		30			

*For all ANOVAs, $df_B = 3$, $df_W = 202$, $p < .001$

Table 5-6: *Three-cluster solution using k-means method*

	3-Cluster Sol. K-means method using seed points from hierarchical results							
	1		2		3		ANOVA*	
	Mean	SD	Mean	SD	Mean	SD	*F*	η^2
V1	.402	.551	.243	.808	-1.255	1.035	78.023	.435
V2	.368	.776	-.278	1.001	-.444	1.154	15.380	.132
V3	.441	.607	-.310	1.161	-.566	1.045	24.199	.193
V4	.460	.841	-.571	.892	-.241	.995	27.644	.214
V6	.460	.706	-.735	1.053	-.008	.881	36.910	.267
V7	.343	.930	-.776	.719	.314	.893	35.839	.261
V8	.543	.500	-.926	1.099	.069	.742	68.856	.404
V9	.434	.651	-.632	1.152	-.095	.941	27.705	.214
V10	-.030	.911	-.523	.714	.805	1.037	29.021	.222
V11	.370	.792	.205	.786	-1.130	.874	55.461	.353
N	100		62		44			

*For all ANOVAs, $df_B = 2$, $df_W = 203$, $p < .001$

Table 5-7: *Two-cluster solution using k-means method*

	2-Cluster Sol. K-means method using seed points from hierarchical results				ANOVA*	
	1		2			
	Mean	SD	Mean	SD	*F*	η^2
V1	.161	.810	-.221	1.182	7.582	.036
V2	.365	.695	-.499	1.133	45.725	.183
V3	.373	.628	-.510	1.178	48.206	.191
V4	.422	.862	-.578	.883	66.322	.245
V6	.434	.695	-.593	1.051	71.209	.259
V7	.420	.895	-.574	.840	65.152	.242
V8	.497	.516	-.679	1.100	104.600	.339
V9	.351	.728	-.480	1.119	41.608	.169
V10	.113	.998	-.154	.987	3.633	.017
V11	.194	.909	-.265	1.061	11.077	.052
N	119		87			

*For all ANOVAs, $df_B = 1$, $df_W = 204$, $p < .01$, except V10 where $p = .058$

Assessment of Cluster Stability

As the structure of cluster solutions is dependent on the clustering procedure, it is necessary to evaluate “cluster stability” (Hair et al., 2006)—the robustness of cluster solutions to variations in method. Several confirmatory tests were run to compare different cluster solutions: first, the original Ward’s method solutions were compared with the seeded k-means solutions; second, the seeded k-means solutions were compared with randomly generated seed points; and finally, clusters generated by randomly assigning cases to a cluster were compared with the k-means solutions.

For each comparison, a chi-square test was run to determine the strength of association between each cluster solution, with the null hypothesis that there is no association. Cluster stability is indicated by a significant result, occurring when the numbers of cases in each cluster corresponded well between the different cluster solutions. Additionally, Cohen's kappa (κ) was calculated to determine the magnitude of agreement between different cluster solutions.

The results in Table 5-8 show that in all cases, the association between test solutions and the seeded k-means solutions is high. Similarly, Cohen's κ is generally high and significant with the exception of the four-cluster solution comparison between the random and seeded k-means approaches where κ is low but significant. These results are supportive of the existence of a natural cluster structure in the data. The final test was performed by randomly generating clusters. Chi-square tests and ANOVAs on the clustering variables were nonsignificant, indicating that clusters are different from random.

Table 5-8: *Results of cluster stability tests*

	Measure of Association		Inter-Solution Agreement Rating		
	χ^2 *			BCa 95% CI	
Comparison	(Cramer's V) *	df	κ*	Lower	Upper
2-Cluster Solution: Wards vs. seeded k-means	119.649 (.762)	1	.762	.665	.847
3-Cluster Solution: Wards vs. seeded k-means	225.321 (.740)	4	.736	.653	.809
4-Cluster Solution: Wards vs. seeded k-means	332.938 (.734)	9	.697	.623	.766
2-Cluster Solution: Seeded vs. random k-means	140.334 (.825)	1	.817	.722	.896
3-Cluster Solution: Seeded vs. random k-means	313.290 (.872)	4	.871	.810	.928
4-Cluster Solution: Seeded vs. random k-means	190.818 (.556)	9	.291	.200	.378

*Significant at the .001 level

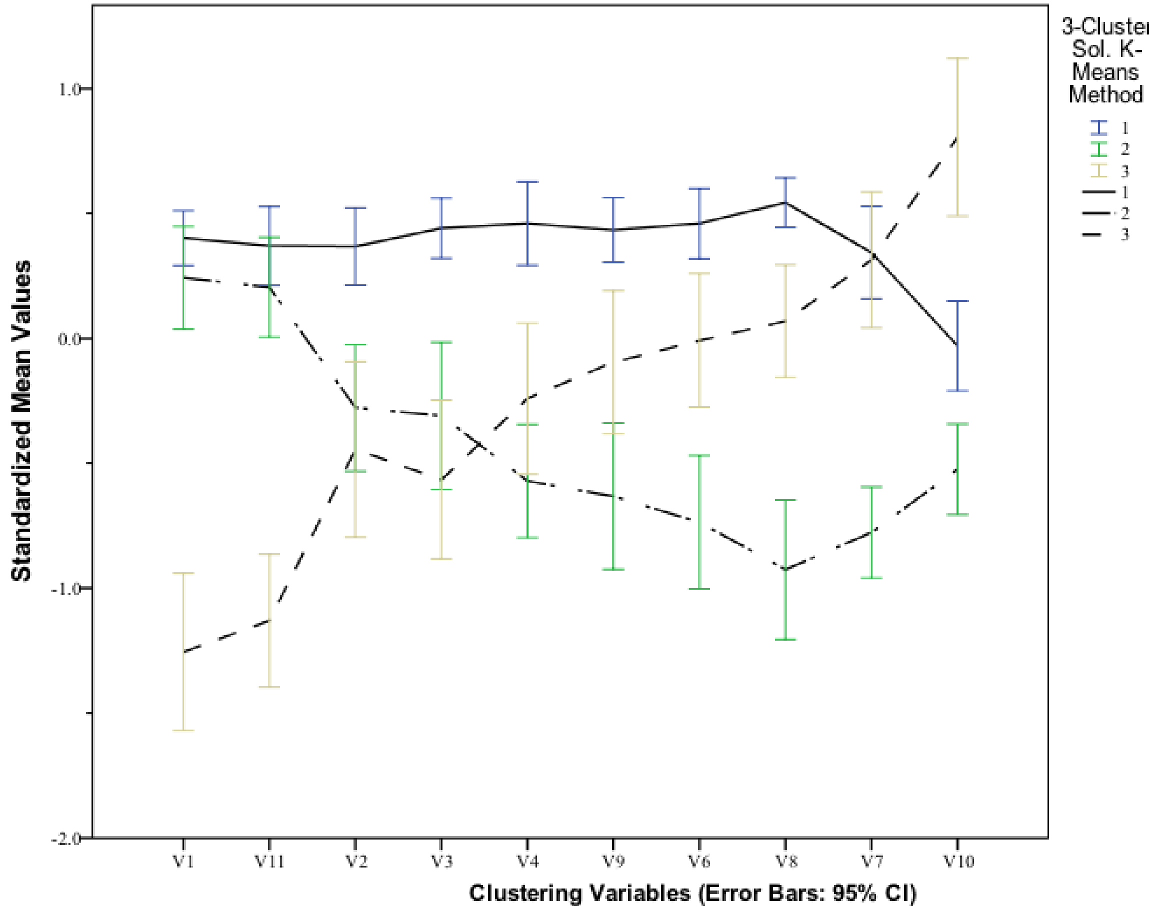
Research Question 1

The first research question asks to what the levels of interaction corresponding to the constructs of cooperation, coordination and collaboration are observed. In other words, from the 206 cases of interorganizational interactions in the sample, are there observed clusters that can be interpreted according to the three levels of interaction defined in the GIIA? The question is answered in this section as follows. First, the three-cluster solution is profiled. Second, concurrent validity is evaluated by profiling observed clusters against variables not used for clustering, namely the "contextual" category of variables. Third, the predictive validity of the clusters is examined using interorganizational outcome variables. Finally, an overall interpretation is made and summary results presented.

Profile of the Three-Cluster Solution

If the GIIA and the concept of a level of interaction were accurate representations of reality, the results would show three, roughly horizontal and equally spaced lines on a means plot across the clustering variables. As shown in Figure 5-1 this is not the case. Cluster one is composed of 100 cases (48.6% of total cases) and is characterized by an higher than average score on the clustering variables with the exception of the Autonomy2_Sum variable, which was lower than average. Cluster two is composed of 62 cases (30.1% of total cases) and displays a range of high and low scores, but they are consistently below those of cluster one. Cluster three, composed of 44 cases (21.4% of total cases), is almost a mirror image of cluster two and displays a range of high and low scores. The Autonomy2_Sum score for Cluster three, however, is higher than all other clusters.

Figure 5-1: *Three-cluster solution standardized means plot*



Cluster two is characterized by a high level of shared perspectives (V1) and trust (V11) between interacting organizations, with an overall low level of formalization and structure of the interorganizational interaction in terms of the extent of collective decision-making (V9), joint working (V6), communications (V8) and formalized policies (V7). Cluster two has the lowest score for the impact of organizational autonomy (V10), meaning that an organization's autonomy is not much affected by participation in the interaction. Cluster three, on the other hand, has low levels of shared perspectives (V1) and trust (V11), but moderate to high levels of formalization in terms of collective decision-making (V9), joint working (V6), communications (V8) and formalized polies

(V7). Cluster three has the highest score for the impact of organizational autonomy (V10), meaning that an organization's autonomy is affected by participation in the interaction. For both cluster two and three, organizations are moderately involved in their respective interorganizational interactions in terms of the extent of resources allocated (V2), the extent to which leadership recognizes the benefits (V3), and the level of staff involved in the interaction (V4).

In cluster one, there is a high level of trust and shared perspectives, a high level of organizational involvement in terms of resources, and a high level of formalization and structure in the interorganizational interaction. The exception is that the impact of autonomy is lower than in cluster three, but above cluster two.

While standardization of clustering variables removes the problem of distortions caused by different measurement scales, this transformation effectively weights each variable according to its standard deviation (Everitt et al., 2011). Thus for cluster interpretation it is necessary to inspect each variable in terms of its "natural" measurement scale. Given that most of the clustering variables are composite sums, however, the natural scales are not intuitive. Instead, the categorical versions of the variables can be used, which have the advantage of being more readily interpretable thus facilitating a direct comparison between the cluster solution and the GIIA.

Cross-tabulations were run to compare each clustering variable in its "_LOI" form, with the three-cluster solution. For the autonomy and trust variables, no LOI variables were created, thus they are reported in their natural Likert scale with a range of one to seven. In Table 5-9, for each clustering variable, each cluster is described in terms of the extent to which it is collaboration, coordination or cooperation. For each of the three levels in the clustering variables, the maximum value (in terms of percentage of cases within that cluster) was identified. This gives an indication of the overall “conformity” of the three-cluster solution to the GIIA.

Table 5-9: *Three-cluster solution profiled in terms of levels of interaction*

	Percentage of cases in cluster at the specified level of interaction for the clustering variable		
	Cluster 1	Cluster 2	Cluster 3
Clustering Variable	*N* = 100	*N* = 62	*N* = 44
1: Problem_Orient_Sum	90.0% collaboration	82.3% collaboration	61.4% *coordination*
2: Resource_Alloc_Comp	59.0% collaboration	72.6% *coordination*	72.7% *coordination*
3: Incentives	91.0% collaboration	67.7% collaboration	54.5% collaboration
4: Key_Personnel_Sum	71.0% collaboration	38.7% *coordination*	45.5% collaboration
9: Decision_Comp	81.0% collaboration	45.2% collaboration	59.1% collaboration
6: Design_Comp	80.0% collaboration	59.7% *coordination*	59.1% collaboration
8: Info_Comp	96.0% collaboration	45.2% collaboration	79.5% collaboration
7: Formality_S	52.0% *coordination*	64.5% **cooperation**	59.1% *coordination*
10: Autonomy2_Sum	$F(2,203) = 29.021$, $p = .000$, $\eta^2 = .222$		
Mean	2.690	2.005	3.849
Std. deviation	1.264	.991	1.439
Median	2.667	1.667	4.000
11: Trust2_Sum	$F(2,203) = 55.461$, $p = .000$, $\eta^2 = .353$		
Mean	5.893	5.726	4.371
Std. deviation	.804	.797	.887
Median	6.000	5.667	4.333

From this initial profiling, cluster one can be interpreted as collaboration. All but one of the clustering variables one through nine are at a majority level of collaboration. The exception—Formality_S—which captures the extent to which plans and implementation details are formalized, is at a level of coordination for both clusters one and three, and cooperation for cluster two. The value of Formality_S for the level of collaboration indicates substantial involvement on behalf of an organization’s leadership, thus it is likely that this occurs infrequently. Collaboration for this variable is defined as "Policy documents (such as terms of reference or memoranda of understanding) describe detailed implementation plans in addition to roles and responsibilities, and are signed off by leadership." The descriptive results for Formality_N (Table 4-33) show that only a minority of cases, 47 out of 206, selected this option. Out of those 47, 33 are in cluster one and 13 in cluster three, while only one is in cluster two. Cluster interpretations will be expanded upon in the summary at the end of this section.

Concurrent Criterion Validity of Three-Cluster Solution

Concurrent criterion validity in the context of cluster analysis is a determination of the extent to which variables not included in the clustering process are associated or related to each cluster. From the 20 dimensions in the GIIA, ten were used in clustering, and these dimensions were categorized as "organizational"—i.e. features of the participating organizations, and "interorganizational"—i.e. features that exist only because of the interorganizational interaction. The remaining dimensions are "contextual," meaning they relate to the surrounding context or situation. In some cases, however, the GIIA essentially makes a hypothesis that certain contextual features will be associated with certain levels of interaction, for example, that collaboration occurs with difficult policy problems. Thus we can expect that these contextual dimensions will discriminate between different clusters.

In this section, the contextual variables that were not included in the clustering analysis, plus a few organizational variables that were omitted, are tested against the three-cluster solution to determine if the variables can discriminate clusters. The primary approach is by means of cross-tabulation and chi-square analysis.

Purpose of interorganizational interaction

The chi-square shows that there is no relationship between the levels of Purpose_Comp_LOI and the three clusters, $\chi^2(4) = 1.019$, $p = .912$. As the Purpose_Comp_LOI variable was artificially segmented into the three categories, the underlying Purpose_Comp variable was also tested to see if the means varied across clusters. A one-way ANOVA was run that found no significant differences between the mean of Purpose_Comp across clusters, $F(2,203) = 2.058$, $p = .130$.

Table 5-10: *Profile of three-cluster solution against Purpose_Comp_LOI variable*

Purpose_Comp_LOI		Cluster 1	Cluster 2	Cluster 3	Total (N=206)
1	Number	3_a	3_a	1_a	7
	% within cluster	3.0%	4.8%	2.3%	3.4%
2	Number	25_a	15_a	9_a	49
	% within cluster	25.0%	24.2%	20.5%	23.8%
3	Number	72_a	44_a	34_a	150
	% within cluster	72.0%	71.0%	77.3%	72.8%
Total	Number	100	62	44	206

$\chi^2(4) = 1.019$, Cramer's V = .050, $p = .912$; Each subscript letter denotes a cluster proportion whose values do not differ significantly across columns at the .05 level (Bonferroni corrected).

These results suggest that the overall purpose of an interorganizational interaction may not be critical in defining the type or level of interaction. This is inconsistent with existing literature that aligns collaboration with more complex purposes, for example Keast et al. (2007).

Time duration of the interorganizational interaction

Out of the 206 cases, 101 reported a finite time duration in months. A one-way ANOVA was run to determine if clusters varied in the mean time duration for interorganizational interactions. Levene's test indicated unequal variances between clusters, thus Welch's F is reported. There was a significant, weak effect of cluster membership on the time duration of the interorganizational interaction, $F(2, 65.023) = 3.652$, $p = .031$, $\eta^2 = .026$. The Games-Howell post-hoc test showed a significant difference only between cluster one (mean = 32.95 months, $SD = 31.080$) and cluster three (mean = 19.89 months, $SD = 11.761$), $p = .05$. This mean difference fits the interpretation of cluster one as "collaboration," but there is limited support overall for the time duration dimension in the GIIA.

The remaining 105 cases recorded the duration of the interorganizational interaction as "indefinite." A cross-tabulation and chi-square analysis in Table 5-11 showed a significant but weak relationship between the indefinite status of an interaction and the three clusters, $\chi^2(4) = 6.832$, $p = .031$, V = .182 , $p = .031$. Cluster one was more likely to be indefinite, indicating support for its interpretation as "collaboration."

Table 5-11: *Profile of three-cluster solution against the time duration of interaction*

		Cluster			Total
Time duration of interaction		1	2	3	(N=206)
Not indefinite	Number	43_a	39_b	$19_{a,b}$	101
	% within cluster	43.0%	62.9%	43.2%	49.0%
Indefinite	Number	57_a	23_b	$25_{a,b}$	105
	% within cluster	57.0%	37.1%	56.8%	51.0%
Total	Number	100	62	44	206

$\chi^2(4) = 6.832$, Cramer's V = .182, $p = .031$; Each subscript letter denotes a cluster proportion whose values do not differ significantly across columns at the .05 level (Bonferroni corrected).

Difficulty of Task

The descriptive analysis of this dimension (Table 4-6) indicated that there is not an underlying task complexity factor in the data as hoped, thus the individual items are retained. A MANOVA was run with the six Task_Complexity variables as dependent variables and cluster membership as the independent, with a follow-up univariate ANOVA (Table 5-12). As cluster sizes are different, but other MANOVA assumptions are met, Pillai's trace is reported. The results indicate a significant effect of cluster membership on task complexity, $V = .275$, $F(12, 398) = 5.287$, $p < .001$, $\eta^2 = .137$, meaning that a linear combination of task complexity items discriminates between clusters.

Table 5-12: *ANOVA results for task complexity variables and three-cluster solution*

	Cluster Means (Seeded K-means)			ANOVA*	
Task Complexity Variables	1	2	3	*F* (sig.)	η^2
Task_Complexity1: number of distinct tasks (1=low, 7=high)	5.37	4.39	5.07	6.679 (.002)	.062
Task_Complexity2: similarity (1=very similar, 7=very different)	3.87	3.79	3.98	.182 (.834)	.002
Task_Complexity3: clarity of tasks (1=known and clearly defined, 7=ambiguous, undefined)	3.29	3.39	4.57	10.933 (.000)	.097
Task_Complexity4: interdependence (1=independent, 7=interdependent)	5.09	4.97	5.30	.678 (.509)	.007
Task_Complexity5: routineness (1=routine, 7=irregular, atypical)	3.81	4.31	4.89	8.786 (.000)	.080
Task_Complexity6: level of agreement amongst participants (1=agreed by all, 7=highly contested)	3.15	2.76	4.11	13.365 (.000)	.116
N	100	62	44		

*For all ANOVAs, $df_B = 2$, $df_W = 203$

Follow-up univariate ANOVAs revealed significant but weak effects for Task Complexity variables except Task_Complexity2 and Task_Complexity4. For all variables except Task_Complexity1, cluster three reports higher mean scores than clusters one and two. Post-hoc follow-ups using Gabriel's test showed that these differences were significant at the .001 level for Task_Complexity1, 3, 5 and 6.

Role of single organization

The results indicate that the extent to which an organization can achieve unilaterally the goal of the multiorganizational interaction does not significantly discriminate between clusters, $\chi^2(4) = 4.946$, $p = .298$. The single largest cell value in the cross-tabulation in Table 5-13, however, is consistent with the interpretation of cluster one as "collaboration," with 67 out of 100 cases in cluster one reporting that no organization can achieve the goals independently (Role_Single_Org_N = 3).

Table 5-13: *Profile of three cluster solution against Role_Single_Org_N*

		Cluster			Total
Role_Single_Org_N		1	2	3	(*N*=206)
1 = If required, my organization could achieve the goals independently without support from other organizations	Number	7_a	9_a	7_a	23
	% within cluster	7.0%	14.5%	15.9%	11.2%
2 = My organization requires some assistance from other organizations to accomplish the goals	Number	26_a	20_a	12_a	58
	% within cluster	26.0%	32.3%	27.3%	28.2%
3 = No organization can achieve the goals independently. My organizational is interdependent with other organizations	Number	67_a	33_a	25_a	125
	% within cluster	67.0%	53.2%	56.8%	60.7%
Total	Number	100	62	44	206

$\chi^2(4) = 4.946$, Cramer's V = .110, $p = .298$; Each subscript letter denotes a cluster proportion whose values do not differ significantly across columns at the .05 level (Bonferroni corrected).

Impetus for collective action

The results shown in Table 5-14 indicate that the way in which the interorganizational interaction was initiated (Impetus_N) significantly discriminates between clusters, $\chi^2(6) = 21.290$, $p = .001$, the effect size, Cramer's V = .227 , $p = .001$, is moderate.

Table 5-14: *Profile of three-cluster solution against Impetus_N*

		Cluster			Total
Impetus_N		1	2	3	(N=206)
1 = Directly tasked by a higher authority or mandate to participate (e.g. a higher command, organizational policy or mission, organization leader decision, legal requirements)	Number	74_a	27_b	$29_{a,b}$	130
	% within cluster	74.0%	43.5%	65.9%	63.1%
2 = No direct tasking, but not participating would result in either a loss of reputation or an inability to meet organizational goals	Number	13_a	14_a	9_a	36
	% within cluster	13.0%	22.6%	20.5%	17.5%
3 = Participation is voluntary and was initiated primarily by senior management	Number	8_a	6_a	2_a	16
	% within cluster	8.0%	9.7%	4.5%	7.8%
4 = Participation is voluntary and was initiated primarily by the staff level	Number	5_a	15_b	$4_{a,b}$	24
	% within cluster	5.0%	24.2%	9.1%	11.7%
Total	Number	100	62	44	206

$\chi^2(6) = 21.290$, Cramer's V = .227, $p = .001$; Each subscript letter denotes a cluster proportion whose values do not differ significantly across columns at the .05 level (Bonferroni corrected).

While the Impetus_N variable discriminates between clusters, the results are not immediately interpretable in terms of the GIIA levels of interaction and it is not clear that cluster one can be interpreted as "collaboration." Recent literature suggests that a special case of collaboration occurs when the interaction is "mandated" by either law or by senior leadership decision (McNamara, 2016). By combining responses 2, 3, and 4 in the Impetus_N variable, a new binary variable was created that determines whether the interaction was mandated or not mandated. The cross-tabulation results for "Mandated" in Table 5-15 indicated a significant, moderate relationship between Mandated and clusters, $\chi^2(2) = 15.432$, $p = .000$. Cramer's V = .274 , $p = .000$.

Table 5-15: *Profile of three-cluster solution against mandated / voluntary status*

Mandated		Cluster 1	Cluster 2	Cluster 3	Total (N=206)
Voluntary	Number	26_a	35_b	$15_{a,b}$	76
	% within cluster	26.0%	56.5%	34.1%	36.9%
Mandated	Number	74_a	27_b	$29_{a,b}$	130
	% within cluster	74.0%	43.5%	65.9%	63.1%
Total	Number	100	62	44	206

$\chi^2(2) = 15.432$, Cramer's V = .274, $p = .000$; Each subscript letter denotes a cluster proportion whose values do not differ significantly across columns at the .05 level (Bonferroni corrected).

The final component of the impetus for collective action dimension is the reason why a particular organizations joins, captured in Reason_Sum and Reason_Sum_LOI variables. The results indicate that Reason_Sum_LOI does not significantly discriminate between clusters, $\chi^2(4) = 4.737$, $p = .317$.

Table 5-16: *Profile of three-cluster solution against Reason_Sum_LOI*

Reason_Sum_LOI		Cluster 1	Cluster 2	Cluster 3	Total (N=206)
1	Number	9_a	6_a	3_a	18
	% within cluster	9.0%	9.7%	6.8%	8.7%
2	Number	62_a	42_a	35_a	139
	% within cluster	62.0%	67.7%	79.5%	67.5%
3	Number	29_a	14_a	6_a	49
	% within cluster	29.0%	22.6%	13.6%	23.8%
Total	Number	100	62	44	206

$\chi^2(4) = 4.737$, Cramer's V = .107, $p = .317$; Each subscript letter denotes a cluster proportion whose values do not differ significantly across columns at the .05 level (Bonferroni corrected).

As the Reason_Sum_LOI variable was artificially segmented into the three categories, the underlying Reason_Sum variable was also tested to see if the means varied across clusters. A one-way ANOVA was run that found no significant differences between the mean of Reason_Sum across clusters, $F(2,203) = 1.609$, $p = .203$.

Numbers of participating organizations

A one-way ANOVA was run to determine if clusters could be distinguished by the mean number of organizations participating in the interorganizational interaction. Levene's test indicated unequal variances between clusters, thus Welch's *F* is reported. There is a significant, weak effect of cluster membership on the numbers of organizations participating in the interorganizational interaction, $F(2, 113.752) = 3.000$, $p = .051$, $\eta^2 = .023$. The Games-Howell post-hoc test shows a significant difference only between cluster one (mean = 14.403 organizations, $SD = 11.765$) and cluster three (mean = 10.238 organizations, $SD = 7.798$), $p = .041$.

History of previous interaction in the problem domains

A one-way ANOVA was run to determine if history of previous interaction discriminated clusters. The results found no significant differences between the mean of History_Sum across clusters, $F(2,203) = 1.269$, $p = .283$.

Time take to establish multiorganizational interaction

A one-way ANOVA was run to determine if the time taken to establish the multiorganizational interaction could discriminate clusters. The results found no significant differences between the mean time in months across clusters, $F(2,203) = .501$, $p = .607$.

Goals

Goals_N is an interorganizational-type variable that was originally considered as a clustering variable, however, due to a level only having one case, it was not selected and was reserved instead for profiling the cluster solutions. After adding the outlier case to the next level up, the cross-tabulation and chi-square analysis indicate a significant but weak relationship between the orientation of the policy objective in interaction (Goals_N) and the three clusters, $\chi^2(2) = 6.640$, V = .177 , $p = .040$

Table 5-17: *Profile of three-cluster solution against Goals_N*

Goals_N (Adjusted outliers)		Cluster 1	Cluster 2	Cluster 3	Total (N=206)
2 = Some shared goals, in addition to individual organizational goals	Number	56_a	$35_{a,b}$	34_b	125
	% within cluster	56.0%	56.5%	77.3%	60.7%
3 = Shared goals agreed between all participants	Number	44_a	$27_{a,b}$	10_b	81
	% within cluster	44.0%	43.5%	22.7%	39.3%
Total	Number	100	62	44	206

$\chi^2(2) = 6.460$, Cramer's V = .177, $p = .040$; Each subscript letter denotes a cluster proportion whose values do not differ significantly across columns at the .05 level (Bonferroni corrected).

Organizational Leadership

Org_Lead_N is an "organizational" type variable that was originally included as part of the Key Personnel dimension of the GIIA. It was not included in the Key_Personnel_Sum variable due to concerns about its meaning, and was retained for cluster profiling. The results indicate that Org_Lead_N does not significantly discriminate between clusters $\chi^2(4) = 4.946$, V = .089, $p = .298$.

Table 5-18: *Profile of three-cluster solution against Org_Lead_N*

Org_Lead_N		Cluster 1	Cluster 2	Cluster 3	Total (N=206)
1 = All organizations are equal partners	Number	19_a	12_a	4_a	35
	% within cluster	19.0%	19.4%	9.1%	17.0%
2 = One organization leads the group	Number	36_a	26_a	20_a	82
	% within cluster	36.0%	41.9%	45.5%	39.8%
3 = A few organizations share leadership of the group	Number	45_a	24_a	20_a	89
	% within cluster	45.0%	38.7%	45.5%	43.2%
Total	Number	100	62	44	206

$\chi^2(4) = 3.261$, Cramer's V = .089, p = .521; Each subscript letter denotes a cluster proportion whose values do not differ significantly across columns at the .05 level (Bonferroni corrected).

Trust

The nominal Trust1_N variable used to check the reliability of the scale Trust2_Sum was not used for clustering and can therefore be used to profile. Results indicate that Trust1_N significantly but weakly discriminates clusters $\chi^2(4) = 13.829$, V = .183, p = .007. Clusters one and two are significantly more likely to report that trust is necessary between organizations in all levels of staff, in comparison to cluster three.

Table 5-19: *Profile of three-cluster solution against Trust1_N*

Trust1_N		Cluster 1	Cluster 2	Cluster 3	Total (N=206)
1 = Trust relationships are not required	Number	3_a	6_a	3_a	12
	% within cluster	3.0%	9.7%	6.8%	5.8%
2 = Trust relationships are useful, but must be based on reciprocal behaviors	Number	25_a	$23_{a,\,b}$	22_b	70
	% within cluster	25.0%	37.1%	50.0%	34.0%
3 = Trust between organizations is necessary; in all levels of staff	Number	72_a	33_a	19_b	124
	% within cluster	72.0%	53.2%	43.2%	60.2%
Total	Number	100	62	44	206

$\chi^2(4) = 13.829$, Cramer's V = .183, p = .007; Each subscript letter denotes a cluster proportion whose values do not differ significantly across columns at the .05 level (Bonferroni corrected).

Autonomy

While the autonomy scale (Autonomy2_Sum) was used in clustering, the nominal Autonomy1_N used to check the scale reliability was not and can therefore be used to profile the cluster solutions. Results indicate that Autonomy1_N significantly and moderately discriminates clusters $\chi^2(4) = 34.790$, V = .291, $p < .001$. Cluster two is significantly more likely to report that the multiorganizational group does not have policies compared to cluster one and cluster three.

Table 5-20: *Profile of three-cluster solution against Autonomy1_N*

Autonomy1_N		Cluster 1	Cluster 2	Cluster 3	Total (N=206)
1 = The multiorganizational group does not have policies	Number	12_a	28_b	4_a	44
	% within cluster	12.0%	45.2%	9.1%	21.4%
2 = Policies developed for the multiorganizational group are compatible with my organizations policies	Number	49_a	27_a	24_a	100
	% within cluster	49.0%	43.5%	54.5%	48.5%
3 = Partner organizations jointly develop policies and negotiation is required when they conflict with individual organization policies	Number	39_a	7_b	16_a	62
	% within cluster	39.0%	11.3%	36.4%	30.1%
Total	Number	100	62	44	206

$\chi^2(4) = 34.790$, Cramer's V = .291, $p < .001$; Each subscript letter denotes a cluster proportion whose values do not differ significantly across columns at the .05 level (Bonferroni corrected).

Evaluation of Systematic Bias in the Clusters

A final chi-square analysis was run to determine if clusters were differentiated based on work status, organizational status, and gender variables. No significant differences were found.

Predictive Criterion Validity of Three-Cluster Solution

Predictive validity is evaluated by determining whether clusters predict a theoretically-expected relationship. This is tested by profiling the clusters against the five outcome variables, as literature suggests that different interorganizational forms will vary in terms of outcome (Jennings, 1994; Jennings & Ewalt, 1998). The hypothesis for this test is that there will be significant differences in outcome variable means for different clusters. The null hypothesis is that no significant differences in outcome variables is observed.

A MANOVA was run with the five outcome variables as dependent variables and cluster membership as the independent. As cluster sizes are different, but other MANOVA assumptions are met, Pillai's trace is reported. The results indicate a significant but weak effect of cluster membership on perceived outcomes of the interorganizational interaction, $V = .220$, $F(10, 400) = 4.946$, $p < .001$, $\eta^2 = .110$, meaning that the a linear combination of outcome variables discriminates between clusters and explains 11% of variance overall.

Follow-up univariate ANOVAs revealed significant differences between cluster means for all variables except Outcome5 at the .05 level, and generally weak effect sizes (Table 5-21). For all variables, cluster one reports higher mean scores than clusters three. Post-hoc follow-ups using Gabriel's test showed that these differences were significant at the .001 level for Outcome1, 2, 3, and 5. There were no significant differences at the .05 level between clusters one and two. The difference in means between clusters two and three were significant at the .001 level for Outcome 1, 2 and 5.

Table 5-21: *Profile of three-cluster solutions against outcome variables*

Outcome Variables (1=strongly disagree, 4=neutral, 7=strongly agree)	3-Cluster Sol. K-means method using seed points from hierarchical results						ANOVA	
	1		2		3			
	Mean	SD	Mean	SD	Mean	SD	F(2, 203)	η^2
Outcome1: Overall, the multiorganizational interaction is effective in achieving expected outcomes	5.76	1.182	5.65	1.103	4.50	1.471	17.172*	.145
Outcome 2: Overall, high quality working relationships have developed between my organization and partner organizations as a result of this multiorganizational interaction	5.70	1.227	5.19	1.566	4.52	1.338	11.695*	.103
Outcome3: Overall, my organizations view of the issue(s)/problem(s) that brought the organizations together has broadened as a result of the interaction	5.82	1.192	5.47	1.457	5.25	1.144	3.514^{X}	.033
Outcome 4: Overall, my organization has increased its interaction with partner organizations as a result of the multiorganizational interaction	5.33	1.615	5.15	1.658	4.70	1.286	2.442^{O}	.023
Outcome 5: Overall, the multiorganizational interaction has helped to make partner organizations' influence on each other more equal	5.02	1.263	4.55	1.467	3.89	1.368	10.966*	.098
N	100		62		44			

* $p < .001$; ^{X} $p = .032$; ^{O} $p = .090$

The results support the prediction that the type of interorganizational interaction affects perceived outcomes of the interaction. In this case, cluster one is generally perceived as having better outcomes than cluster three. There is no substantial nor significant difference in outcome between clusters one and two.

Summary of Results for Research Question 1

This section summarizes the evidence presented for research question one. A three cluster solution was produced using a k-means optimization algorithm, with seed points from a hierarchical Ward's cluster algorithm. The cluster solution was evaluated in four different ways. First, cluster stability tests ensured that clusters were robust to changes in clustering algorithm. The final cluster solutions were compared with hierarchically-produced cluster solutions and randomly generated k-means solutions, producing statistically significant chi-square test results. Comparison with completely random clusters showed no significant results.

Second, the clusters were evaluated for their distinctiveness by comparing means across the clustering variables and examining profile plots. ANOVAs were run that compared means for the clustering variables across the clusters, finding significant results. Third, clusters were assessed for criterion validity on set of 17 demographic, contextual, and organizational variables not used in the clustering. There were nine variables that did not significantly discriminate clusters: Purpose_Comp_LOI, Org_Lead_N, Gender, Work_Status, Org_Status, Role_Single_Org_N, History_Sum, Time_Interact, and Reason_Sum_LOI. Eight variables significantly discriminated clusters:

- Time_Dur_Mths – the mean time duration of the interaction was significantly higher for cluster one (32.95 months) compared to cluster three (19.98 months)
- Time_Dur_Indef – clusters one and three were more likely to be indefinite in duration;

- Task_Complexity – cluster three involved interorganizational interactions with higher ratings overall for task complexity;
- Mandated – clusters one and three were more likely to be mandated, compared to cluster two, which was predominately voluntary;
- Num_Orgs – the mean number of organizations involved in the interorganizational interactions was significantly higher for cluster one (14.4) than cluster three (10.2);
- Goals_N – cluster three was the least likely to have shared goals between all participants;
- Autonomy1_N – cluster two was more likely to report that the interorganizational interaction did not have policies;
- Trust1_N – clusters one and two rated the necessity of trust significantly higher than cluster three.

Finally, clusters were tested for predictive validity by profiling against outcome variables. The five outcome variables significantly distinguished between clusters one and three, and to a limited extent cluster two and three. Cluster one was overall associated with better perceived outcomes, followed by cluster two then cluster three.

Interpretation of the Three-Cluster Solution

The results in Table 5-9 and Figure 5-1 suggest that cluster one can be interpreted as “collaboration” and support the description of this level of interaction in the GIIA. The criterion profiling also supports this interpretation. Cluster one is more enduring, either indefinite or of longer duration than the others; and involves more interactions with shared goals. The other clusters are not so readily interpretable, however, thus warrant closer scrutiny.

The majority of clustering variables are at a level of collaboration also for cluster three, and the Formality_S variable is equal in score. This suggests that cluster three can be interpreted as a "different variant" of collaboration. Where cluster one and cluster three differ most in terms of their natural scores is on Problem_Orient_Sum, Autonomy2_Sum, and Trust2_Sum. Problem_Orient_Sum describes the extent of shared perspectives. Cluster one scores highly on this variable, supporting its interpretation as collaboration. The literature consistently identifies shared perspectives as an essential criterion for collaboration (Gajda, 2004; Gajda & Koliba, 2007; Gray, 1989; Mattessich et al., 2001)

Autonomy2_Sum captures the impact on organizational autonomy from participating in the interaction. Cluster one records a below average score of autonomy (V10). This suggests that the formalized collaborative processes (V6—V9), combined with shared perspectives (V1) and high trust (V11), serve to mitigate the overall impact of organizational autonomy (V10). Again, this finding is consistent with the interpretation of interorganizational collaboration as a relatively structured state of interaction in which the collective processes serve to mitigate the overall impact of the interaction on each organization. In contrast, cluster three seems to be a "difficult" state of interaction, in which—compared to cluster one—the slightly lower amount of collaborative process (V6, V8, V9) with the same level of formalization (V7), results in a situation of high impact on organizational autonomy (V10).

The difference in levels of trust between the clusters offers another important layer of interpretation. Cluster one is characterized by a high level of trust (V11), whereas cluster three is low. The structure of cluster three suggests that collaborative processes (as indicated by V6—V9) can still occur in the absence of high levels of trust (V11) and shared perspectives (V1). As noted above, however, the tradeoff is the impact on organizational autonomy and outcomes.

To interpret and compare further cluster three and cluster one, the criterion profiling results are useful. The GIIA dimension "difficulty" and its Task_Complexity variables used for profiling were able to discriminate clusters (Table 5-12). Cluster three reported generally higher ratings of task complexity than for cluster one. This fits with the overall impression of cluster three as a "difficult" variant of collaboration—low trust and shared perspectives, and greater than average difficulty and complexity of tasks. Another key difference between cluster one and three that is consistent with this interpretation is the Goals_N variable, which significantly discriminated clusters. 22.7% of cluster three cases scored the interaction as having "shared goals agreed between all participants" compared to 44.0% of cluster one. Similarly, the predictive validity tests showed that cluster one reports the highest perceived outcomes and cluster three the lowest.

Cluster two is not significantly different to cluster three across the three organizational category "objective" variables Resource_Alloc_Comp (V2), Incentives (V3) and Key_Personnel_Sum (V4). This means that cluster two and cluster three are, on average, similar in the overall magnitude and scale of commitments made by organizations to the interorganizational interaction. Cluster two and three are highly significantly different across the other three organizational category "perception" variables: Problem_Orient_Sum (V1), Autonomy2_Sum (V10) and Trust2_Sum (V11). Cluster one, however, is significantly different across all these variables.

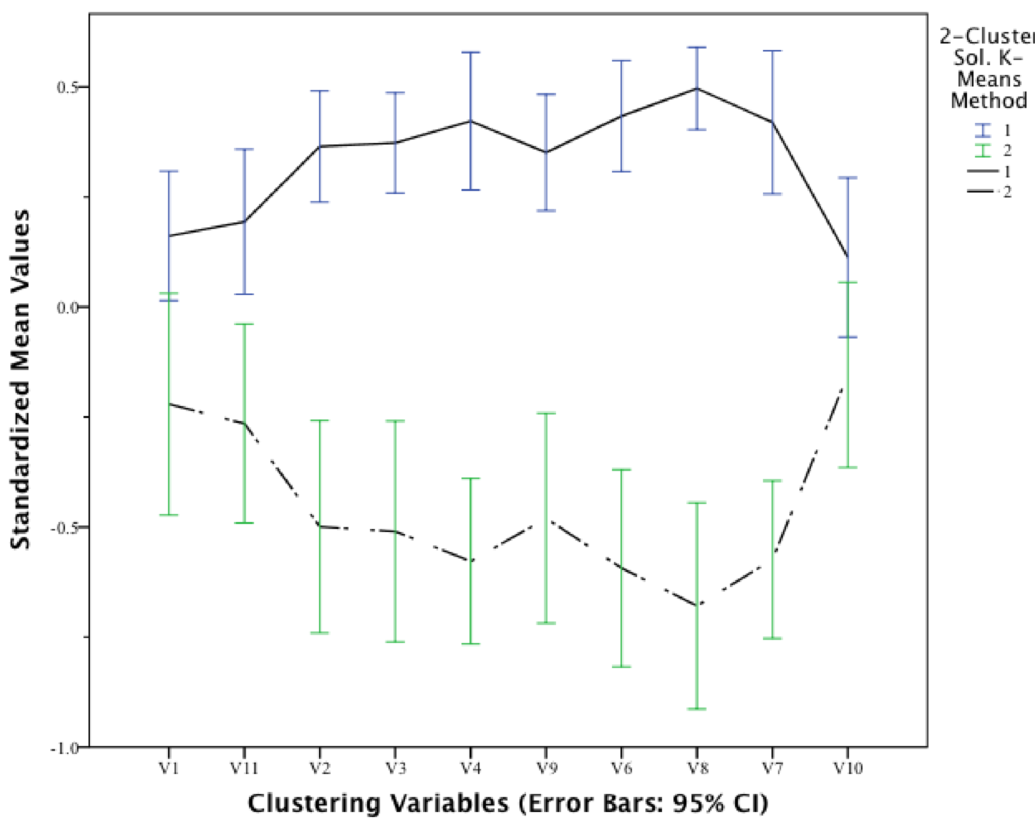
Some perspective is offered by the four interorganizational category variables: Design_Comp (V6), Formality_S (V7), Info_Comp (V8), Decision_Comp (V9). These variables capture the heart of interorganizational interaction, describing features that only emerge out of an interorganizational interaction such as joint policies and collective decision processes. Cluster two differs most from the others on Design_Comp, which describes the structural features of the interaction (e.g. meetings, decision boards, new joint organizations), and Formality_S, which describes the level of formality of policy documents governing the interaction. Cluster two is predominately at the level of coordination for Design_Comp, meaning that most cases within cluster two do not have executive decision boards or joint organizations created for the interorganizational interaction. Cluster two is at the level of cooperation for Formality_S, meaning that there are not formalized policies governing the interaction and organizations work informally together.

The presence of these two results means that cluster two *cannot* be interpreted as collaboration—at least not in the same sense as the other two clusters, which do have formalized policies and executive decision boards created especially for the interaction. Likewise, cluster two cannot accurately be described as "cooperation"—in terms portrayed by the GIIA—as its score on Decision_Comp was 45.2% at the level of collaboration. Given its high scores for trust and shared perspectives and low score on impact of autonomy, but overall medium level of structure and formalization, cluster two may be better described as "partnering" in a manner similar to Woodland and Hutton (2012).

Research Question 2

The second research question asks to what extent other constructs or levels of interaction are observed that depart from the three-level framework in the GIIA. This question is answered in this section as follows. First, the two-cluster solution is profiled, tested for criterion validity and predictive validity, and then interpreted. Second, the four-cluster solution is evaluated in the same manner. For space considerations, discussion of the results is left until the interpretation sections, and only summary results are presented for the profiling and criterion validity tests.

Figure 5-2: *Two-cluster solution standardized means plot*



Profile of Two-Cluster Solution

In the same manner as for the three-cluster solution, the value of each clustering variable can be expressed in terms of the level of interaction according to the GIIA, as shown in Table 5-22. The values for the autonomy and trust variables are expressed in their natural scales (Likert scales from one to seven).

Table 5-22: *Two-cluster solution profiled in terms of levels of interaction*

	Percentage of cases in cluster at the specified level of interaction for the clustering variable	
	Cluster 1	Cluster 2
Clustering Variable	*N* = 119	*N* = 87
1: Problem_Orient_Sum	79.0% collaboration	64.4% collaboration
2: Resource_Alloc_Comp	56.3% collaboration	74.7% *coordination*
3: Incentives	89.1% collaboration	58.6% collaboration
4: Key_Personnel_Sum	69.7% collaboration	37.9% **cooperation**
9: Decision_Comp	78.2% collaboration	48.3% collaboration
6: Design_Comp	79.0% collaboration	55.2% *coordination*
8: Info_Comp	95.8% collaboration	51.7% collaboration
7: Formality_S	52.9% *coordination*	54.0% **cooperation**
10: Autonomy2_Sum	$F(1,204) = 3.633$, $p = .058$, $\eta^2 = .017$	
Mean	2.888	2.517
Std. deviation	1.385	1.369
Median	2.667	2.000
11: Trust2_Sum	$F(1,204) = 11.878$, $p = .001$, $\eta^2 = .052$	
Mean	5.713	5.249
Std. deviation	.923	1.077
Median	6.000	5.667

Two-Cluster Solution Criterion Validity

In the same manner as performed for the three-cluster solution, the criterion validity of the two-cluster solutions is tested using cross-tabulations, chi-square tests, and

ANOVAs. For conciseness, the cross-tabulations are not presented and only summary results given in Table 5-23.

Table 5-23: *Summary results from profiling two-cluster solution for criterion validity*

Variable	Statistic	Effect Size	Sig.	Details of Significant Results
Work_Status	$\chi^2(3) = 15.144$	V = .271	.002	Cluster one > cluster two for military personnel Cluster one < cluster two in civilian government employees No practical significance of result
Org_Status	$\chi^2(2) = 1.073$	V = .072	.585	
Gender	$\chi^2(1) = .332$	V = .404	.564	
Purpose_Comp_LOI	$\chi^2(2) = .695$	V = .291	.706	
Purpose_Comp	$F(1, 204) = .561$	$\eta^2 = .003$	.455	
Time_Dur_Indef	$\chi^2(1) = 4.295$	V = .144	.038	Cluster one more likely to be indefinite in duration (57% of cases)
Time_Dur_Mths	$F(1, 99) = .106$	$\eta^2 = .001$	.745	
Task_Complexity (Multivariate)	Pillai's V = .129 $F(6,199) = 4.895$	$\eta^2 = .129$	.000	Clusters are weakly discriminated by a multivariate task complexity
Task_Complexity1	$F(1, 204) = 11.906$	$\eta^2 = .055$	.001	Cluster one reports higher numbers of tasks
Task_Complexity2	$F(1, 204) = .909$	$\eta^2 = .004$	.341	
Task_Complexity3	$F(1, 204) = 3.450$	$\eta^2 = .065$	.017	Cluster one reports less task clarity
Task_Complexity4	$F(1, 204) = 2.343$	$\eta^2 = .011$	.127	
Task_Complexity5	$F(1, 204) = 11.793$	$\eta^2 = .055$	.001	Cluster two reports less routine, more atypical tasks
Task_Complexity6	$F(1, 204) = .001$	$\eta^2 = .000$	.976	
Role_Single_Org_N	$\chi^2(2) = 5.230$	V = .159	.073	Cluster one more likely to report that no organization can achieve goals independently (66.4% of cases)
Impetus_N	$\chi^2(3) = 21.692$	V = .325	.000	Cluster one more likely to be directly tasked by higher authority Cluster two more likely to be voluntarily initiated by lower staff levels
Mandated	$\chi^2(1) = 16.519$	V = .283	.000	Cluster one more likely mandated Cluster two more likely voluntary
Reason_Sum_LOI	$\chi^2(2) = 2.553$	V = .111	.279	

Variable	Statistic	Effect Size	Sig.	Details of Significant Results
Reason_Sum	$F(1, 204) = .751$	$\eta^2 = .004$	.387	
Num_Orgs	$F(1, 195) = 3.593$	$\eta^2 = .018$	.060	
History_Sum	$F(1, 204) = 6.679$	$\eta^2 = .032$	.010	
Time_Interact	$F(1, 204) = .106$	$\eta^2 = .001$	.745	
Goals_N	$\chi^2(2) = 2.336$	V = .106	.311	
Org_Lead_N	$\chi^2(2) = .468$	V = .048	.791	
Autonomy1_N	$\chi^2(2) = 22.322$	V = .329	.000	Cluster one more likely to have jointly developed policies Cluster two more likely to have no joint policies
Trust1_N	$\chi^2(2) = 6.983$	V = .184	.030	Cluster one more likely to report necessity of trust at all levels

Two-Cluster Solution Predictive Validity

A MANOVA was run with the five outcome variables as dependent variables and cluster membership as the independent. As cluster sizes are different, but other MANOVA assumptions are met, Pillai's trace is reported. The results indicate a significant but weak effect of cluster membership on perceived outcomes of the interorganizational interaction, $V = .966$, $F(5, 200) = 3.625$, $p < .001$, $\eta^2 = .083$, meaning that the a linear combination of outcome variables discriminates between clusters and explains 8.3% of variance overall.

Follow-up univariate ANOVAs revealed significant differences between cluster means for Outcome2, Outcome3, and Outcome5 at the .01 level, and generally weak effect sizes (Table 5-24). For all variables, cluster one reports higher mean scores than clusters two.

Table 5-24: *Profile of two-cluster solution against outcome variables*

Outcome Variables (1=strongly disagree, 4=neutral, 7=strongly agree)	2-Cluster Sol. K-means method using seed points from hierarchical results 1 Mean	1 SD	2 Mean	2 SD	ANOVA $F(1, 204)$	ANOVA η^2
Outcome1: Overall, the multiorganizational interaction is effective in achieving expected outcomes	5.56	1.182	5.31	1.367	1.850	.009
Outcome 2: Overall, high quality working relationships have developed between my organization and partner organizations as a result of this multiorganizational interaction	5.56	1.267	4.93	1.561	10.267*	.048
Outcome3: Overall, my organizations view of the issue(s)/problem(s) that brought the organizations together has broadened as a result of the interaction	5.79	1.149	5.32	1.410	6.875*	.033
Outcome 4: Overall, my organization has increased its interaction with partner organizations as a result of the multiorganizational interaction	5.25	1.558	4.99	1.596	1.409	.007
Outcome 5: Overall, the multiorganizational interaction has helped to make partner organizations' influence on each other more equal	4.91	1.321	4.26	1.458	10.906*	.051
N	119		87			

* $p < .01$

Two-Cluster Solution Interpretation

The two-cluster solution is composed of one cluster of 119 cases (57.8%) and another cluster of 87 cases (42.2%). As the clusters are comprised of more cases than the three- and four-cluster solutions, they have higher variances across the clustering variables and the means of each cluster tend to be closer to the total mean of all cases.

This has the effect of lowering the scores for each variable but increasing the error margins.

The profiling in Table 5-22 shows that cluster one can clearly be interpreted as collaboration, in terms of the GIIA. Clustering variables (V1 to V9) are predominately at the level of collaboration, albeit with slightly less prevalence compared to the three-cluster solution due to the increasing variance effect mentioned above. As with the three-cluster solution, Formality_S (V7) is a the level of coordination.

The criterion validity tests demonstrate cluster discrimination across eight variables: Work_Status, Time_Dur_Indef, Task_Complexity, Role_Single_Org_N, Impetus_N, Mandated, Autonomy1_N, and Trust1_N. Predictive validity tests of the five Outcome variables show that, as in the case of the three-cluster solution, cluster one is generally rates higher outcomes that cluster two. The multivariate and univariate tests discriminated between the clusters. The results are supportive of an interpretation of cluster one as collaboration. Cluster one is more likely to: be of indefinite duration; involve higher numbers of tasks of less clarity; report that no individual organization in an interorganizational interaction can achieve the collective goal independently; report that trust is required at all levels; and involve joint policies.

Inspection of a cross-tabulation of the two-cluster solution against the three-cluster solution shows that 99% of cluster one cases in the three-cluster solution are present in cluster one of the two-cluster solution. Likewise 97% of cluster two cases in the three-cluster solution are in cluster two of the two-cluster solution. Cluster three of the three-cluster solution, however, is roughly equally divided between cluster one and two of the two-cluster solution. Cluster three was unique in that it had very high scores for autonomy (V10) and very low scores for shared perspectives (V1) and trust (V11). The division of cluster three cases between cluster one and two in the two-cluster solution has the effect of smoothing out the differences between these variables, as shown by the overlapping error bars in the means plot.

The implication is that for the two-cluster solution, the “perception” type variables (shared perspectives (V1), autonomy (V10) and trust (V11)), are reduced in their discriminating effect, whereas the structural- and process-related organizational and interorganizational category variables are increased in their discriminating effect.

In terms of evaluating the overall meaning of the two-cluster solution, the results suggest that collaboration is still a distinct and observable level of interaction, but only in the “pure” sense of tangible structural, resource, and process factors. There are factors that fundamentally define collaboration—jointly developed policies, executive decision boards created only for the interorganizational interaction, joint decision making at leadership and staff levels simultaneously. It would not be meaningful to call something collaboration in the absence of these factors.

There is no logical constraint, however, on the variation of perception of trust or autonomy among the participants. In other words, the presence of a jointly developed policy does not logically require a certain level of trust; however, high levels of trust may contribute to a more successful experience—evidence that is provided by the higher rated outcome variables for higher trust clusters.

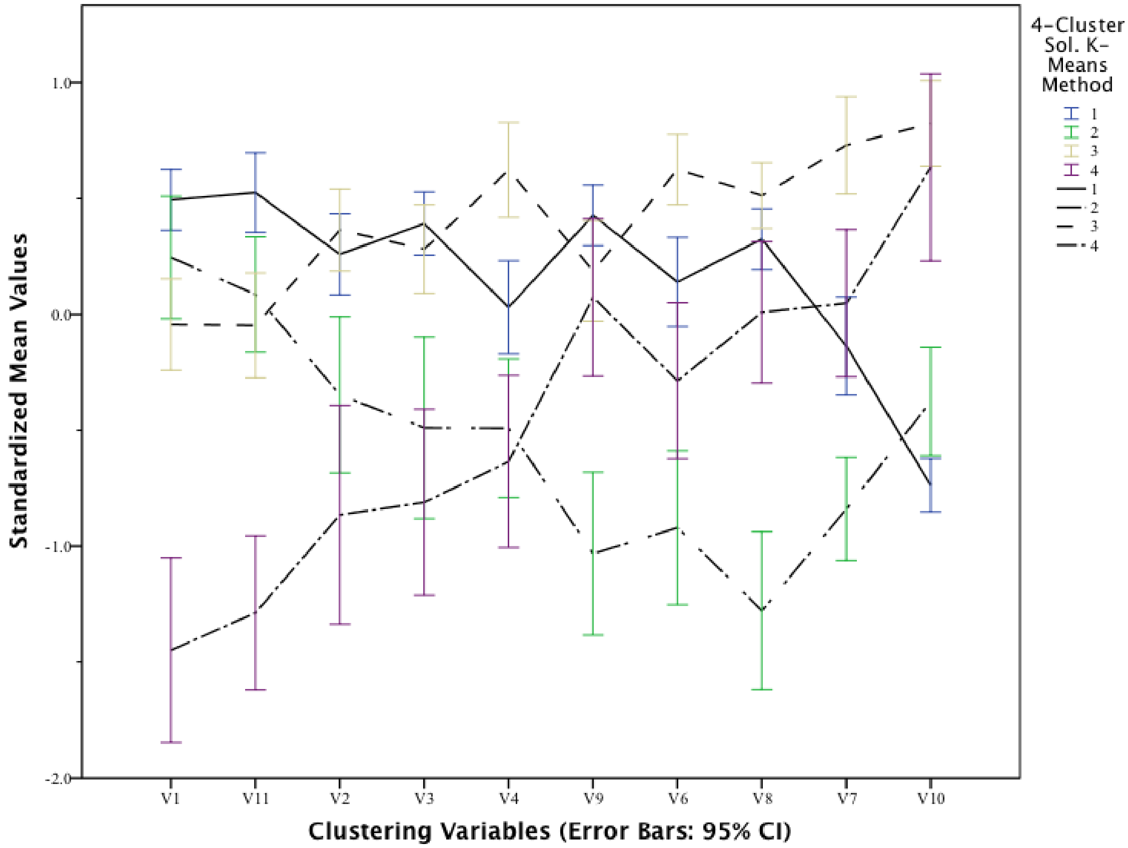
Profile of Four-Cluster Solution

In the same manner as for the two- and three-cluster solution, the value of each clustering variable can be expressed in terms of the level of interaction according to the GIIA, as shown in Table 5-25. The standardized means plot is displayed in Figure 5-3.

Table 5-25: *Four-cluster solution profiled in terms of level of interaction*

	Percentage of cases in cluster at the specified level of interaction for the clustering variable			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Clustering Variable	*N* = 72	*N* = 43	*N* = 61	*N* = 30
1: Problem_Orient_Sum	91.7% collab.	83.7% collab.	72.1% collab.	66.7% *coord*.
2: Resource_Alloc_Comp	50.0% collab.	69.8% *coord.*	52.5% collab.	76.7% *coord.*
3: Incentives	87.5% collab.	65.1% collab.	86.9% collab.	50.0% *coord.*
4: Key_Personnel_Sum	51.4% collab.	37.2% *coord.*	80.3% collab.	50.0% **coop.**
9: Decision_Comp	86.1% collab.	41.9% *coord.*	63.9% collab.	70.0% collab.
6: Design_Comp	65.3% collab.	60.5% *coord.*	86.9% collab.	46.7% *coord.*
8: Info_Comp	93.1% collab.	51.2% *coord.*	93.4% collab.	73.3% collab.
7: Formality_S	55.6% *coord.*	69.8% **coop.**	50.8% collab.	63.5% *coord.*
10: Autonomy2_Sum	$F(3,88.97) = 74.800$, $p = .000$, $\eta^2 = .481$ (Welch's *F* reported)			
Mean	1.708	2.209	3.874	3.611
Std. deviation	.681	1.054	.999	1.501
Median	1.667	2.000	4.000	3.500
11: Trust2_Sum	$F(3,202) = 34.936$, $p = .000$, $\eta^2 = .342$			
Mean	6.051	5.605	5.470	4.211
Std. deviation	.739	.821	.897	.903
Median	6.000	5.667	5.667	4.167

Figure 5-3: *Four-cluster solution standardized means plots*



Four-Cluster Solution Criterion Validity

Summary results of criterion validity tests of the four-cluster solutions are presented in Table 5-26.

Table 5-26: *Summary results from profiling four-cluster solution for criterion validity*

Variable	Statistic	Effect Size	Sig.	Details of Significant Results
Work_Status	$\chi^2(9) = 23.135$	V = .193	.006	No practical significance of result
Org_Status	$\chi^2(6) = 5.880$	V = .119	.442	
Gender	$\chi^2(3) = .955$	V = .068	.844	
Purpose_Comp_LOI	$\chi^2(6) = .9.309$	V = .150	.150	
Purpose_Comp	$F(3,202) = .980$	$\eta^2 = .014$	.403	
Time_Dur_Indef	$\chi^2(3) = 5.642$	V = .165	.132	

Variable	Statistic	Effect Size	Sig.	Details of Significant Results
Time_Dur_Mths	$F(3,97) = 1.302$	$\eta^2 = .039$	.278	
Task_Complexity (Multivariate)	Pillai's $V = .347$ $F(18,597) = 4.332$	$\eta^2 = .116$	.000	Clusters are weakly discriminated by a multivariate task complexity
Task_Complexity1	$F(3, 202) = 5.104$	$\eta^2 = .070$	.002	Cluster one and three report higher numbers of tasks than two and four
Task_Complexity2	$F(3, 202) = 2.121$	$\eta^2 = .031$	.099	Cluster one and three report greater task dissimilarity than two and four
Task_Complexity3	$F(3, 202) = 8.646$	$\eta^2 = .114$	.000	Cluster one reports greatest task clarity, cluster four reports least
Task_Complexity4	$F(3, 202) = .957$	$\eta^2 = .014$	.414	
Task_Complexity5	$F(3, 202) = 4.077$	$\eta^2 = .057$	.008	Cluster four reports least routine, most atypical tasks; cluster three reports most routine, least atypical tasks
Task_Complexity6	$F(3, 202) = 11.619$	$\eta^2 = .147$	.000	Cluster four reports least agreement about tasks Cluster one reports most agreement
Role_Single_Org_N	$\chi^2(6) = 7.091$	V = .131	.316	
Impetus_N	$\chi^2(9) = 25.960$	V = .205	.002	Cluster one, three and four more likely to be directly tasked by higher authority Cluster two more likely to be voluntarily initiated by lower staff levels or by leadership
Mandated	$\chi^2(3) = 21.850$	V = .326	.000	Cluster three most likely to be mandated (82% of cases) Cluster one and four are 60% mandated / 40% voluntary Cluster two more likely voluntary (63% of cases)
Reason_Sum_LOI	$\chi^2(6) = 9.091$	V = .149	.168	
Reason_Sum	$F(3,202) = .320$	$\eta^2 = .005$	.811	
Num_Orgs	Welch's $F(3,99.4) = 1.722$	$\eta^2 = .036$	.001	Cluster three has highest mean number of participating orgs. (15) Cluster four has the lowest (8.3)
History_Sum	$F(3,202) = 1.711$	$\eta^2 = .025$	.166	
Time_Interact	$F(3,202) = .592$	$\eta^2 = .009$	.621	

Variable	Statistic	Effect Size	Sig.	Details of Significant Results
Goals_N	$\chi^2(6) = 11.455$	V = .075	.047	Clusters three (62%) and four (83%) have higher proportions of "both shared and individual" goals compared to cluster one (50%) and two (58%)
Org_Lead_N	$\chi^2(6) = 4.042$	V = .099	.678	
Autonomy1_N	$\chi^2(6) = 27.566$	V = .259	.000	Cluster two more likely to have no joint policies
Trust1_N	$\chi^2(6) = 11.013$	V = .163	.085	Cluster one more likely to report necessity of trust at all levels

Four-Cluster Solution Predictive Validity

A MANOVA was run with the five outcome variables as dependent variables and cluster membership as the independent. Box's *M* test of equality of covariance matrices was highly significant, indicating that a key assumption for MANOVA was violated. Furthermore, Levene's test of equality of variances failed for three out of the five outcome variables. Thus it is not possible to determine if a multivariate combination of outcome variables can discriminate clusters in the four-cluster solution.

Follow-up univariate ANOVAs, correcting for the unequal variances, revealed significant differences between cluster means for all outcome variables, but generally weak effect sizes with the exception of Outcome1, which accounted for 14.8% of variance between clusters (Table 5-27). For all variables, cluster three reports significantly higher mean scores than clusters four. Cluster one reports significantly higher mean scores than cluster four for Outcome1, Outcome2 and Outcome5.

Table 5-27: *ANOVA results for outcome variables and the four-cluster solution*

Outcome Variables (1=strongly disagree, 4=neutral, 7=strongly agree)	4-Cluster Sol. K-means method using seed points from hierarchical results 1 Mean SD	2 Mean SD	3 Mean SD	4 Mean SD	ANOVA *F* Significance	η^2
Outcome1: Overall, the multiorganizational interaction is effective in achieving expected outcomes	5.85 1.252	5.65 1.021	5.43 1.117	4.30 1.601	Welch's $F(3,89.7) = 7.708$ .000	.148
Outcome 2: Overall, high quality working relationships have developed between my organization and partner organizations as a result of this multiorganizational interaction	5.50 1.353	5.07 1.682	5.66 1.196	4.40 1.276	$F(3,202) = 6.557$ .000	.089
Outcome3: Overall, my organizations view of the issue(s)/problem(s) that brought the organizations together has broadened as a result of the interaction	5.65 1.436	5.40 1.498	5.90 .831	5.10 1.185	Welch's $F(3,90.8) = 7.435$ .000	.045
Outcome 4: Overall, my organization has increased its interaction with partner organizations as a result of the multiorganizational interaction	5.10 1.737	4.98 1.739	5.57 1.258	4.60 1.329	Welch's $F(3,92.9) = 4.089$ .009	.042
Outcome 5: Overall, the multiorganizational interaction has helped to make partner organizations' influence on each other more equal	4.88 1.363	4.49 1.437	4.92 1.320	3.70 1.317	$F(3,202) = 6.523$ .000	.088
N	72	43	61	30		

Four-Cluster Solution Interpretation

In the four-cluster solution, cluster one has 72 cases (35.0% of the total number), cluster two has 43 cases (20.9%), cluster three has 61 (29.6%), and cluster four has 30 cases (14.6%). As the clusters are comprised of less cases than the two- and three-cluster solutions, they have generally lower variances across the clustering variables and more diverse or extreme means. The smaller clusters tend to exhibit greater error bars, as shown in the means plot in Figure 5-3.

The profiling in Table 5-25 shows that cluster one clearly can be interpreted as collaboration in terms of the GIIA as clustering variables (V1 to V9) are predominately at the level of collaboration. As with the three-cluster solution, Formality_S (V7) is at the level of coordination. Cluster one in the four-cluster solution is characterized by high levels of organizational commitment (V2 – V4), high levels of structure, process and formality (V6 – V9), the highest levels of shared perspectives (V1), the highest levels of trust (V11) and low levels of impact of autonomy (V10), more so than even for cluster one in the three-cluster solution. Cluster three, on the other hand, has similar levels across V2 – V9, but a high level of impact of autonomy (V10), average shared perspectives (V1) and a slightly lower trust score (V11) compared to cluster one. Cluster three appears to be a highly formalized variant of collaboration, but without the high levels of trust in cluster one, and having a great impact on participating organization's autonomy.

Cluster two exhibits high trust and shared perspectives, moderate organizational commitments, low levels of structure, process and formality, and a low level—not significantly different from cluster one—of autonomy. Cluster two receives an overall rating of cooperation for Formality_S (V7), with 70% of cases indicating that no formalized agreements exist in their respective interorganizational interactions. Cluster two may be interpreted as another variant of "partnering" described in the three-cluster solution, as the level of organizational commitment is higher than would be expected for cooperation, but the level of formality and structure is fairly low.

Cluster four exhibits the lowest levels of trust and shared perspectives, low levels of organizational commitment, moderate to high levels—between collaboration and coordination—of formality, structure and process, but a high level of impact of autonomy. Cluster four is significantly lower across all outcome variables. Cluster four may be the “difficult” collaboration variant observed in the three cluster solution.

Inspection of a cross-tabulation of the three-cluster solution with the four-cluster solution shows that the original “collaboration” cluster in the three-cluster solution was split evenly between clusters one and three in the four-cluster solution, supporting further the interpretation of cluster three in the four-cluster solution as a collaboration variant. Furthermore, about 30% of cases from cluster two in the three-cluster solution were allocated to cluster one in the four-cluster solution, and about 70% formed a new cluster two. The “difficult collaboration” cluster three in the three-cluster solution was split in two in the four-cluster solution, with 36% of cases going to cluster three and 63% of cases to cluster four. Closer inspection shows that the “difficult” cases ended up in cluster four, whereas the less difficult cases went to cluster three.

The criterion validity tests demonstrate cluster discrimination across eight variables: Work_Status, Time_Dur_Indef, Task_Complexity, Num_Orgs, Impetus_N, Mandated, Autonomy1_N, and Trust1_N. Predictive validity tests of the five Outcome variables were less conclusive due to violation of statistical assumptions required for the MANOVA. Individual univariate tests showed generally higher means for clusters one and three compared to cluster two and four. The univariate tests discriminated between the clusters with Bonferroni-adjusted significance values. The criterion and predictive results are supportive of an interpretation of cluster one and cluster three as collaboration. Cluster one and three are more likely to: be indefinite in duration; involve higher numbers of tasks of less clarity; report that no individual organization in an interorganizational interaction can achieve the collective goal independently; report that trust is required at all levels; and involve joint policies.

The more granular look at the cluster structure reveals an inconsistency with the interpretation from the three-cluster solution, in which cluster one was a high outcome, high trust collaboration with low impact on autonomy, and cluster three was a low outcome, low trust collaboration with high impact on autonomy. In the four-cluster solution, there are three variants of collaboration, two high outcome variants (cluster one and three) with high and average trust scores but significantly different high and low autonomy levels, and a low outcome variant, with very low trust and high impact on autonomy. The narrative in the interpretation for the three-cluster solution suggested that in cluster three—the "difficult collaboration"—the low trust and shared perspectives coupled with the high level of formalization contributed to a state of high impact on autonomy. But in the four-cluster solution we now see a high impact of autonomy collaboration (cluster three) and low impact of autonomy collaboration (cluster one) that have similar levels of trust and similar high outcomes compared to the other clusters. A series of MANCOVA tests were run to investigate these results further, especially concerning the trust variable, which are explained in research question four.

Research Question 3

Research question three examines which dimensions of the GIIA are most important for predicting an organization's level of interaction in an interorganizational interaction. In other words, which variables are most important in discriminating cluster membership? Researchers are often faced with a multitude of potential variables that could be included in an analysis, thus selecting a parsimonious yet theoretically meaningful set is important.

A series of discriminant function analyses were run for the two-, three-, and four-cluster solutions with the clustering, contextual and outcome variables. The aim of each analyses was to investigate differences between clusters by creation of a discriminant function—a linear combination of GIIA variables that maximizes group separation. The coefficients of the discriminant functions, coupled with the function-variable correlations, allow the relative contributions of variables to cluster separation to be assessed.

This section is organized as follows: first, the protocol concerning discriminant analysis assumptions is reviewed; second, for each clustering solution the clustering, contextual and outcome variables are assessed using the discriminant function significance and model fits, the standardized canonical discriminant function coefficients and function-variable correlations; and third, the ability of functions to correctly classify cases is checked. After reviewing the two-, three-, and four-cluster solution discriminant analyses, an overall assessment is made about the contribution of the variables. For space considerations, only the results from the clustering variables are shown in detail, and results are only reported if the discriminant analysis assumptions are met.

Assumptions of Discriminant Analysis

Discriminant function analysis is fairly sensitive to assumptions concerning sample size, multicollinearity, and equality of covariance between the tested groups. First, the sample size must be assessed. Hair et al. (2006) recommend that the sample size be 20X the number of independent variables. With ten clustering variables and a sample of 206, this assumption is satisfied. Second, multicollinearity must be evaluated, as high correlations between variables affects their importance in the discriminant functions. The results in Table 4-53 showed that only moderate to low correlations are present in the clustering variables, thus multicollinearity is not an issue. The final assumption concerns equality of covariance matrices. This is tested in each case using Box's *M* test. If the covariance matrices are not equivalent—indicated by a significance test at the .001 level—then the log determinants are compared. The convention adopted is that given the large sample size, failures of Box's *M* test can be ignored providing that log determinants are of the same order of magnitude (Burns & Burns, 2008; Garson, 2012).

The interpretations for each of the results presented are as follows:

- Function: a projection of the data onto a latent dimension that best separates clusters. For more than two clusters, multiple orthogonal (i.e. uncorrelated) functions are created.
- Eigenvalue: a measure of overall effectiveness of a discriminant function by describing how much discriminating ability a function possesses. For multiple functions, eigenvalues are relative to each other.
- Percent variance: the proportion of discriminating ability of all independent variables in a discriminant function.
- Wilk's Lambda (Λ): the proportion of the total variance in discriminant scores unexplained by group differences, hence the closer to zero Λ is, the more representative a discriminant function is of the underlying variance.
- R_c: the canonical correlations of discriminant scores with the set of independence variables, indicating an overall strength of relationship between the discriminant function and the variables.

- Standardized canonical discriminant function coefficients: standardized weights for each variable in the discriminant function, which allows calculation of discriminant score used to classify cases. The magnitude of coefficients indicates how strongly discriminating variables affect the score. Their calculation is affected by correlation between variables, hence coefficients cannot be used as the only source of interpretation.
- Variable-discriminant function correlations: Often termed the "structure matrix," these report correlations between the independent variables and discriminating functions, indicating how much variables 'load' onto functions reflecting shared variance.
- Classification confusion matrix: compares the prediction accuracy of the discriminant functions with the actual data (cluster membership).

Two-Cluster Solution Discriminant Analysis

Discriminant analysis for the ten clustering variables, presented in Table 5-28, revealed one discriminant function that significantly discriminated clusters, $\Lambda = .323$, $\chi^2(10) = 224.7$, $R_C^{\ 2} = .677$, $p < .001$. The Wilk's Λ indicates that 32.3% of variance in the discriminant scores is unexplained by the difference between clusters. The effect size, $R_C^{\ 2}$, is moderate. Table 5-29 shows the classification accuracy of the discriminant function is high, correctly classifying 96.6% of cases.

Table 5-28: *Summary discriminant analysis results for the two-cluster solution*

Overall Model Fit: Canonical Discriminant Functions

Function	Eigenvalue	Percent of Variance: Function %	Percent of Variance: Cum. %	Canonical Corr. R_C	$R_C^{\ 2}$	Wilk's Λ	χ^2 (df)	Sig.
1	2.903	100	100	.823	.677	.323	224.7 10	.000

Discriminant Function Coefficients and Discriminant Loadings

Independent Variables	Standardized Discriminant Function Coefficients: Function 1	Independent Variable – Discriminant Function Correlations: Function 1
V1: Problem_Orient_Sum	.153	.133
V2: Resource_Alloc_Comp	.348	.327
V3: Incentives	.384	.336
V4: Key_Personnel_Sum	.353	.394
V6: Design_Comp	.357	.408
V7: Formality_S	.308	.391
V8: Info_Comp	.379	.495
V9: Decision_Comp	.385	.312
V10: Autonomy2_Sum	.113	.092
V11: Trust2_Sum	.083	.161

Table 5-29: *Classification matrix for two-cluster solution discriminant function*

		2-Cluster Sol. K-Means Method	Predicted Group Membership*: 1	Predicted Group Membership*: 2	Total
Original	Count	1	119	0	119
		2	7	80	87
	%	1	100.0	.0	100.0
		2	8.0	92.0	100.0

* 96.6% of original grouped cases correctly classified.

For V2 – V8, the standardized coefficients lie within the range of .308 - .385, with Decision_Comp (V9) the largest. V1, V10 and V11 lie within the range of .083 - .152, with Trust2_Sum the smallest. These results indicate that the Trust2_Sum and Autonomy2_Sum variable contribute least to the discriminant function scores, which is further reflected in their low loadings (r =.161, r =.092, respectively). The analysis confirms the conclusions from the two-cluster solution profiling made earlier—at the relatively crude level of granularity provided by a two-cluster solution, clusters are distinguished most based on the interorganizational category variables, which cannot logically vary across groups to the extent that perceptual organizational category variables can.

Another discriminant analysis was run for four contextual variables: Purpose_Comp, Role_Single_Org_S, Reason_Sum, and History_Sum. These variables were chosen because they are continuous and do not have missing values. Task_Complexity_Sum was not selected due to its poor multivariate performance in the previous tests, and Num_Orgs was omitted due to the nine cases removed for outliers. Time_Dur was not selected as its number of cases does not meet the assumptions for discriminant analysis. Other nominal variables cannot be used in the analysis due to the limitations of the method.

One discriminant function was revealed that significantly but weakly discriminated clusters, $\Lambda = .942$, $\chi^2(4) = 12.175$, $R_C{}^2 = .059$, $p = .016$. The Wilk's Λ indicates that 94.2% of variance in the discriminant scores is unexplained by the difference between clusters. The effect size, $R_C{}^2$, is low, and correspondingly the low classification accuracy of 60.2% was achieved. The results indicated that for this discriminant function (but not generally), History_Sum is highly correlated (r = .726) and Role_Single_Org_S is moderately correlated (r = .643). These results confirm the criterion validity tests displayed in Table 5-23, which showed a significant effect for these variables, although History_Sum was not interpreted due to its low effect size.

A further discriminant analysis was run for the five Outcome variables. One discriminant function was revealed that significantly but weakly discriminated clusters, $\Lambda = .917$, $\chi^2(5) = 17.482$, $R_C{}^2 = .083$, $p = .004$. The Wilk's Λ indicates that 91.7% of variance in the discriminant scores is unexplained by the difference between clusters. The effect size, $R_C{}^2$, is low, and correspondingly the low classification accuracy of 64.6% was achieved. The structure matrix confirms the predictive validity MANOVA tests of the clusters, showing that Outcome5, Outcome2 and Outcome3 discriminate most, albeit weakly, between clusters.

Three-Cluster Solution Discriminant Analysis

Discriminant analysis for the ten clustering variables across the three-cluster solution, presented in Table 5-30 revealed two discriminant functions. The first explained 53.1% of variance, $R_C{}^2 = .638$, and the second explained 46.9% of variance, $R_C{}^2 = .608$. In combination, these functions significantly discriminated clusters, $\Lambda = .142$, $\chi^2(20) = 387.9$, $p < .001$. Removing the first function also significantly discriminated clusters, $\Lambda = .391$, $\chi^2(9) = 186.4$, $p < .001$. Table 5-31 shows the classification accuracy of the discriminant functions are high, correctly classifying 97.6% of cases.

Table 5-30: *Summary discriminant analysis results for the three-cluster solution*

Overall Model Fit: Canonical Discriminant Functions

Function	Eigenvalue	Percent of Variance: Function %	Percent of Variance: Cum. %	Canonical Corr. R_C	R_C^2	Wilk's Λ	χ^2 df	Sig.
1	1.760	53.1	53.1	.799	.638	.142	387.9	.000
						(1 & 2)	20	
2	1.557	46.9	100.0	.780	.608	.391	186.4	.000
							9	

Discriminant Function Coefficients and Discriminant Loadings

Independent Variables	Standardized Discriminant Function Coefficients: Function 1	Standardized Discriminant Function Coefficients: Function 2	Independent Variable – Discriminant Function Correlations: Function 1	Independent Variable – Discriminant Function Correlations: Function 2
V1: Problem_Orient_Sum	.228	.621	.231	.658
V2: Resource_Alloc_Comp	.152	.037	.265	.133
V3: Incentives	.326	.305	.325	.183
V4: Key_Personnel_Sum	.298	.084	.393	.009
V6: Design_Comp	.370	.072	.441	-.117
V7: Formality_S	.187	-.356	.374	-.261
V8: Info_Comp	.442	-.387	.591	-.202
V9: Decision_Comp	.453	-.056	.390	-.061
V10: Autonomy2_Sum	.090	-.281	.086	-.419
V11: Trust2_Sum	.026	.446	.203	.552

Table 5-31: *Classification matrix for three-cluster solution discriminant functions*

		3-Cluster Sol. K-Means Method	Predicted Group Membership*: 1	2	3	Total
Original	Count	1	100	0	0	100
		2	6	54	2	62
		3	4	0	40	44
	%	1	100.0	.0	.0	100.0
		2	9.7	87.1	3.2	100.0
		3	9.1	.0	90.9	100.0

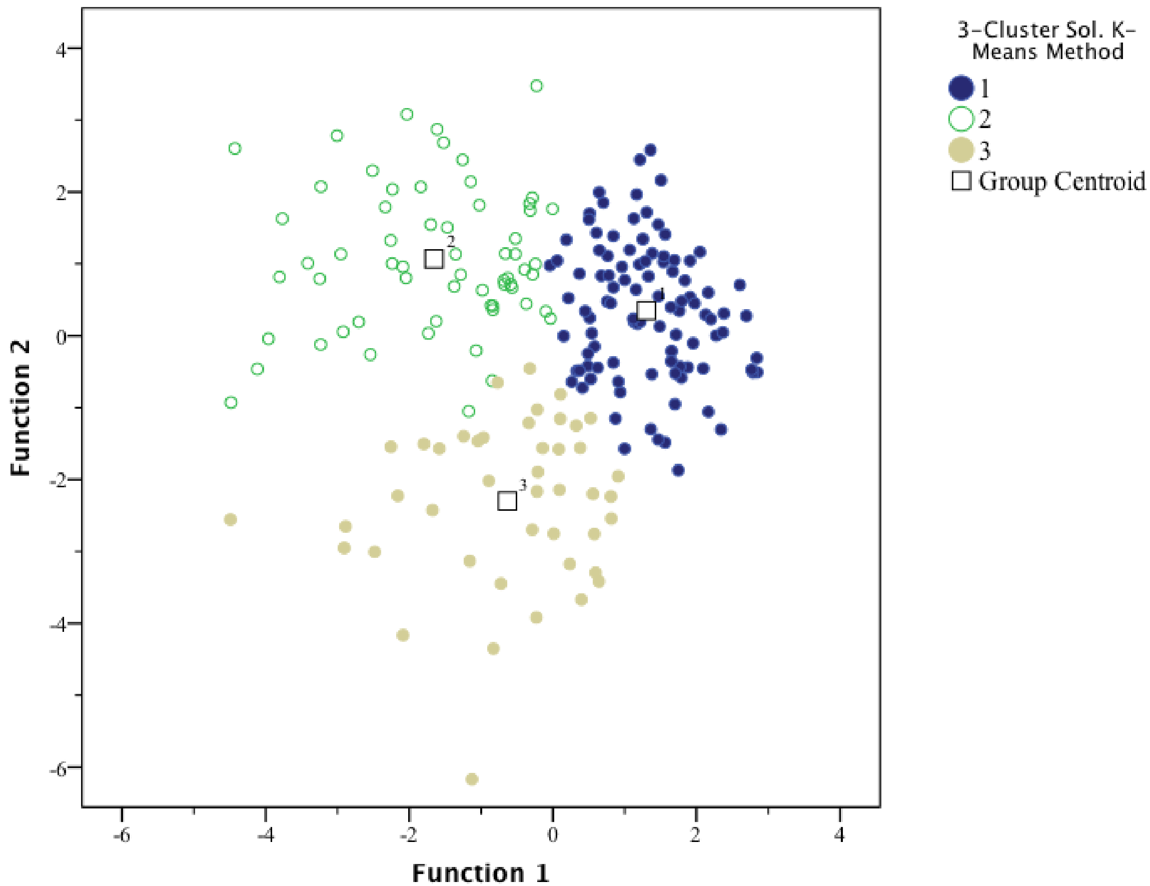
* 94.2% of original grouped cases correctly classified.

Comparing the discriminant loadings for the two functions offer the best way to interpret the results. The loadings for function one are highest across the interorganizational category variables (Design_Comp (*r* = .441), Formality_S (*r* = .374), Info_Comp (*r* = .591), Decision_Comp (*r* = .390)), the next highest across the organizational commitment group of variables (Resource_Alloc_Comp (*r* = .265), Incentives (*r* = .325), Key_Personnel_Sum (*r* = .393)), and finally lowest across the three perception-based organizational variables (Problem_Orient_Sum (*r* = .231), Autonomy2_Sum (*r* = .086), Trust2_Sum (*r* = .203)). Thus the interorganizational variables offer greatest discriminating power, confirmed by their generally higher coefficient magnitudes.

In comparison, correlations of the variables with function two show the highest loadings—even greater in magnitude than function one—for the perception-based variables (Problem_Orient_Sum (*r* = .658), Autonomy2_Sum (*r* = -.419), Trust2_Sum (*r* = .552)). Conversely, the other variables now load very weakly—all less than .26—with function two.

The territorial map in Figure 5-4 shows this visually. Looking horizontally across function one, cluster one is at a further distance from clusters two and three. Cluster one showed the greatest difference from the other two in terms of its interorganizational category variables—thus explaining why these variables load more on function one. Looking vertically at function two, cluster three is now at a greater distance from clusters one and two. Cluster three showed the greatest difference from the others in terms of its values for trust, shared perspectives and autonomy—explaining why these variables load more onto function two.

Figure 5-4: *Territorial map for three-cluster solution discriminant analysis*



Another discriminant analysis for the four contextual variables across the three-cluster solution revealed two discriminant functions. The first explained 58.3% of variance, $R_C{}^2 = .038$, and the second explained 41.7% of variance, $R_C{}^2 = .028$. In combination, these functions significantly but weakly discriminated clusters, $\Lambda = .936$, $\chi^2(8) = 13.425$, $p = .098$. When the first function was removed, however, clusters were not significantly discriminated, $\Lambda = .972$, $\chi^2(2) = 5.621$, $p = .132$. The classification accuracy of the discriminant functions were moderate, correctly classifying 55.8% of cases. Due to the weak effects, the variable-function loadings are not conclusive, but overall the model provides a weak confirmation of the criterion validity of clusters.

Finally, a discriminant analysis for the five outcome variables across the three-cluster solution revealed two discriminant functions. The first explained 88.5% of variance, $R_C^{\,2} = .190$, and the second explained 11.5% of variance, $R_C^{\,2} = .003$. In combination, these functions significantly but weakly discriminated clusters, $\Lambda = .786$, $\chi^2(10) = 48.508$, $p < .001$. When the first function was removed, however, clusters were not significantly discriminated, $\Lambda = .970$, $\chi^2(5) = 6.051$, $p = .195$. The classification accuracy of the discriminant functions were low, correctly classifying only 48.1% of cases. The overall the model provides a reasonable confirmation of the predictive validity of clusters. Inspection of the discriminant function centroids and territorial maps shows that function one discriminates cluster one from two and three, and function two discriminates cluster two from one and three.

Four-Cluster Solution Discriminant Analysis

Discriminant analysis for the ten clustering variables across the four-cluster solution revealed three discriminant functions, presented in Table 5-32. The first explained 52.0% of variance, $R_C^{\,2} = .717$, the second explained 36.8% of variance, $R_C^{\,2} = .643$, and the third explained 11.1% of variance, $R_C^{\,2} = .209$. In combination, these functions significantly and strongly discriminated clusters, $\Lambda = .065$, $\chi^2(30) = 539.8$, $p < .001$. Removing the first and second functions also significantly discriminated clusters at the $< .001$ level. Table 5-33 shows the classification accuracy of the discriminant functions are high, correctly classifying 97.1% of cases.

Table 5-32: *Summary discriminant analysis results for the four-cluster solution*

Overall Model Fit: Canonical Discriminant Functions

Function	Eigenvalue	Percent of Variance: Function %	Percent of Variance: Cum. %	Canonical Corr. R_C	R_C^2	Wilk's Λ	χ^2 df	Sig.
1	2.538	52.0	52.0	.847	.717	.065 (1, 2 & 3)	539.8 30	.000
2	1.798	36.8	88.9	.802	.643	.232 (2 & 3)	289.6 18	.000
3	.543	11.1	100.0	.593	.209	.648	85.9 8	.000

Discriminant Function Coefficients and Discriminant Loadings

Independent Variables	Standardized Discriminant Function Coefficients: Func. 1	Func. 2	Func. 3	Independent Variable – Discriminant Function Correlations: Func. 1	Func. 2	Func. 3
V1: Problem_Orient_Sum	-.289	.482	.322	-.214	.545	.251
V2: Resource_Alloc_Comp	.058	.286	.150	.100	.329	.218
V3: Incentives	.085	.476	-.022	.118	.373	.066
V4: Key_Personnel_Sum	.049	.174	.428	.220	.232	.360
V6: Design_Comp	.279	.368	.031	.370	.237	.108
V7: Formality_S	.369	-.150	.069	.408	.056	.224
V8: Info_Comp	.624	.022	-.289	.510	.286	-.260
V9: Decision_Comp	.396	.269	-.542	.307	.231	-.409
V10: Autonomy2_Sum	.449	-.339	.641	.428	-.385	.603
V11: Trust2_Sum	-.177	.294	.254	-.149	.502	.126

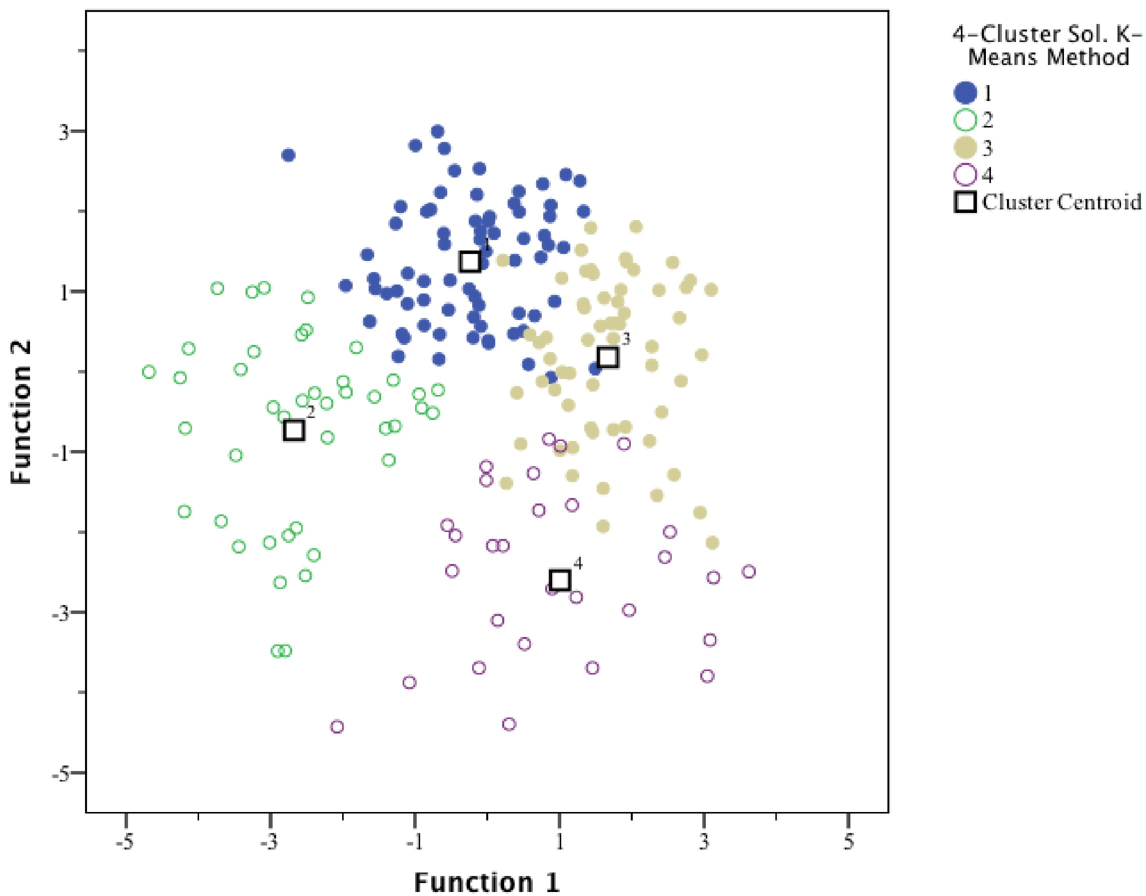
Interpretation of the coefficients and loadings is more challenging with three functions; however, the territorial map in Figure 5-5 shows that function one separates out cluster two, whereas function two separates out cluster four. Again, this is due to the different ways to load the autonomy and trust variables compared with the interorganizational variables. Cluster four is the lowest on trust, but the highest on impact of autonomy, whereas cluster two is the inverse.

Table 5-33: *Classification matrix for four-cluster solution discriminant functions*

		4-Cluster Sol. K-Means Method	Predicted Group Membership* 1	2	3	4	Total
Original	Count	1	71	0	1	0	72
		2	2	41	0	0	43
		3	1	0	59	1	61
		4	0	0	1	29	30
	%	1	98.6	.0	1.4	.0	100.0
		2	4.7	95.3	.0	.0	100.0
		3	1.6	.0	96.7	1.6	100.0
		4	.0	.0	3.3	96.7	100.0

* 97.1% of original grouped cases correctly classified.

Figure 5-5: *Territorial map for four-cluster solution discriminant analysis*



Summary of Results

As more groups are added to the discriminant calculation, interpretation becomes increasingly challenging. Hair et al. (2006) recommend calculating a "potency index," which creates a composite sum of a variable's discriminating power across functions. The potency indices (multiplied by 100 for ease of viewing) are shown in Table 5-34. The indices for the two-cluster solution are simply the squared correlations (discriminant loadings) as there is only one function with one eigenvalue.

Table 5-34: *Potency indices for 4-, 3, & 2-cluster solution discriminant analyses*

	4-Cluster Solution		3-Cluster Solution		2-Cluster Solution	
Variable	Potency Index	Rank	Potency Index	Rank	Potency Index	Rank
V1: Problem_Orient_Sum	14.04	**3**	23.14	**1**	1.77	9
V2: Resource_Alloc_Comp	5.04	10	4.56	10	10.69	6
V3: Incentives	5.91	9	7.18	9	11.29	5
V4: Key_Personnel_Sum	5.94	8	8.21	8	15.52	**3**
V6: Design_Comp	9.32	6	10.97	**4**	16.65	**2**
V7: Formality_S	9.33	5	10.62	5	15.29	**4**
V8: Info_Comp	17.29	**2**	20.46	**2**	24.50	**1**
V9: Decision_Comp	8.73	7	8.25	7	9.73	7
V10: Autonomy2_Sum	19.03	**1**	8.63	6	0.85	10
V11: Trust2_Sum	10.63	**4**	16.48	**3**	2.59	8

The top four ranks in each solution are in **bold**

The two-cluster solution resulted in one cluster clearly interpretable as collaboration, and another that, while not at any one particular level of interaction, clearly lacked certain key features of collaboration such as formalized policies and joint decision making. This is reflected in the ranking for potency indices. The top four ranks (in bold) all relate to "observable" aspects of an interorganizational interaction that either are or are not present. The least discriminating variables are the autonomy, trust and shared perspectives, which as discussed in the cluster interpretations – have no “logical” reason constraining their values across clusters.

The three-cluster solution “opened up” the second cluster from the two cluster solution based on different scores on trust, autonomy, and shared perspectives. This is indicated by top rankings for these variables, with the exception of autonomy. Once again, Design_Comp is highly ranked, indicating that the presence—or absence—of joint decision-making forums is critical to distinguishing clusters. The four-cluster solution creates even more detail between clusters. It appears that the numerous possible combinations of variables two through nine smooth-out the overall importance of their discriminating power, leaving clusters to be primarily distinguished by variations in trust, autonomy and shared perspectives.

For all solution sets, Info_Comp is consistently ranked high, either first or second, in discriminating ability. Reviewing the descriptives in Table 4-35 show that this variable scores predominately at the level of collaboration terms of the nominal categorical variable, Info_Comp_LOI. Examining the frequency distribution for the continuous version of the variable reveals a highly skewed distribution. Further analysis needs conducting using a stepwise approach to adding variables into the discriminant function to understand the importance of this finding.

In conclusion, the discriminant function analysis adds supporting weight to the distinctiveness of clusters, although their interpretation in terms of the GIIA is still inconclusive, with the exception of the collaboration-variant clusters. The discriminant function analysis also reaffirms the multivariate results concerning the weak, but significant difference in outcomes between clusters.

Research Question 4

Research question four asks to what extent dimensions of an interorganizational interaction array can be conceptualized as “increasing” along a continuum of interaction. The aim is to critique and evaluate this assumption inherent in much public administration and organizational science literature. The analysis proceeds as follows. First, for each dimension of the GIIA descriptive and cluster analysis results are reviewed, referring back to the original GIIA framework and, where necessary, the supporting literature. At each stage, the ability to interpret the dimension as varying along a continuum is made. Second, an overall evaluation is made of the usefulness of the dimension in understanding or defining interaction states. Finally, the evidence for each dimension of the GIIA is summarized and conclusions are made. The following abbreviations are used: two-cluster solution (2CS), three-cluster solution (3CS) and four-cluster solution (4CS).

Review of GIIA Dimensions

Purpose of interorganizational interaction

While Mandell and Steelman (2003) and Keast et al. (2007) make the reasonable assumption that “increasing” levels of interaction are associated with more complex purposes, the purpose dimension of the GIIA does not discriminate any of the cluster solutions identified. The descriptive results for the Purpose_Comp and Purpose_Comp_LOI variables show that 72.8% of responses are at the level of collaboration, in GIIA terms. This should increase the chance that clusters clearly identified as collaboration, based on the clustering variables, would differ significantly from the other clusters. The cross-tabulations and chi-square analysis show no such result, however, as the cases with high levels of Purpose_Comp are even spread throughout all clusters. There are 44 case of interorganizational interactions that are clearly not collaboration as defined by clustering variables, but in which the purpose dimension is rated at the level of collaboration.

The survey results do not support use of the purpose dimension in defining an interaction state. There is nothing preventing an informal network aspiring to create institutional and system change—the highest ranking purpose. Similarly, it is reasonable to assume that highly formalized and structured collaborations could be formed purely for the purpose of exploring interests—the lowest ranking purpose in the GIIA. There is little support to interpret this dimension as a continuum.

There is a possibility, however, that results are affected by the survey sample. In the highly bureaucratized domain of defense organizations, interaction between organizations may more likely be formalized—regardless of the purpose. Thus future research is needed in other contexts to evaluate the importance of purpose, especially as it seems a popular choice in defining interaction states (Cross et al., 2009; Gajda, 2004; Gajda & Koliba, 2007).

Time

The length of time that the interorganizational interaction is expected to exist is significant for cluster one (collaboration) in the 2CS, and for clusters one (collaboration) and three (difficult collaboration) in the 3CS. No significant results are found in the 4CS. In general, the clusters identifying as collaboration are more likely to be either indefinite or of greater number of months in duration. This supports the assertion made by McNamara (2008) that collaboration is associated with longer-term interactions.

From a logical perspective, however, there is no reason why interaction states should be defined by time. In fact, many examples can be found of intense collaboration in emergency or crisis situations (Bryson et al., 2006; Simo, 2009). While the time dimension is a "natural" continuum, there is little reason why it should be overlain onto a continuum of interaction.

Difficulty

For all cluster solutions, the Task_Complexity variables discriminate clusters in the expected direction, with collaboration clusters receiving generally higher ratings. The factor analysis for this dimension is inconclusive, however, indicating that each element should be retained as a separate feature. For example, Task_Complexity6, which captures the level of disagreement amongst participants, may be more related to other dimensions in the framework such as participant's problem orientation, trust, and autonomy.

While task complexity overall discriminates clusters, there are some unexpected results. For example, task complexity is higher overall for cluster three—the "difficult" variant of collaboration—in the 3CS. Furthermore, results from the 4CS show that the cooperation-like or partnering clusters report greater task dissimilarity. This hints at the possibility that task complexity may not be a necessary condition for any particular interaction state. In other words, there is no logical reason why "collaboration" could not exist in the absence of high task complexity.

Role of single organization

For the 2CS, cluster one is more likely to report that no single organization can accomplish the goals alone—the highest level of Role_Single_Org_N. At the low level of detail afforded by the 2CS, collaboration in general is distinguished by this dimension.

With the greater resolution of detail in the 3CS and 4CS, however, this dimension does not discriminate clusters.

Strictly, there is no logical reason why a highly formalized and structured collaboration could not exist for a problem that any one of the collaborating organizations could solve alone. A total of 36 respondents, for example, record that their participation in the interaction is technically “voluntary” but is necessary to prevent loss of reputation. For these cases there is insufficient evidence to understand the reasons for this choice of answer, but the possibility remains that highly capable organizations—especially in the defense sector—could solve problems on their own but instead choose to collaborate for other reasons.

Interdependence is treated as a fundamental element of collaboration in the literature (Emerson et al., 2012; Morris et al., 2013; Morris & Miller-Stevens, 2016b; Trist, 1977), or as Gray (1989) states: “collaboration implies interdependence” (p.11). Thus even given the inconclusive results from the survey, there is theoretical ground to warrant continued inclusion of this dimension in the framework. This dimension was captured by a single survey question with only three possible options, which given the complex nature of interdependence, is probably insufficient.

Impetus for collective action

This dimension describes two distinct components: first whether an organization’s participation in an interaction is voluntary or mandated, and second, ratings of importance of different reasons for an organization’s participation. Result show that the mandated/voluntary status of an interaction significantly discriminates clusters in all solutions. Generally, the cluster identifying as collaboration is more likely to be mandated. Given the number of exceptions (e.g. 26% of cluster one was voluntary), the fact that an interaction is mandated does not seem to be a strong determinant of an interaction state: mandated cooperation could equally well exist, albeit less frequently as evidenced from the survey results, as mandated collaboration.

McNamara (2016) suggests that mandated collaborations are distinct interaction states that occupy a separate "level" in an interorganizational array. Further testing is needed to determine whether this is the case and the multitude of consequences that result. Bryson et al. (2006) suggest that deliberate planning—i.e. joint decision boards—is more likely in mandated collaborations. A cross-tabulation of Design_Comp_LOI with Mandated shows this to be the case. In the context of the present study, there is evidence to suggest that the mandated/voluntary nature is important in distinguishing interaction states, but there little justification for placing "mandated" interactions on a continuum.

The other part of the impetus dimension captures the importance of several reasons for an organization's participation. No significant relationships are found, indicating that the importance of a particular reason is highly contextual for each organization, regardless of interaction state. There is no justification for assuming a level of interaction in this dimension.

Numbers of participating organizations

In the 2CS, there are no differences between clusters in terms of the number of participating organizations. In the 3CS, cluster one (collaboration) has slightly higher mean numbers, and in the 4CS, cluster three (collaboration variant) is higher. No specific prediction is made in the GIIA about the numbers of organizations for each level of interaction. The results suggest that collaboration may be associated generally with higher numbers. This may be indicative, however, of increased interdependence or task complexity rather than something fundamental about the number of participants. Higher numbers of participants may also naturally force different types of decision making structures, though in the terms of the present study this assertion is not supported as cluster three (the difficult variant of collaboration) exhibits the lowest number of participating organizations but has a high level of collaboration-like decision making structures.

Category of participating organizations

Margerum (2008) finds that different interaction states can be identified based on the types of participants, which in turn relate to the nature of the problem bringing organizations together. Other scholars define collaboration in terms of a cross-sector interaction (Ansel & Gash, 2007). Although no specific predictions are made in the GIIA, no evidence is found that suggests any difference between clusters in terms of participating organizations. The significance of this finding, however, should be interpreted in the context of the study sample, which was dominated heavily by governmental organizations.

History of previous interaction in the problem domain

The extent to which organizations and participants have worked together on previous initiatives only weakly discriminates clusters in the 2CS, with the collaboration cluster reporting higher previous history scores. Mattessich et al. (2001) identify previous history as a key element of a successful collaboration, and a major explanatory part of Ostrom (2005) institutional analysis framework relies on the fact that repeated interactions over time contribute to shared institutions and trust. Conversely, using empirical data during disaster relief collaborations, Hicklin et al. found no evidence that prior history affected collaboration.

While there is very weak evidence from the present study to suggest an effect, the special case of the sample may affect the results. Military officers and NATO civilian staff tend to rotate posts fairly frequently, hence respondents may not have had a full appreciation of the extent of previous history of interaction with other organizations.

Participant's problem orientation

The extent to which participants view problems from a shared or individual perspective strongly discriminates clusters, with decreasing importance moving from the 4CS to the 2CS. Mandell and Steelman (2003) assert that shared perspectives are necessary for higher levels of interaction, and Mattessich et al. (2001) identify it as a requirement for successful collaboration. Shared perspectives are related to the more encompassing concept of "shared vision," which is frequently identified as an essential component of collaboration (Mayer & Kenter, 2016).

There is strong evidence for treating this dimension as varying along a continuum. First, its discriminating power increases with greater number of clusters, and second, the descriptives reveal a relatively smooth frequency distribution, albeit fairly skewed towards the higher end of the scale as indicated by the _LOI version of the variable.

While the dimension does discriminate clusters, there is no logical reason as to why interaction states must fundamentally be defined by the presence or absence of shared vision, and the evidence suggests that this dimension is more indicative of the level of perceived outcomes rather than the structural nature of an interaction. The

MANCOVA results, for example, reveal that differences in outcome variables between clusters become nonsignificant when controlling for the Problem_Orient_Sum variables.

Resource allocation

Resource allocation—or the contributions allocated by individual organizations to the interorganizational interaction—is a moderate discriminant of clusters. Across all cluster solutions, cluster tend to form into two variants with respect to this dimension—high resource allocation at the level of collaboration in GIIA terms, and moderate resource allocation at the level of coordination in GIIA terms.

The underlying distribution of Resource_Alloc_Comp values are smooth, with very few values below the level of coordination. This is likely a sample effect due to the nature of military and government organizations, which contribute relatively substantial resources even for small interactions. For example, almost 80% of cases indicate that their organization had contributed financially to interactions.

There is justification for treating resource allocation as a continuum. Above the level of cooperation, the distribution of the composite variable Resource_Alloc_Comp is fairly smooth. Increasing resource allocation in terms of money, personnel time, or physical assets represents increasing "stakes" for an organization involved in an interaction, and there is a logical relationship between the level of organizational involvement and the existence of collective decision making apparatus, as portrayed by the interorganizational category of dimensions.

The exception to the continuum is perhaps the idea that resources are "pooled" in certain interaction states. One of the survey items, taken from the "collaboration" cell of the GIIA for the resource allocation dimension, states that organizations "pool financial resources with other organizations into an independent operating fund for the multiorganizational interaction." Only 7% of respondents selected this option, which seems incongruent with the generally higher rated answers from other items in this scale. Further research should expand on the meaning of pooling resources; the stated benefit of pooling seems linked with other important features of interorganizational interaction such as authority, autonomy and decision making.

Incentives

This dimension as stated in the GIIA captures both the intrinsic and extrinsic rewards provided to individuals and participating organizations. No reliable survey instruments were found that could capture the entire dimension and only the leadership element was carried forward in the survey, which rated the extent to which leaders recognized the benefits of participating in the interaction. This dimension is a reasonable discriminant of clusters and is significantly lower for the less successful clusters four (in the 4CS) and three (in the 3CS).

While the descriptive results indicate a heavy skew toward the level of collaboration, there is nothing in principle preventing this dimension from existing on a continuum. It is not certain, however, whether its point on a continuum is relevant for an interorganizational interaction state, as leaders could equally recognize the benefit of participating even for a low level of interaction. For the 3CS, the results show that 67% of cases in cluster two—the "lower" interaction state in terms of overall mean values—received the highest rating for incentives.

Time to establish multiorganizational arrangement

Keast et al. (2007) suggest that the time it takes for an interorganizational to establish itself to the point where it could achieve its objectives, is related to the level of interaction. No significant results are found for this dimension. Given the lack of concern in the literature for this particular dimension, its removal from the GIIA is supported.

Key personnel

This dimension describes the extent of involvement of personnel responsible for bringing together and implementing the interorganizational interaction. Two questions looking at the role of staff and the role of leadership were combined into a single composite scale. The smooth variation of the scale variable suggests that this dimension can be interpreted as a continuum, although for this sample the distribution is skewed towards the level of collaboration. This dimension is best at discriminating clusters in the 2CS. In the 3CS and 4CS, it does not discriminate between the collaboration-variant clusters, but does for the non-collaboration clusters.

At the level of collaboration, the GIIA includes additional elements concerning the role of lead organizations, thus a third survey question was created to ask respondents about whether a single organization led the group (Org_Lead_N). This was not included in the key personnel variable due to the obvious level of analysis inconsistency, and the variable was instead used to profile clusters. The Org_Lead_N variable does not discriminate clusters, indicating that for this sample, whether an interorganizational interaction is led by single or multiple organization makes little difference to the level of interaction. This result stands in contrast to the importance placed on “lead organization-governed networks” by Provan and Kenis (2008), who suggest that the type of collective governance (either shared, lead organization, or via a bespoke “network” organization) is related to the numbers of participants, goal consensus and trust.

Orientation of policy objective (goals)

This dimension captures the extent to which goals are agreed between organizations. As a result of a highly skewed response distribution, this dimension was not selected for clustering as originally intended and was used to profile the cluster solutions. The Goals_N variable significantly but weakly discriminates clusters in the 4CS and 3CS, showing that the “difficult collaboration” cluster three is less likely to report shared goals than the other clusters. The evidence for this dimension’s inclusion in the GIIA and its interpretation as a continuum of interaction is inconclusive.

Design

This dimension captures the administrative structure emerging from the interorganizational interaction and reflects the “intensity” of the ways in which organizations work together. Arguably, this dimension captures a core element of collaboration—the presence of joint decision making boards or joint organizations created specifically for the interaction—a fact recognized in all the interorganizational array and typologies reviewed for this study, and much of the broader literature on collaboration (Thomson & Perry, 2006; Thomson et al., 2009).

For the 2CS and 3CS this dimension strongly discriminates all clusters, and for the 4CS discriminates only cluster two, with the other three clusters being similar in design level. This dimension is crucial in interpreting clusters as “collaboration,” indicated by a majority of cases at the level of collaboration for the Design_Comp variable. The descriptive analysis reveals a smooth distribution of the Design_Comp variable, thus lending support to the interpretation of a continuum.

Formality of the agreement

This dimension describes the way in which organizations agree on their roles and responsibilities in the interaction, either informally, formally specifying roles, or formally specifying detailed planning in addition to roles. Overall, this dimension as strong discriminant of clusters for the 2CS, but less so for the other solutions, although cluster two in the 3CS is substantially different in its level of formality.

Cross-tabulations with the other dimensions reveal some obvious results: mandated interactions exhibit more formal arrangements, and executive-level decision making structures are associated with higher formality. Yet it is challenging to interpret the dimension as a continuum; instead, it appears to be a binary condition: either the interorganizational interaction is informal, or there are some formalized policies. The significant results mainly lie in the difference between these two states, rather than the two variants of formalization expressed in the survey question. This binary state is reflected in the pattern of discriminant analysis for clusters, with the collaboration-variant cluster types lying close together in formality, including the "difficult" variants, and the non-collaboration cluster types with low formality being fairly distinct.

Information sharing and communications

This dimension describes the ways in which organizations use information and communication processes, and is a strong discriminator of clusters for all cluster solutions. The descriptive analysis shows, however, that the distribution is highly skewed towards the top value possible, putting 77.2% of all respondents at collaboration. While the impact of this skew was not appreciated at the time the cluster analysis was conducted, further investigation is required concerning this dimension, including omitting it from further cluster analysis runs. The evidence supporting this dimension in the GIIA is inconclusive, even given its top ranking as a discriminant variable. There is insufficient evidence to evaluation its interpretation as a continuum.

Decision making

Decision making refers to the ways in which organizations make decisions in the interaction in terms of its level of collectiveness. This dimensions is one of the weaker discriminators of clusters and is ranked seventh out of ten in potency index for all cluster solutions. Given the importance of this dimension in the collaboration literature this result was initially surprising, however, closer analysis reveals that its discriminating power lies mainly in discerning collaboration from non-collaboration. Much research identifies certain types of collective decision making as synonymous with collaboration. Thomson and Perry (2006), for example, identify the decision making and governance mechanism as a core component of the “black box” of collaboration process, and many of the interorganizational arrays reviewed include this dimension (Carrasco, 2009; Gajda, 2004; McNamara, 2012; Williams, 2010; Woodland & Hutton, 2012). Descriptive analysis shows a smooth distribution of scores across the sample, indicating that this dimension can be interpreted as a continuum.

Organizational autonomy

The autonomy dimension captures the degree to which each partnering organization independently operates. The GIIA along with much collaboration research assumes that as the level of interaction increases, individual organizations become less autonomous as a consequence of an “intrinsic tension between self-interest and the collective interest.” (Thomson, 2001, p.94). Autonomy is weakly discriminating for the 2CS, moderately discriminating for the 3CS and strongly discriminating for the 4CS.

The results obtained do not support the hypothesis that increasing interaction results in loss of autonomy. In the 3CS there are two variants of collaboration, identified by their high scores on interorganizational dimensions, which differ markedly on the autonomy scores. The “difficult” collaboration variant has the highest autonomy score. Likewise, the four cluster solution features three variants of collaboration, two with high autonomy scores, and one with very low scores. Yet all of these clusters have relatively high scores on the interorganizational dimensions, meaning that the presence of highly formalized policies and joint decision making do not necessarily result in loss of autonomy.

The autonomy dimension is lifted primarily from the work of Thomson (2001); Thomson et al. (2009), however, this dimension often gave inconclusive and sometimes contradictory results. This was explained by the fact that organizations in Thomson’s study samples “do not experience a great deal of tension between their own self-interest and the collective interest of the collaboration” (Thomson, 2001, p. 145). A simple and obvious explanation for this result, however, lies in the basic nature of interorganizational interaction itself: the collective structures created to govern and administer a collaboration may serve to mitigate the negative effects of reduced organizational autonomy. If an organization is involved in collaboration in the first place, that may signify that the collaboration is important to achievement of that organization’s mission.

The loss of autonomy may be applicable at the very start of collaboration, but as organizations interact and create joint governance and administration structures, the autonomy issue is less relevant in the context of an ongoing collaborative process.

This suggests that, rather than considering the *loss* of autonomy in collaboration, research should focus on *how collaboration mitigates or reduces the importance of this loss*. This would involve a complete re-specification of the autonomy dimension in the GIIA to an "Importance of Organizational Autonomy" dimension. There is indication of the importance of this from the results concerning outcomes. When controlling for autonomy, for example, MANCOVA results show a reduced significance and effect size of difference between means of cluster solutions.

Given that autonomy is shown to vary across different interactions states in which the interorganizational dimensions are essentially constant, there is little justification for interpreting autonomy as a continuum, even though descriptive results show a smooth distribution throughout the total sample. This also suggests that autonomy should not be an intrinsic part of a definition of interorganizational interaction.

Trust

The trust dimension refers to the extent to which trustworthy relationships between organizations are built. This dimension is derived from the wide literature on institutional rational choice and game theory, which suggests that participation in collective action is increased by tit-for-tat reciprocity between participants (Axelrod, 1984; Ostrom, 2005; Thomson, 2001). Short-term reciprocal behavior creates a reputation and trust norm, which thus supports long term reciprocal behavior as this norm become institutionalized. As related in the literature review on many of the frameworks and typologies, trust is essential to collaboration in the absence of formal legal rational authority.

Trust is strongly discriminating in the 3CS and 4CS, but differentiates clusters in a different manner to the autonomy dimension. In the 3CS, cluster one (collaboration) and cluster two (informal partnering) exhibit similar high levels of trust, but differ in their autonomy. Cluster three (difficult collaboration), on the other hand, is very low in trust. In the 4CS, the three variants of collaboration differ markedly on their trust values.

The importance of trust can be evaluated using the five outcome variables. The MANOVA analysis reported previously showed a multivariate effect of cluster membership on outcome level for the 3CS ($V = .220$, $F(10, 400) = 4.946$, $p < .001$, $\eta^2 = .110$). When controlling for trust, however, a MANCOVA reveals that the significance in differences in outcome means for each cluster are almost removed ($V = .073$, $F(10, 398) = 4.946$, $p = .131$, $\eta^2 = .037$). Individual post-hoc comparisons between clusters reveal only barely significant differences between clusters one and three for Outcome2 and Outcome4.

Similarly to autonomy, trust can vary significantly across similar interaction states, thus there is little justification for interpreting it along a continuum of interaction. Further research should encourage treating trust as an important interaction variable as Lundin (2007) does, in addition to treating it as an input and output of a collective process. The results in the present study do not support the description of trust in the GIIA. At the highest levels of interaction trust was found at both high *and* low values. The MANCOVA result show that trust is more important for outcomes than it is for defining a particular level of interaction.

Resolution of turf issues

This dimension was not evaluated in the survey.

Conclusions and Evaluation of Interorganizational Array Structure

A continuum of interaction?

The GIIA tested in this research was created from a variety of previous attempts in the literature, which all have two things in common. First, they assume a continuum of interaction, and second they define arbitrarily-named interaction states (i.e. cooperation, coordination or collaboration) based on their constituent dimensions. Part of the justification of this present study lies in the fact that many of the supporting typologies and arrays as a whole have not been well tested.

While many of the dimensions included in typologies and arrays have strong theoretical and empirical backing for their importance to interorganizational interaction, when researchers attempted to overlay a continuum of interaction on these dimension, it forced them to create operationalizations at each level for each dimension. For the arrays with five or more discrete levels such as those by Mandell and Steelman (2003) and Gajda (2004), it is questionable whether the level of detail is meaningful. With the large sample of evidence presented in the present study what, if anything, needs to change? Are the typologies and arrays valid and useful?

The results summarized in Table 5-35 at the end of this section paint a mixed picture. Some dimensions can be interpreted as a continuum, while others cannot. The fact that a dimension is a continuum, however, does not necessarily signify theoretical or practical importance in defining an interaction state. In terms of distinguishing between interaction states, many of the interorganizational-type dimensions exhibit “threshold” effects, independent of the level of interaction. Once a certain value is reached, any additional variation makes no further difference. For the sample surveyed in this research, the interorganizational-type dimensions are important only in a “binary” sense—either they are high or low, and this is the only meaningful distinguishing feature between the various clusters found. The implication for the GIIA or other arrays is that is it is not meaningful to create highly refined graduations to distinguish interaction states.

On the other hand, three of the organization-type variables—problem orientation, autonomy, and trust—are clearly continuous, thus one might assume that they can be overlain on a continuum of interaction. The results show, however, that this is not the case. In the four cluster solution, three collaboration-variant clusters are observed—based on the interorganizational dimension values—yet these three clusters have completely different values for autonomy. Thus it is clearly false to assign a particular level of autonomy in the way in which the GIIA and many other arrays do. A similar result is found for trust and also problem orientation. The results do not suggest that these dimensions are unimportant, but merely that they cannot be included on a continuum of interaction.

The importance of dimension type

From the twenty or so typologies and arrays reviewed in chapter two, a framework was created to organize and categorize the dimensions encountered (Table 2-7). This framework distinguishes dimensions based on whether they are contextual, organizational or interorganizational. From the literature analysis, a conclusion was reached that the contextual-type dimensions should not be used to define interaction states, as they are by definition—contextual. The cluster analysis results show that this conclusion is warranted: with the exception of the interdependence (role of single organization) and the mandated/voluntary (impetus) dimensions, the contextual dimensions generally have no bearing on the state of interaction. This does not imply that they are unimportant, just that they should not be called upon do create fundamental definitions.

The organizational- and interorganizational-type dimensions, on the other hand, are key in defining interorganizational interaction states. The two-cluster solution shows two distinct clusters in which the trust, autonomy and problem orientation dimensions are essentially averaged out, but the interorganizational and remaining organizational dimensions are either high or low. The "higher resolution" three-cluster and four-cluster solutions mainly increase the detail of the "high" cluster in the two-cluster solution. Part of the reason is that the interorganizational-type dimensions logically "hang" together—a collective decision making process and an executive level decision board would suggest that a formalized agreement is present between participants.

Likewise, the organizational-type dimensions of key personnel and resource allocation logically are related: the extent to which personnel throughout an organization are involved in an interaction, is likely related to the extent to which financial and physical resources are involved. Again, the cluster solutions generally indicate that these two variables exist in an either high or medium state.

Table 5-35: *Summary evaluation of evidence for each GIIA dimension*

Dimensions	Type	Continuum of Interaction?	Include in GIIA?	Justification / Recommendations
Purpose of Interorganizational interaction	Context	N	N	No logical reason No evidence
Time	Context	Y	N	No logical reason No evidence
Difficulty	Context	Y	N	No logical reason Weak evidence of discriminating interaction states
Role of single organization	Context	Y	Y	No evidence, but poorly specified dimension Important theoretical reasons for inclusion Improvement required in construct of "interdependence"
Impetus for collective action: Mandated vs. voluntary	Context	N	Y	Important in discriminating clusters
Impetus for collective action: Reasons	Context	N	N	No logical reason No evidence
Numbers of participating organizations	Context	N	N	No evidence
Category of participating organizations	Context	N	Inconclusive	Theoretical reasons for inclusion, but evidence inconclusive
History of previous interaction in the problem domain	Context	N	Inconclusive	Theoretical reasons for inclusion, but evidence inconclusive
Participant's Problem Orientation	Org	Y	N	Varies across similar states of interaction Treat as important condition or contextual factor
Resource allocation	Org	Y	Y	Examine "pooled resources" construct

Dimensions	Type	Continuum of Interaction?	Include in GIIA?	Justification / Recommendations
Incentives	Org	Y	N	Varies across similar states of interaction
Time to establish multiorganizational arrangement	Context	Y	N	No evidence
Key personnel	Org	Y	Y	Importance to defining interaction states may be binary
Orientation of policy objective (Goals)	Interorg	N	Inconclusive	Theoretical reasons for inclusion, but insufficient evidence to assess
Design	Interorg	Y	Y	Importance to defining interaction states may be binary
Formality of the agreement	Interorg	N	Y	Importance to defining interaction states may be binary
Info. sharing and communications	Interorg	Y	Inconclusive	Poorly specified dimension Insufficient variation in data to account for trends
Decision making	Interorg	Y	Y	Importance to defining interaction states may be binary
Resolution of turf issues	Interorg	Not tested	Not tested	Not tested
Organizational autonomy	Org	N	N	Varies across similar states of interaction
Trust	Org	N	N	Varies across similar states of interaction

CHAPTER 6:

CONCLUSIONS

This chapter summarizes the data analysis and results presented in chapters four and five. The theoretical significance of the results is discussed in the context of the literature, and then the practical significance of the results is assessed in terms of their impact on managing and evaluating interorganizational interactions. The overall study limitations are evaluated. Finally, the chapter lays out an agenda for future research and offers concluding remarks to the study.

Study Conclusions

This study has investigated conceptualization and operationalization of commonly-used constructs of interorganizational interaction in the public administration literature. This research is important primarily because interaction between organizations that occur outside of traditional government hierarchies is now commonplace in policy implementation (Donahue & Zeckhauser, 2011; Goldsmith & Kettl, 2009; O'Leary & Bingham, 2009). Thus it is essential for public administration research to develop stable constructs of interorganizational interaction to allow cumulative research and shared knowledge (Morris & Miller-Stevens, 2016a; Thomson et al., 2009; Wood & Gray, 1991).

Yet there are several problems in the way interorganizational interaction has been conceptualized to date. There is a mismatch between systems-based frameworks that emphasize process dynamics and typology / array frameworks that present detailed but static conceptualizations. There is an overreliance on the untested assumption of a "continuum of interaction," and more generally, both frameworks and arrays have received little empirical confirmation. This research asked several basic questions to consider these issues. First, in a large sample of interorganizational interactions, are the most commonly described interaction states of collaboration, coordination and cooperation observed? Second, are other interaction states observed? Third, what are the most important dimensions for defining an interaction state? And finally, is the continuum of interaction concept valid?

The results show that collaboration is the only interorganizational interaction state that is clearly identifiable in the sample. When the sample is divided into two clusters, one cluster containing over half the total cases identifies as collaboration based on the interorganizational-type dimensions: the "design" or ways in which organizations work together; the formality of agreements between organizations; the extent to which collective decision making is practiced; and the density and institutionalization of information sharing and communications in the interaction. The remaining cases in the second cluster cannot clearly be identified as either coordination or cooperation.

When the sample is divided into three and four clusters, different variants of collaboration are revealed, distinguished by the levels of shared perspectives between participants, the impact on organizational autonomy, and the level of trust between interacting organizations. These collaboration variants differ on perception of outcomes from the interorganizational interaction, yet the level of trust between organizations is the key factor that determines overall perception of outcomes. The organizational-type variables are important in discriminating between different clusters, but are relatively unimportant to the difference between collaboration and non-collaboration clusters. From the set of contextual-type dimensions studied, only a few are useful in distinguishing between observed clusters. A conclusion is reached that, in general, contextual dimensions are not useful in differentiating between interaction states, with the exception of whether an interaction is voluntary or mandated. In the study sample, the majority of interactions identifying as collaboration are mandated.

There is little evidence supporting the relevance of conceptualizing dimensions in terms of a continuum of interaction. Some dimensions are "naturally" continuous such as the time dimensions, the extent of shared perspectives, autonomy, trust, and organizational commitments made in the interaction. Other dimensions appear to exist only in binary conditions: the formality of the agreements between organizations, and the voluntary or mandated status of an interaction. The extent to which a dimension can be interpreted as existing on a continuum, however, has little relevance in distinguishing between cluster structures or interaction states. Clusters that are clearly collaboration, based on their interorganizational-type dimensions, have large variations across the continuums of other dimensions, notably shared perspectives, trust and autonomy. Furthermore, with the exception of a few combinations (formality of agreement and presence of joint decision making structures), there are no logical restrictions that prevent the co-existence of different "levels" of dimensions in a single interaction state. In fact, all of the clusters observed displayed a mixture of interaction levels across dimensions, in terms of the GIIA interpretation.

From the results obtained, there is little evidence to support the GIIA framework overall. The conclusions drawn from this study, however, apply to a specific problem domain (defense) and are based on a sample composed primarily of governmental and international organizations. This is addressed further in the Study Limitations section below.

Theoretical Implications

Conceptualization and operationalization of interaction states

The literature review shows that typologies and arrays in the public administration and organizational science literature seldom recognize the distinction between contextual-, organizational-, and interorganizational-type dimensions. The empirical results of this study confirm that distinguishing between these three types is essential. In terms of identifying differences between interorganizational interaction states, contextual-type dimensions have low relevance whereas interorganizational-type have high relevance and are fundamental to characterizing “high” levels of interaction such as collaboration.

The literature review shows that many scholars use contextual-type dimensions to define interaction states: Mandell and Steelman (2003) use complexity and scope of effort; Carrasco (2009); Gajda and Koliba (2007); Woodland and Hutton (2012) use purpose of the interorganizational interaction; Keast et al. (2007) use purpose and the time taken to establish the interaction; McNamara (2008) uses time, interdependence and impetus for collective action; and Margerum (2008) uses the institutional level of interaction and type of participant. And of course the GIIA tested in this research is an omnibus compilation of all these dimensions.

What can explain this preponderance of attempts to conceptualize and define collaboration or other interaction states using contextual-type dimensions? The systems framework literature may point toward an answer. In this body of work, contextual-type dimensions are often referred to as preconditions (Wood & Gray, 1991), starting conditions (Ansel & Gash, 2007), or antecedents (Thomson & Perry, 2006). The systems framework literature, while generally conceptualizing contextual-type dimensions as "inputs" to the system, often identifies specific categories of inputs such as "general environment," "direct antecedents," and "contingencies and constraints" (Bryson et al., 2006, p. 45). The systems view takes into account all parts of the system in understanding how it works, yet there is less concern how discrete states of interaction are defined, probably due to the fact that systems frameworks inherently account for dynamic processes. The frameworks recognize, however, that contextual dimensions may affect the overall process or outcomes in some manner.

Returning to the typology and array literature for the crucial insight, we can observe that scholars who use contextual-type dimensions in conceptualizations generally tend to refer to "collaboration" in the context of *the entire system*. On the other hand, scholars who omit the contextual-type dimensions tend to conceptualize only the *process* elements of collaboration—or other interaction states. Thus thinking of collaboration as a system naturally requires consideration of all variables: contextual, organizational and interorganizational. Collaboration as process, however, only requires interorganizational-type, and to some extent the organizational-type dimensions. This is not far removed from a similar problems with other concepts such as "governance," for which ten different uses in the literature have been identified depending on whether one views it as system, process, structure, etc. (Kooiman, 1999).

The key question now is how best to define an interorganizational interaction state such as "collaboration," especially when the literature is rife with definitions that invariably mix contextual-type dimensions as evidenced by the review conducted by Mayer and Kenter (2016). Unfortunately there is no right answer; other than to ensure that a distinction is made between the whole-system and process views. Adopting the system view to conceptualize a “collaborative system” requires contextual dimensions. It is safe to say that a definition of a collaboration process, such as Thomson (2001) approach, must include interorganizational-type dimensions: the common feature of all collaboration definitions, typologies, and arrays is that they identify collective decision making structures and processes as key to differentiating collaboration from other interaction states. The definitional question becomes somewhat more challenging, however, when considering the organizational-type dimensions.

The results from this research show that certain organizational-type dimensions—shared perspectives, autonomy, and trust—can vary considerably across states identified as collaboration based on the interorganizational-type dimensions. This is highly inconsistent with the typologies and arrays that use these dimensions to define interaction states, namely those by D'Amour et al. (2008); Keast et al. (2007); Mandell and Steelman (2003); McNamara (2008, 2012). It *may* be the case that in the global population of interorganizational interactions, low trust is generally associated with “cooperative” interactions; however, this is a result that requires empirical testing across different population segments to determine.

The results from this research show that the trust and shared perspectives dimensions moderate the perceived effectiveness of collaboration. Thus when scholars define collaboration as, amongst other factors, a high trust state involving shared perspectives amongst participants, what the definer should really state is that “*successful* collaborations are associated with high trust and shared perspectives…" On the other hand, a collaboration process could be defined simply by referring to the fundamental interorganizational variables emerging from the interacting organizations: formalized agreements, joint decision making structures, collective decision making processes, and shared information and communications. In other words, a parsimonious definition of collaboration need only refer to the *presence* of emergent interorganizational collective decision making structures and processes, rather than incorporate subjective conditions such as trust and perspectives, or claims about effectiveness.

This approach is somewhat at odds, however, with Thomson's (2001) collaboration process framework, which is one of the most cited in the literature. Thomson's framework incorporates five dimensions—joint decision making, administrative structures, mutuality, norms of trust, and autonomy—that are indicators of a higher-order latent "collaboration" dimension. The framework essentially allows creation of a single collaboration score based on the five dimensions, and assumes therefore, that higher trust and autonomy lead to higher levels of collaboration. As mentioned previously in chapter five, the autonomy dimension was inconclusive in several studies. In fact, in her original Ph.D. research (Thomson, 2001) a four-factor latent model omitting the autonomy dimension was found that fit the data equally well; however, Thomson chose to keep the autonomy dimension for theoretical reasons. Likewise, when Thomson's framework was used in other studies, results were inconclusive for this dimension (Chen, 2006; Thomson et al., 2008). Thus taken in tandem with the results of the present study, the conclusion that autonomy should not be used as a definitional element of collaboration is supported.

The systems framework literature offers some resolution to this conundrum concerning the organizational-type dimensions of trust, shared perspectives and autonomy. The early attempts by Ring and Van de Ven (1994) and more recently of Ansel and Gash (2007) and Emerson et al. (2012) explicitly conceive of processes such as trust building and developing shared perspectives that in turn affect the "institutional arrangements" (Emerson et al., 2012, p. 7) or the "institutional design" (Ansel & Gash, 2007, p. 550). These frameworks allow for the natural variation and development of trust, which then affects the collective decision making structures, thus mitigating the impact of organizational autonomy of participants. In other words, in random sample of collaborations in different stages their life-cycle, one would expect to find trust and shared perspectives at different levels, as specified by the cyclical feedback loops that are the "engine" of many systems frameworks.

What of the other interaction states of cooperation and coordination? The cluster analysis results found no interaction state that could clearly be identified as either. While conceptualization of collaboration is relatively stable in the literature, which identifies it by the presence of collective decision making structures and processes, coordination is less clear. There several approaches encountered. The first defines coordination as a formalized state of interaction, but one in which the collective decision making occurs either between the senior leadership of participating organizations or in a centralized group of actors in the interaction. This is the approach adopted in the GIIA, which was influenced by McNamara (2008, 2012). The second approach maps level of interaction with the hierarchical level of participation in the organization: Carrasco (2009) for example, considers cooperation as occurring between working level staff, coordination occurring at the level of team or business unit, and collaboration occurring between leadership. Finally, the third approach is as a “continuum,” in which various elements gradually emerge such as consensus decision making (D'Amour et al., 2008) or collective leadership (Woodland & Hutton, 2012), putting coordination somewhere in the middle of these continuums.

In terms of defining coordination, these approaches are clearly incompatible. A similar problem occurs also for cooperation, although less so given that cooperation is identified by an absence of formalized agreement between organizations. An approach taken almost two decades ago by Konrad (1996) may offer a solution. Konrad puts cooperation and coordination together in the same category on a continuum of “intensity of integration.” While the continuum has five levels, they are labeled by a higher category of either “informal” or “formal,” where cooperation and coordination are informal, collaboration lies at the boundary of informal and formal and then “integration” is at the higher end of formal. This is similar to the results of the cluster analysis. The clusters observed are either relatively formalized in terms of the interorganizational-type dimension, or not. Thus a key question is – do highly refined gradations of interorganizational-type dimensions across interaction states yield any significant explanatory power? This question can only be answered with additional empirical research; however, the exploratory results in this study show that the general variation in organizational-type dimensions is more important in determining outcomes rather than defining interaction states.

Interorganizational Interaction Arrays

Some key conclusions can be drawn regarding the nature and structure of interorganizational arrays in general. First, the idea of a continuum of interaction is not well supported. The literature analysis shows a general lack of consistency in how interaction states are defined, and the empirical analysis demonstrates that organizational- and contextual-type dimensions are neither empirically nor logically constrained by interaction states. Only interorganizational-type dimensions guarantee a differentiation between states. Thus the evidence supports a radical restructuring of the array concept moving away from the idea of a continuum of interaction.

The second conclusion concerns the utility of typologies. While typologies and arrays are useful for exploratory research, organizing concepts, and introducing new students to a subject, without a logical constraint on the possible numbers of combinations of dimensions, it is easy to see how the empirical utility of arrays is limited. In the case of this research, the array used for clustering analysis has ten dimensions each with three values. Thus there are 3^{10} or 59,049 possible combinations of cells, making it likely that the neat gradations of cooperation, coordination or collaboration are unlikely to be found in their “pure” states. This is important because without the ability to clearly identify an interaction state as “cooperation” or “coordination” versus something else, it is not possible to investigate meaningful research problems such as determining which is more effective—cooperation or coordination? While in the research sample, collaboration is the most prevalent state overall, there is a mixture of other states, making it challenging to clearly identify cooperation or coordination. The tentative conclusion is that it is not meaningful to distinguish between them.

This result is foreshadowed in the very nature of the systems-based frameworks. Given that collaboration is something "special"—identified only by the presence of emergent collective decision structures, the majority of systems frameworks are called "collaboration" frameworks. While some scholars use the term "cooperation" in their frameworks, close inspection reveals that they are actually referring to collaboration.

A similar situation was encountered in the policy process literature. Initially, scholars created typologies of the policy process, dividing it up into discrete stages. Many attempts to confirm empirically these typologies and stage-models failed (Smith & Larimer, 2009). The main reasons for failure were that the categories (i.e. dimensions) were rarely mutually exclusive given the complexity of the systems that the typologies attempted to describe, dynamic processes were not accounted for, and therefore the typologies as a whole lacked predictive utility (McCool, 1995). Subsequently, scholars went on to create systems-based frameworks that had better predictive utility and better captured the complexities of the system (Hill & Hupe, 2009; Sabatier & Jenkins-Smith, 1993).

The overall conclusion emerging from this analysis is that GIIA—and the general approach of interorganizational interaction arrays—are not supported overall; systems-based frameworks are a better approach to representing interorganizational interaction such as collaboration both as an entire system and a distinct process. "Lower" levels of interaction such as cooperation or coordination—or whatever term is chosen—could either represent collaborations in the process of formation, or interorganizational states where the contextual factors do not warrant the creation of collaboration, such as low interdependence. The cluster analysis results do not show any practical significance in differences between these lower level states.

The array research should not be abandoned completely, however. The operationalization of each dimension in the GIIA and the survey instrument are useful contributions to the literature. While some dimensions were problematic, such as the role of a single organization (interdependence) dimension, others showed reasonable performance, such as the trust and autonomy, adding to the cumulative knowledge in the discipline by refining the Thomson (2001) and Mattessich et al. (2001) operationalizations. The use of the original Thomson (2001) outcome variables also adds to the cumulative knowledge by showing that, at least, these outcome variables are relevant to distinguishing between interaction states and have a strong relationship to trust.

Defining research samples in interorganizational research

This research explicitly identifies an interorganizational-organizational unit of analysis, with the limitation that each data point in the sample corresponds to only one interorganizational-organizational dyad. The implications of this choice, expressed in table 3-1 in chapter three, have received little attention in the literature, both in terms of the effect on research results and sampling methodology. The discussion in chapter three points out a critical, but unexplored point—the possibility that different organizations participating in an interaction may experience or be involved in the process with differing levels of commitment and intensity. Putting aside for a moment the fact that the continuum of interaction language should be discarded in the previous sections, a situation might be encountered in which organization A is at level of collaboration, whereas organization B is only cooperating with the group. In this situation how should the collective interorganizational unit be described?

In the case of collaboration, the answer may be easy: once a collective decision making structure is established, different organizations can participate with differing levels of commitments and risks, but the whole interorganizational unit can still meaningfully be called "collaboration." In fact, at the time of writing, the author is currently involved in a collaboration in which a memorandum of understanding written between organizations allows for participation with differing levels of commitment. Findings from the network literature suggest that organizations with stronger ties to a collective unit have more influence on the development of trust-building processes than organizations with weaker ties, but that the influence of weakly tied organizations cannot not be ignored as they tend to bring in new information to the interaction (Brass et al., 2004; Granovetter, 1973; Provan & Lemaire, 2012). In the case of informal interorganizational interactions without collective decision making structures or formalized agreement, it is more challenging to assess how different levels of commitments can be described or understand their significance.

This short discussion highlights the importance of correctly defining—and consistently maintaining—the unit of analysis in any study. Depending on whether an organization is strongly or weakly tied to a collective group, or whether the interorganizational group can be considered collectively as "collaboration" makes a difference. If the research question focuses on strength of ties, sampling an entire interorganizational unit is inappropriate as the importance of each tie is averaged out in the group. Yet if the research question focuses on the properties of the collective as a whole, then selecting only one organization as representative of the collective could bias findings depending on how strongly the sampled organization was connected.

Practitioner Implications

Interorganizational interactions are now commonplace in the landscape of contemporary governance and public administration from national homeland security initiatives (Hocevar, Jansen, & Thomas, 2011) to local ecosystem restoration projects (Morris et al., 2013). Many policy areas see interorganizational interaction mandated by either law or department policy (Brummel, 2010; Rodríguez et al., 2007). Besides addressing the challenging theoretical issues in understanding interorganizational interaction, there are several policy and practitioner areas that are affected by this results of this research.

The first area concerns the practice of conducting evaluations of interorganizational interactions. Often, grant allocations to nonprofits are contingent upon forming community partnerships, and the growth in evaluation of interorganizational interaction has been driven in part by the requirement to conduct program evaluations for donors (Frey et al., 2006). Others also worry that the view that collaboration is a "cure-all" is going unfounded and unchallenged in organizational policy (Conley & Margaret, 2003). Based on these concerns and factors, a growing body of practitioner-orientated literature is developing various frameworks to evaluate interorganizational interactions, most notably the "strategic alliance formative assessment rubric" (Gajda, 2004), the "level of community linkage" (Cross et al., 2009), the "level of organizational integration rubric" (Woodland & Hutton, 2012), and most recently the "collaboration assessment tool" (Marek, Brock, & Savla, 2015)

With the exception of Marek et al. (2015), these evaluation approaches incorporate interorganizational arrays coupled with a continuum of interaction assumption. From the commentary available in the cited articles, the frameworks appear to be used as one aspect of a mixed-methods approach and as a discussion tool for organizational leadership, rather than for quantitative survey analysis. Nevertheless, given the results of the present study concerning the limitations of the continuum of interaction concept, a meta-evaluation of the evaluation templates is suggested, as program evaluations using the templates may be going to unnecessary levels of detail. Furthermore, given the sampling considerations discussed above, there is a danger of over- or under-emphasizing certain features of the interorganizational interaction, depending on the sampling strategy used. This concern is acknowledged by Cross et al. (2009), and the approach taken by Marek et al. (2015) actually abandons the continuum concept and adopts a latent factor model.

The second practitioner implication concerns the requirements for collaboration set out in policy mandates, and the steps organizations take to improve their capacity to collaborate. In terms of policy mandates, policy makers would benefit from a more refined understanding of how interorganizational interaction functions, especially when it is required for grant allocation. Nonprofit and public managers on the receiving end of federal grants, however, have observed that mandates often do not allow sufficient flexibility (B. L. Lewis, Boulahanis, & Matheny, 2009) or run counter to local interests (Conley & Margaret, 2003). An evaluation conducted of federal homeless assistance grants that required local community collaboration, for example, encountered a wide range of interorganizational interactions (HUD, 2002). While benefits were observed, attribution to the level of interorganizational interaction was not possible.

In terms of developing organizational collaborative capacity, a growing body of literature is developing frameworks to help organizations plan for future required collaboration. As an example, the lack of ability of organizations to collaborate was identified as a failure in the responses to Hurricane Katrina and other disasters. Since then, emergency management departments are investing in strategies for developing interorganizational collaborative capacity (R. D. Hall, 2011). A common framework in this discipline is that of Hocevar et al. (2011), which suffers from many of the problems already identified in this thesis, including mixing contextual dimensions and assuming levels of interaction. Thus, before this and other framework filter widely into the emergency management literature, further investigations are warranted on the applicability and relevance of levels of interaction to the development of collaborative capacity.

Finally, a general implication for managers and leaders of interorganizational interactions is the focus on the importance of trust and shared perspectives in successful outcomes. The results of this research indicate that trust is the critical factor in higher perceived outcomes. There is a tendency for organizations to emphasize “technocratic” solutions to problems (Williams & Mengistu, 2015), yet the results of this thesis suggest that above all else, managers and leaders should emphasize developing trusting relationships rather than—or at least in addition to—bureaucratic solutions and formalized policies.

Study Limitations

While conceived as exploratory, the results and conclusions of this research should be interpreted in the light of several limitations. First, the research was conducted with the explicit assumptions of rational open systems organizational theory-namely that interorganizational interactions can be described meaningfully by “objective” structures that exist. Yet there are several other possible research perspectives that could affect the interpretations. A natural open systems approach might emphasize more the importance of dialogue, perspective and relationships, rather than formalization, decision making structure and information sharing mechanisms. As noted in chapter two, however, theoretical perspectives are often suited to certain contexts, and perhaps the rational approach is better suited to the governmental-based research sample.

Nevertheless, care is required when interpreting the current results using other theoretical lenses with different assumptions. Gray’s (1985, 1989) work on collaboration, for example, drew heavily on conflict resolution and stakeholder theory as the collaborations she studied were mainly between local community groups in conflicted situations. Thomson (2001), on the other hand, drew her collaboration framework from a nationwide sample of a national nonprofit organization. An example of why this is important is illustrated by the voluntary / mandated dimension. The significance of a “mandated” collaboration is probably more for the samples used by Thomson’s and Gray’s original research, than the significance for the military-governmental sample in this study, in which organizational mandates are commonplace. In other words, mandates to collaborate may not affect the intrinsic process of collaboration between military organizations, as much as it might between local nonprofit organizations. Other scholars have noted that actor-type makes a difference. Moore and Koontz (2003), for example, found different variants of collaboration depending on whether government agencies or local citizen groups were involved.

This leads to a general point about the research sample. Results cannot be generalized to other research contexts (i.e. nonprofit or local community collaborations) as the research was performed primarily on military, government, and international organizations, which all display a similar characteristics of large bureaucracies with highly formalized decision making. As Phillips (2000, p. 32) notes: "the social processes that constitute a collaboration – the negotiation of membership, definition or issues and standardization of practices – will be enacted in terms and concepts drawn from the institutional fields in which members are located."

Finally, several methodological limitations should be noted. The survey prioritized quantity of dimensions over rigor in sampling each one. The approaches by Thomson (2001) and Marek et al. (2015) used confirmatory factor analysis approaches for fewer dimensions with more survey items, thus the error in each dimension is likely reduced. A limitation with this thesis research is that each dimension was only sampled by one or two survey questions. However, in essence, many questions asked simply for the presence or absence of certain features. Another methodological limitation concerns the level of analysis of the interorganizational field. While appropriate for the main research questions in the study, this level omits important individual level factors. One such factor is the importance of special individuals in collaborations and networks—boundary spanners and managers—who have been shown to have major impacts (Meier, 2002; Williams, 2010).

Another limitation is the way in which time is considered. Gray (1989), for example, recognized several distinct stages of collaboration in a life cycle. In this research, the survey did not take into account how interorganizational interactions might change with time and it is not known from the data at which stage of the life cycle sampled interactions were located. A much needed subject for further research, however, is rigorous longitudinal studies of long-term collaborations.

Future research

This research primarily examined the extent to which clusters of interorganizational interactions are distinguished by certain dimensions, in order to arrive at conclusions about how best to define clusters. Thus the independent variable was generally cluster membership. Given the data set obtained in this research, however, a series of analyses are now possible that could examine relationships between different dimensions across the whole sample, or across different clusters or interorganizational interaction states. The most theoretically important subjects are as follows.

Replication Studies

The results obtained in this research are inherently limited by the choice of sample, which was predominately composed of international and national defense organizations. Thus results are not generalizable to other contexts. Further research using other samples and contexts is required to increase the validity of findings. Another variety of replication study involves re-testing published findings using the data set taken in this research, thus contributing to cumulative knowledge in the field.

Construct Development

Many constructs in the GIIA still require further refinement, ideally employing confirmatory factor analysis approach with a greater number of items for each dimension. Several dimensions, notably the “role of a single organization,” which captured the extent of interdependence needs refining. This is quite a complex theoretical issue, as the nature of interdependence has its source in many contextual and organizational factors (Gray, 1989).

The findings from this study showed that within the same type of interaction, the values of organizational-type dimensions could vary quite considerably. An explanation of this is provided by the systems-framework literature, which “allows” for dynamic variation of organizational commitments and perceptions within any collaboration. The constructs used in the GIIA do not assume anything about this dynamic variation; however, they merely capture a static snapshot. Hence further construct development is required to determine whether this static snapshot is appropriate for longitudinal research.

Perhaps the most intriguing result of this current study is the relationship between trust and outcomes. While trust was positively associated with interorganizational outcomes, further questions remain about specifically what processes might mediate this relationship (Chen, 2010)? Does trust act as a replacement for legal rational authority (Agranoff & McGuire, 2001)? Is trust contingent on resource interdependence (Lundin, 2007)? Likewise, many possible research questions can be examined concerning the role of organizational autonomy.

Voluntary and Mandated Interactions

A small but growing body of literature now considers “mandated” collaboration as a distinct state of interorganizational interaction, yet there is little theoretical development or empirical studies that consider specifically how mandated collaborations differ in terms of process compared to voluntary interactions. This research found more cases of mandated interactions, but this is explained by the particular nature of the study sample. In any case, further research is required. One route is to continue analysis and refinement of interorganizational interaction arrays in which “mandated collaboration” is a distinct state, as suggested by McNamara (2016). Another route is to test more directly the factors that tend to be related with mandated interactions, notably the level of formalization (Nylen, 2007).

Systems-Based Frameworks

The literature review found many systems-based frameworks describing interorganizational interaction—but particularly collaboration—that were developed in the past decade. Yet these frameworks have rarely been empirically tested. Subsequent research has used them as an organizing lens for case studies, for example, rather than testing the framework per se (Agbodzakey, 2012; Montoya, Montoya, & González, 2015). Given their prevalence and repeated citation in the public administration collaboration literature, further research is warranted on the system frameworks’ approaches to conceptualization and operationalization of interorganizational interaction.

Related to the system-based framework approach is the study of interorganizational interaction as a form of formal organization or as a network. Both approaches depend on the type, scale and intensity of interaction, yet much research from organizational science offers systems concepts to treat collaboration as an organizational-form, and likewise, less intense forms of interaction can usefully be treated as networks. As already alluded to, the time dimension in interorganizational interaction is critical and systems-based frameworks offer a useful lens through which to consider the "life-cycles" of collaborations (Williams, Merriman, & Morris, 2016).

Closing remarks

This research has examined aspects of a conventional paradigm within interorganizational theory and conducted one of the first tests of the continuum of interaction concept and its application in the interorganizational array and typology literature in public administration. While the results were negative in the sense that the continuum of interaction was not empirically observed, the power of this idea runs deep in the public administration and program evaluation literature. There is something irresistible about organizing and viewing the world in neat continuums, distinct stages or processes, and ordered boxes. The prevalence of this idea speaks to its intuitiveness and success in deconstructing highly complex systems into understandable parts. Yet in a manner similar to the "policy stages" debate, occasionally enough problematic observations about the paradigm are accumulated eventually to support their fall.

This research has cast doubt upon two notions in the conventional paradigm: the notion of continuum of interaction, and the idea that three distinct states of interaction exist called: collaboration, coordination, and cooperation. While collaboration is supported—although we could just as well call it something else—cooperation and coordination were not observed and theoretical analysis suggests that their reasons for existing are overstated. Obviously, this research is unlikely to be the final word; further conceptualization and operationalization studies are required to ensure that public administration research develops with valid, reliable and parsimonious constructs of interorganizational interaction.

REFERENCES

Ackoff, R. L. (1974). *Redesigning the future*. New York, NY: Wiley.

Adam, S., & Kriesi, H. (2007). The network approach. In P. A. Sabatier (Ed.), *Theories of the policy process* (2nd ed.). Boulder, CO: Westview Press.

Agbodzakey, J. K. (2012). Collaborative Governance of HIV Health Services Planning Councils in Broward and Palm Beach Counties of South Florida. *Public Organization Review, 12*(2), 107-126.

Agranoff, R. (2006). Inside collaborative networks: Ten lessons for public managers. *Public Administration Review, 66*, 55-65.

Agranoff, R., & McGuire, M. (2001). Big questions in public network management research. *Journal of Public Administration Research and Theory, 11*(3), 295-326.

Agranoff, R., & McGuire, M. (2003). *Collaborative public management: New strategies for local governments*. Washington, DC: Georgetown University Press.

Aiken, M., Dewar, R., DiTomasa, N., Hage, J., & Zeitz, G. (1985). *Coordinating human services*. San Francisco, CA: Jossey-Bass.

Alberts, D., & Hayes, R. (2007). *Planning for complex endeavors*. Washington, DC: Command and Control Research Program.

Aldenderfer, M. S., & Blashfield, R. K. (1984). *Cluster analysis*. Beverly Hills, CA: Sage.

Alter, C., & Hage, J. (1993). *Organizations working together*. Newbury Park, CA: Sage.

Andersen, O., & Broegaard, E. (2012). The political economy of joint donor evaluations. *Evaluation, 18*(1), 47-59.

Anderson, P. (1999). Complexity theory and organizational science. *Organization Science, 10*(3), 216-232.

Ansel, C., & Gash, A. (2007). Collaborative governance in theory and in practice. *Journal of Public Administration, Research and Theory, 18*(4), 543-571.

Astley, W. G., & Fombrun, C. J. (1983). Collective strategy: Social ecology of organizational environments. *The Academy of Management Review, 8*(4), 576-587.

Astley, W. G., & Van de Ven, A. H. (1983). Central perspectives and debates in organization theory. *Administrative Science Quarterly, 28*(2), 245-273.

Axelrod, R. (1984). *The evolution of cooperation*. New York: Basic Books.

Aydinoglu, A. U. (2010). Scientific collaborations As complex adaptive systems. *Emergence: Complexity & Organization, 12*(4), 15-29.

Bailey, K. D. (1994). *Typologies and taxonomies: An introduction to classification techniques*. Thousand Oaks, CA: Sage.

Bardach, E. (1998). *Getting agencies to work together*. Washington, DC: Brookings Institute.

Bardach, E. (2001). Developmental dynamics: Interagency collaboration as an emergent phenomenon. *Journal of Public Administration Research and Theory, 11*(2), 149-164.

Barile, J. P., Darnell, A. J., Erickson, S. W., & Weaver, S. R. (2012). Multilevel measurement of dimensions of collaborative functioning in a network of collaboratives that promote child and family well-being. *American Journal of Community Psychology, 49*(1-2), 270-282.

Barrett, S. M., & Fudge, C. (1981). Examining the policy-action relationship. In S. M. Barrett & C. Fudge (Eds.), *Policy and action: Essays on the implementation of public policy* (pp. 3-34). London: Methuen.

Barringer, B. R., & Harrison, J. S. (2000). Walking a tightrope: Creating value through interorganizational relationships. *Journal of Management, 26*(3), 367-403.

Beck, T., & Buchanan-Smith, M. (2008). Joint evaluations coming of age? The quality and future scope of joint evaluations. In M. Herson, J. Mitchell & B. Ramalingam (Eds.), *ALNAP seventh review of humanitarian action*. London, United Kingdom: Overseas Development Institute.

Bedwell, W. L., Wildman, J. L., DiazGranados, D., Salazar, M., Kramer, W. S., & Salas, E. (2012). Collaboration at work: An integrative multilevel conceptualization. *Human Resource Management Review, 22*(2), 128-145.

Bel, G., Fageda, X., & Mur, M. (2014). Does cooperation reduce service delivery costs? Evidence from residential solid waste services. *Journal of Public Administration Research and Theory, 24*(1), 85-107.

Ben-Ner, A. (2002). The shifting boundaries of the mixed economy and the future of the nonprofit sector. *Annals of Public and Cooperative Economics, 73*(1), 5-40.

Benson, J. K. (1975). The interorganizational network as a political economy. *Administrative Science Quarterly, 75*(20), 229-249.

Bevir, M. (2010). *Democratic governance*. Princeton, NJ: Princeton University Press.

Blomquist, W. (2007). The policy process and large-N comparative studies. In P. A. Sabatier (Ed.), *Theories of the policy process* (2nd ed., pp. 261-289). Boulder, CO: Westview.

Boote, D. N., & Beile, P. (2005). Scholars before researchers: On the centrality of the dissertation literature review in research preparation. *Educational Researcher, 34*(6), 3-15.

Borgatti, S. P., & Cross, R. (2003). A relational view of information seeking and learning in social networks. *Management Science, 49*(4), 432-445.

Borgatti, S. P., & Foster, P. C. (2003). The network paradigm in organizational research: A review and typology. *Journal of Management*, *29*(6), 991-1013.

Börzel, T. A. (1998). Organizing Babylon: On the different conceptions of policy networks. *Public Administration, 76*(2), 253-273.

Bovaird, T. (2008). Emergent Strategic Management and Planning Mechanisms in Complex Adaptive Systems. *Public Management Review, 10*(3), 319-340.

Brass, D. J., Galaskiewicz, J., Greve, H. R., & Wenpin, T. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal*, *47*(6), 795-817.

Brock, K. A., & Doucette, W. R. (2004). Collaborative working relationships between pharmacists and physicians: an exploratory study. *Journal of the American Pharmacists Association, 44*(3), 358-365.

Bronstein, L. R. (2003). A model for interdisciplinary collaboration. *Social work, 48*(3), 297-306.

Brown, E. C., Hawkins, J. D., Arthur, M. W., Abbott, R. D., & Van Horn, M. L. (2008). Multilevel analysis of a measure of community prevention collaboration. *American Journal of Community Psychology*, *41*(1-2), 115-126.

Brummel, R. (2010). *Burning through boundaries: Collaborative governance and wildland fire planning in the United States and New South Wales, Australia.* (Ph.D. dissertation), University of Minnesota, Minnesota.

Bryson, J., Crosby, B., & Stone, M. (2006). The design and implementation of cross-sector collaborations: Propositions from the literature. *Public Administration Review, 66*(s1), 44-55.

Buijs, J.-M. (2010). Understanding connective capacity of program management from a self-organization perspective. *Emergence: Complexity & Organization, 12*(1), 29-38.

Burns, R., & Burns, R. (2008). *Business research methods and statistics using SPSS*. Thousand Oaks, CA: Sage.

Burrell, G., & Morgan, G. (1979). *Sociological paradigms and organisational analysis: Elements of the sociology of corporate life.* London: Heinemann Educational.

Carrasco, V. (2009). *Building collaborative capacity across institutional fields: A theoretical dissertation based on a meta-analysis of existing empirical research.* (Ed.D. dissertation), The University of Texas at El Paso, Texas.

Chen, B. (2006). *When collaboration is required by public funding agencies: Formation and performance of nonprofit social service networks.* (Ph.D. dissertation), University of Southern California, Ann Arbor.

Chen, B. (2008). Assessing interorganizational networks for public service delivery: A process-perceived effectiveness framework. *Public Performance & Management Review, 31*(3), 348-363.

Chen, B. (2010). Antecedents or processes? Determinants of perceived effectiveness of interorganizational collaborations for public service delivery. *International Public Management Journal*, *13*(4), 381-407.

Chisholm, D. (1992). *Coordination without hierarchy: Informal structures in multiorganizational systems*. Berkeley: University of California Press.

Choi, B. C. K., & Pak, A. W. P. (2005) A catalog of biases in questionnaires. *Preventing Chronic Disease: Public Health Research, Practice, and Policy: Vol. 2*: Centers for Disease Control and Prevention.

Chompalov, I., Genuth, J., & Shrum, W. (2002). The organization of scientific collaborations. *Research Policy, 31*, 749-767.

Cohen, M. D., March, J. G., & Olsen, J. P. (1972). A garbage can model of organizational choice. *Administrative Science Quarterly*, *17*(1), 1-25.

Coleman, J. (1990). *Foundations of social theory*. Cambridge, MA: Belknap Press.

Conley, A., & Margaret, A. M. (2003). Evaluating collaborative natural resource management. *Society &Natural Resources, 16*(5), 371-386.

Cross, J. E., Dickmann, E., Newman-Gonchar, R., & Fagan, J. M. (2009). Using mixed-method design and network analysis to measure development of interagency collaboration. *American Journal of Evaluation, 30*(3), 310-329.

Cuijpers, M., Guenter, H., & Hussinger, K. (2011). Costs and benefits of inter-departmental innovation collaboration. *Research Policy, 40*, 565-575.

D'Amour, D., Goulet, L., Labadie, J.-F., Martín-Rodriguez, L. S., & Pineault, R. (2008). A model and typology of collaboration between professionals in healthcare organizations. *BMC health services research*, *8*, 188.

Dedrick, R. F., & Greenbaum, P. E. (2011). Multilevel confirmatory factor analysis of a scale measuring interagency collaboration of children’s mental health agencies. *Journal of Emotional and Behavioral Disorders, 19*(1), 27-40.

Dees, J., & Anderson, B. (2003). Sector-bending: Blurring lines between nonprofit and for-profit. *Society, 40*(4), 16-27.

deLeon, P. (1999). The stages approach to the policy process: What has it done? Where is it going? In P. A. Sabatier (Ed.), *Theories of the policy process* (1st ed.). Boulder, CO: Westview Press.

Diaz-Kope, L., & Miller-Stevens, K. (2015). Rethinking a typology of watershed partnerships: A governance perspective. *Public Works Management & Policy, 20*(1), 29-48.

Diehl, S. H. (2005). *Examining characteristics of collaboration through the lens of an interorganizational arrangements model: A case study of Colleagues in Caring: Regional Collaboratives for Nursing Work Force Development.* (Ed.D. dissertation Dissertation), University of Hartford, Hartford, CT.

Donahue, J. D., & Zeckhauser, R. J. (2011). *Collaborative governance: Private roles for public goals in turbulent times*. Princeton, NJ: Princeton University.

Dougherty, M. B., & Larson, E. L. (2010). The nurse-nurse collaboration scale. *The Journal of nursing administration, 40*(1), 17-25.

Dunleavy, P., & Hood, C. (1994). From old public administration to new public management. *Public Money & Management, 14*(3), 9-16.

Dunsire, A. (1995). Administrative theory in the 1980s: A viewpoint. *Public Administration, 73*(1), 17-40.

Easton, D. (1957). An approach to the analysis of political systems. *World Politics, 9*(3), 383-400.

Edmondson, B. J. (2006). *Factors that contributed to the longevity of a Coordinated School Health Program in a northeastern state.* (Ed.D. Dissertation), University of Hartford, Hartford, CT.

Emerson, K., Nabatchi, T., & Balogh, S. (2012). An integrative framework for collaborative governance. *Journal of Public Administration Research and Theory, 22*(1), 1-29.

Emery, F. E., & Trist, E. (1965). The causal texture of organizational environments. *Human Relations, 18*(1), 21-32.

Engestrom, Y. (2005). Knotworking to create collaborative intentionality capital in fluid organizational fields. In M. M. Beyerlein, S. T. Beyerlein & F. A. Kennedy (Eds.), *Collaborative capital: Creating intangible value*. Amsterdam: Elsevier.

Everitt, B. S., Landau, S., Lesse, M., & Stahl, D. (2011). *Cluster analysis* (5th ed.). Chichester, UK: John Wiley & Sons, Ltd.

Fagan, P. (1997). *Collective efficiency and collaboration: A case study of a comunity-based partnership.* (Ph.D. dissertation), Texas A&M University, College Station, TX.

Fay, B. (1975). *Social theory and political practice*. Winchester, MA: Unwin Hyman.

Fayol, H. (1949). *General and industrial management*. London, UK: Pittman.

Feigenbaum, H., Hening, J., & Hamnett, C. (1998). *Shrinking the state: The polical underpinnings of privatization*. New York, NY: Cambridge University Press.

Field, A. (2013). *Discovering statistics using IBM SPSS Statistics* (4th ed.). Thousand Oaks, CA: Sage.

Fisher, F., & Forester, J. (1993). *The argumentative turn in policy analysis and planning*. Durham, NC: Duke University Press.

Fisher, R., Ury, W., & Patton, B. (1991). *Getting to yes: Negotiating agreement without giving in*. New York, NY: Penguin Books.

Fisher, R. J. (1990). *The social psychology of intergroup and international conflict resolution*. New York, NY: Springer-Verlag Publishing.

Fleishman, R. (2009). To participate or not to participate? Incentives and obstacles for collaboration. In R. O'Leary & L. B. Bingham (Eds.), *The collaborative public manager: New ideas for the twenty-first century* (pp. 31-52). Washington, DC: Georgetown University Press.

Fowler, F. J. (2009). *Survey research methods* (4th ed.). Thousand Oaks, CA: Sage.

Franklin, S., & Walker, C. (2003). *Survey methods and practices*. Ottawa, Canada: Statistics Canada.

Freeman, L. C., White, D., & Romney, A. K. (1992). *Research methods in social network analysis*. New Brunswick, NJ: Transaction Books.

Frey, B. B., Lohmeier, J. H., Lee, S. W., & Tollefson, N. (2006). Measuring Collaboration Among Grant Partners. *American Journal of Evaluation, 27*(3), 383-392.

Gajda, R. (2004). Utilizing collaboration theory to evaluate strategic alliances. *American Journal of Evaluation, 25*(1), 65-77.

Gajda, R., & Koliba, C. (2007). Evaluating the imperative of intraorganizational collaboration. *American Journal of Evaluation, 28*(1), 26-44.

Galaskiewicz, J. (1985). Interorganizational relations. *Annual Review of Sociology, 11*(1), 281-304.

Galvan, J. L. (2006). *Writing literature reviews: A guide for students of the social and behavioural sciences* (3rd ed.). Glendale, CA: Pyrczak.

Garson, G. D. (2012). *Discriminant function analysis*. Asheboro, NC: Statistical Associates Publishing.

Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. Berkeley, CA: University of California.

Gioia, D. A., & Pitre, E. (1990). Multiparadigm perspectives on theory building. *The Academy of Management Review, 15*(4), 584-602.

Goertz, G. (2006). *Social science concepts: A user's guide*. Princeton, NJ: Princeton University Press.

Goggin, M. L. (1986). The" too few cases/too many variables" problem in implementation research. *Political Research Quarterly, 39*(2), 328-347.

Goggin, M. L., Bowman, A., Lester, J. P., & O'Toole, L. J. (1990). *Implementation theory: Toward a third generation*. Glenview, IL: Scott Foresman.

Goldsmith, S., & Kettl, D. F. (Eds.). (2009). *Unlocking the power of networks: Key to high performance government*. Washington, DC: Brookings Institution.

Graddy, E. A., & Chen, B. (2009). Partner selection and the effectiveness of interorganizational collaborations. In R. O'Leary & L. B. Bingham (Eds.), *The collaborative public manager: New ideas for the twenty-first century* (pp. 53-70). Washington, DC: Georgetown University Press.

Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, 1360-1380.

Gray, B. (1985). Conditions facilitating interorganizational collaboration. *Human Relations, 38*(10), 911-936.

Gray, B. (1989). *Collaborating: Finding common ground for multiparty problems*. San Francisco, CA: Jossey-Bass, Inc.

Gray, B., & Wood, D. J. (1991). Collaborative Alliances: Moving from Practice to Theory. *The Journal of Applied Behavioral Science, 27*(1), 3-22.

Guba, E. G., & Lincoln, Y., S. (1989). *Fourth generation evaluation*. Newbury Park, CA: Sage.

Gueguen, G., Pellegrin-Boucher, E., & Torres, O. (2006). *Between cooperation and competition: The benefits of collective strategy within ecosystems.* . Paper presented at the European Institute for Advanced Studies in Management: 2nd Workshop on Coopetition Strategy, Milan, Italy.

Gulati, R., Lavie, D., & Madhavan, R. R. (2011). How do networks matter? The performance effects of interorganizational networks. *Research in Organizational Behavior, 31*, 207-224.

Gulick, L. (1937). Notes on the theory of organization. In L. Gulick & L. Urwick (Eds.), *Papers on the science of administration* (pp. 1-46). New York, NY: Institute of Public Administration.

Guo, C., & Acar, M. (2005). Understanding collaboration among nonprofit organizations: Combining resource dependency, institutional, and network perspectives. *Nonprofit and Voluntary Sector Quarterly, 34*(3), 340-361.

Habermas, J. (1981). *The theory of communicative action: Reason and the rationalization of society*. Boston, MA: Beacon Press.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis* (6th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Hall, R. D. (2011). *Smart practices in building interorganizational collaborative capacity to strengthen the Florida comprehensive disaster management enterprise.* (MA), Naval Postgraduate School, Monterey, CA.

Hall, R. H., Clark, J. P., Giordano, P. C., Johnson, P. V., & Roekel, M. V. (1977). Patterns of interorganizational relationships. *Administrative Science Quarterly, 22*(3), 457-474.

Hall, T. E., & O'Toole, L. J. (2004). Shaping formal networks through the regulatory process. *Administration & Society, 36*(2), 186-207.

Hall, T. E., & O’Toole, L. J. (2000). Structures for policy implementation: An analysis of national legislation, 1965-1966 and 1993-1994. *Administration & Society, 31*(6), 667-686.

Haque, M. S. (2001). The diminishing publicness of public service under the current mode of governance. *Public Administration Review, 61*(1), 65-82.

Haraoka, T., Ojima, T., Murata, C., & Hayasaka, S. (2012). Factors Influencing Collaborative Activities between Non-Professional Disaster Volunteers and Victims of Earthquake Disasters. *PLoS One, 7*(10)

Hardy, S. D., & Koontz, T. M. (2009). Rules for collaboration: Institutional analysis of group membership and levels of action in watershed partnerships. *Policy Studies Journal, 37*(3), 393-414.

Hassard, J. (1991). Multiple paradigms and organizational analysis: A case study. *Organization Studies, 12*(2), 275-299.

Head, B. W., & Alford, J. (2013). Wicked problems: Implications for public policy and management. *Administration & Society,* doi: 10.1177/0095399713481601

Heclo, H. (1978). Issue networks and the executive establishment. In A. King (Ed.), *The new American political system* (pp. 87-124). Washington, DC: American Enterprise Institute for Public Policy Research.

Heilman, J. G., Johnson, G. W., Morris, J. C., & O'Toole, L. J. (1994). Water policy networks in the United States. *Environmental Politics, 3*(4), 80-109.

Herranz, J., Jr. (2008). The multisectoral trilemma of network management. *Journal of Public Administration Research and Theory, 18*(1), 1-31.

Herranz, J., Jr. (2009). Endogenous development dynamics of multisectoral network management. *International Public Management Journal, 12*(3), 37-397.

Herranz, J., Jr. (2010a). Multilevel performance indicators for multisectoral networks and management. *American Review of Public Administration, 40*(4)

Herranz, J., Jr. (2010b). Network performance and coordination: A theoretical review and framework. *Public Performance & Management Review, 33*(3), 311-431.

Hill, M., & Hupe, P. (2009). *Implementing public policy* (2nd ed.). Thousand Oaks, CA: Sage.

Himmelman, A. (2002). Collaboration for a change: Definitions, decision-making models, roles, and collaboration process guide. Minneapolis, MN: Himmelman Consulting.

Hitt, M. A., Beamish, P. W., Jackson, S. E., & Mathieu, J. E. (2007). Building theoretical and empirical bridges across levels: Multilevel research in management. *Academy of Management Journal, 50*(6), 1385-1399.

Hjern, B., & Porter, D. O. (1981). Implementation structures: A new unit of administrative analysis. *Organization Studies, 2*(3), 211-227.

Hocevar, S. P., Jansen, E., & Thomas, G. F. (2011). Interorganizational collaboration: Addressing the challenge. *Homeland and Security Affairs*, *7*, 1-8.

Hodges, S., Ferreira, K., Mowery, D., & Novicki, E. (2013). Who's in charge here? Structures for collaborative governance in children's mental health. *Administration in Social Work, 37*(4), 418-432.

Hood, C. (1991). A public management for all seasons? *Public Administration, 69*(1), 3-19.

Hood, C. (1995). The "New Public Management" in the 1980s: variations on a theme. *Accounting, Organizations and Society, 20*(2), 93-109.

Huxham, C. (2000). The challenge of collaborative governance. *Public Management, 2*(3), 337-358.

Huxham, C. (2003). Theorizing collaboration practice. *Public Management Review, 5*(3), 401-423.

Huxham, C. (Ed.). (1996). *Creating collaborative advantage*. Thousand Oaks, CA: Sage.

Huxham, C., & Vangen, S. (2000). Ambiguity, complexity and dynamics in the membership of collaboration. *Human Relations, 53*(6), 771-806.

Huxham, C., & Vangen, S. (2005). *Managing to collaborate: The theory and practice of collaborative advantage*. Abingdon, England: Routledge.

Imperial, M. (2005). Using collaboration as a governance strategy: Lessons from six watershed management programs. *Administration and Society, 37*(3), 281-320.

Ingold, K. (2011). Network structures within policy processes: Coalitions, power, and brokerage in Swiss climate policy. *Policy Studies Journal, 39*(3), 435-459.

Innes, J. E., & Booher, D. E. (1999). Consensus building and complex adaptive systems. *Journal of the American Planning Association, 65*(4), 412-423.

Innes, J. E., & Booher, D. E. (2010). *Planning with complexity: An introduction to collaborative rationality for public policy*. New York, NY: Routledge.

Intriligator, B. A. (1994). Coordinating services for children and families: The organizational perspective. In R. Levin (Ed.), *Greater than the sum: Professionals in a comprehensive services model* (pp. 19-44). Washington, DC: ERIC Clearinghouse on Teacher Education.

Isett, K. R., Ines, A. M., LeRoux, K., & Mischen, P. A. (2011). Networks in public administration scholarship: Understanding where we are and where we need to go. *Journal of Public Administration Research and Theory, 21*(s1), 157-173.

Isett, K. R., & Provan, K. G. (2005). The evolution of dyadic interorganizational relationships in a network of publicly funded nonprofit agencies. *Journal of Public Administration Research and Theory, 15*(1), 149-165.

Ivery, J. (2008). Policy mandated collaboration. *Journal of Sociology and Social Welfare, 35*(4), 53-70.

Jennings, E. (1994). Building bridges in the intergovernmental arena: Coordinating employment and training programs in the American states. *Public Administration Review, 54*(1), 52-60.

Jennings, E., & Ewalt, J. (1998). Interorganizational coordination, administrative consolidation and policy performance. *Public Administration Review, 58*(5), 417-428.

Johnston, E., Hicks, D., Nan, N., & Auer, J. (2011). Managing the inclusion process in collaborative governance. *Journal of Public Administration Research and Theory, 21*(4)

Joumard, I., & Kongsrud, P. M. (2003). Fiscal relations across government levels. Paris, France: Organisation for Economic Cooperation and Development.

Kanter, R. M. (1994). Collaborative advantage: The art of alliances. *Harvard Business Review, 72*(4), 96-108.

Keast, R., Brown, K., & Mandell, M. P. (2007). Getting the right mix: Unpacking integration meanings and strategies. *International Public Management Journal, 10*(1), 9-33.

Kenaszchuk, C., Reeves, S., Nicholas, D., & Zwarenstein, M. (2010). Validity and reliability of a multiple-group measurement scale for interprofessional collaboration. *BMC health services research, 10*, 83.

Kettl, D. F. (1993). *Sharing power: Public governance and private markets*. Washington, DC: Brookings Institution.

Kettl, D. F. (2000). The transformation of governance: Globalization, devolution, and the role of government. *Public Administration Review, 60*(6), 488-497.

Kettl, D. F. (2002). *The transformation of governance: Public administration for twenty-first century America*. Baltimore, MD: John Hopkins University Press.

Kettl, D. F. (2003). Contingent coordination: Practical and theoretical puzzles for homeland security. *The American Review of Public Administration, 33*(3), 253-277.

Kettl, D. F. (2006). Managing boundaries in American administration: The collaboration imperative. *Public Administration Review, 66*, 10-19.

Kingdon, J. W. (1995). *Agendas, alternatives and public policies*. New York, NY: Harper Collins.

Klein, K. J., & Kozlowski, S. W. (Eds.). (2000). *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*. San Francisco, CA: Jossey-Bass.

Klein, K. J., Palmer, S. L., & Conn, A. B. (2000). Interorganizational relationships: A multilevel perspective. In K. J. Klein & S. W. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations* (pp. 267-307). San Francisco, CA: Jossey-Bass.

Klijn, E., Edelenbos, J., & Steijn, B. (2010). Trust in governance networks: Its impacts on outcomes. *Administration & Society*, *42*(2)

Kocoglu, I., Imamoglu, S., & Ince, H. (2011). Inter-organizational relationships in enhancing information sharing: The role of trust and commitment. *The Business Review, Cambridge*, *18*(2)

Konrad, E. L. (1996). A multidimensional framework for conceptualising human services integration initiatives. *New Directions for Evaluation*, *69*, 5-19.

Kooiman, J. (1999). Socio-political governance: Overview, reflections and design. *Public Management*, *1*(1), 67-92.

Koppenjan, J., & Klijn, E. (2004). *Managing uncertainties in networks*. London: Routledge.

Kriesberg, L. (2007). *Constructive conflicts: From escalation to resolution*. Lanham, MD: Rowman and Littlefield.

Lai, A. Y.-H. (2012). Towards a collaborative cross-border disaster management: A comparative analysis of voluntary organizations in Taiwan and Singapore. *Journal of Comparative Policy Analysis, 14*(3), 217-233.

Laumann, E. O., Marsden, P. V., & Prensky, D. (1992). The boundary specification problem in network analysis. In L. C. Freeman, D. White & A. K. Romney (Eds.), *Research methods in social network analysis* (pp. 61-87). New Brunswick, NJ: Transaction.

Lawrence, P. R., & Lorsch, J. W. (1967). *Organization and environment: Managing differentiation and integration*. Boston, MA: Harvard University.

Lewis, B. L., Boulahanis, J., & Matheny, E. (2009). Joined-up governance: Mandated collaboration in US homeless services. *International Journal of Public Sector Management, 22*(5), 392-399.

Lewis, C., & Marsh, D. (2012). Network governance and public participation in policy ‐ making: Federal community cabinets in Australia. *Australian Journal of Public Administration, 71*(1), 6-19.

Liao, C. H., & Yen, H. R. (2012). Quantifying the degree of research collaboration: A comparative study of collaborative measures. *Journal of Informetrics, 6,* 27-33.

Lincoln, Y., S (Ed.). (1985). *Organizational theory and inquiry: The paradigm revolution*. Newbury Park, CA: Sage.

Lindblom, C. E., & Woodhouse, E. J. (1993). *The policy-making process*. Upper Saddle River, NJ: Prentice Hall.

Liu, P., & Li, Z. (2012). Task complexity: A review and conceptualization framework. *International Journal of Industrial Ergonomics, 42*(6), 553-568.

Logsdon, J. M. (1991). Interests and Interdependence in the Formation of Social Problem-Solving Collaborations. *The Journal of Applied Behavioral Science, 27*(1), 23-37.

Loughlin, J. (2004). The "transformation" of governance: New directions in policy and politics. *Australian Journal of Politics & History, 50*(1), 8-22.

Lundin, M. (2007). Explaining cooperation: How resource interdependence, goal congruence, and trust affect joint actions in policy implementation. *Journal of Public Administration Research and Theory, 17*(4), 651-672.

Madlberger, M., & Roztocki, N. (2009). *Digital cross-organizational collaboration: Towards a preliminary framework.* Paper presented at the Fifteenth Americas Conference on Information Systems, San Francisco, CA.

Mandell, M. P. (1999). The impact of collaborative efforts: Changing the face of public policy through networks and network structures. *Policy Studies Review, 16*(1), 4-17.

Mandell, M. P., & Steelman, T. A. (2003). Understanding what can be accomplisehd through interorganizational innovations. *Public Management Review, 5*(2), 197-224.

March, J. G., & Olsen, J. P. (2010). *Rediscovering institutions: The organizational basis of politics*. New York, NY: The Free Press.

Marek, L. I., Brock, D.-J. P., & Savla, J. (2015). Evaluating collaboration for effectiveness conceptualization and measurement. *American Journal of Evaluation, 36*(1), 67-85.

Margerum, R. D. (2008). A typology of collaboration efforts in environment management. *Environmental Management, 41*(4), 487-500.

Matland, R. E. (1995). Synthesizing the implementation literature: The Ambiguity-Conflict Model of policy implementation. *Journal of Public Administration Research and Theory, 5*(2), 145-174.

Mattessich, P. W., Murray-Close, M., & Monsay, B. R. (2001). *Collaboration: What makes it work* (2nd ed.). St. Paul, MN: Fieldstone Alliance.

Mayer, M., & Kenter, R. (2016). The prevailing elements of public-sector collaboration. In J. C. Morris & K. Miller-Stevens (Eds.), *Advancing collaboration theory: Models, typologies, and evidence*. New York, NY: Routledge.

McCool, D. C. (Ed.). (1995). *Public policy theories, models and concepts: An anthology*. Englewood Cliffs, NJ: Prentice-Hall.

McGuire, M. (2006). Collaborative public management: Assessing what we know and how we know it. *Public Administration Review, 66*(s1), 33-43.

McGuire, M., & Agranoff, R. (2011). The limitations of public management networks. *Public Administration, 89*(2), 265-284.

McNamara, M. (2008). *Exploring interactions during multiorganizational policy implementation: A case study of the Virginia Coastal Zone Management program.* (Ph.D. dissertation), Old Dominion University, Norfolk, VA.

McNamara, M. (2012). Starting to untangle the web of cooperation, coordination, and collaboration: A framework for public managers. *International Journal of Public Administration, 35*(6), 389-401.

McNamara, M. (2016). Unraveling the characteristics of mandated collaboration. In J. C. Morris & K. Miller-Stevens (Eds.), *Advancing collaboration theory: Models, typologies, and evidence*. New York, NY: Routledge.

Milward, H. B., & Provan, K. G. (2000). Governing the hollow state. *Journal of Public Administration, Research and Theory, 10*(2), 359-379.

Milward, H. B., & Provan, K. G. (2006). *A manager's guide to choosing and using collaborative networks*. Washington, DC: IBM Center for the Business of Government.

Miner, J. B. (2005). *Organizational behavior 1: Essential theories of motivation and leadership*. Armonk, NY: M. E. Sharpe.

Montoya, L., Montoya, I., & González, O. S. (2015). Lessons from collaborative governance and sociobiology theories for reinforcing sustained cooperation: a government food security case study. *Public health*, doi: http://dx.doi.org/10.1016/j.puhe.2015.01.030

Mooi, E., & Sarstedt, M. (2011). *A concise guide to market research*. New York, NY: Springer.

Moore, E. A., & Koontz, T. M. (2003). Research note a typology of collaborative watershed groups: citizen-based, agency-based, and mixed partnerships. *Society &Natural Resources, 16*(5), 451-460.

Morris, J. C., Gibson, W. A., Leavitt, W. M., & Jones, S. C. (2013). *The case for grassroots collaboration: Social capital and ecosystem restoration at the local level*. Lantham, MD: Lexington.

Morris, J. C., & Miller-Stevens, K. (2016a). The state of knowledge in collaboration. In J. C. Morris & K. Miller-Stevens (Eds.), *Advancing collaboration theory: Models, typologies, and evidence*. New York, NY: Routledge.

Morris, J. C., & Miller-Stevens, K. (Eds.). (2016b). *Advancing collaboration theory: Models, typologies, and evidence*. New York, NY: Routledge.

Morris, J. C., Morris, E., & Jones, D. (2007). Reaching for the philosopher's stone: Contingent coordination and the military's response to hurricane Katrina. *Public Administration Review, 67*, 94-106.

Nair, D. M., Fitzpatrick, J. J., McNulty, R., Click, E. R., & Glembocki, M. M. (2012). Frequency of nurse-physician collaborative behaviors in an acute care hospital. *Journal of Interprofessional Care, 26*(2), 115-120.

NATO. (2006). *SAS-050 - Final Report: Exploring new command and control concepts and capabilities*. Paris, France: NATO Science and Technology Organisation.

NATO. (2010). NATO networked enabled capability command and control maturity model. Washington, DC: US OSD, Command and Control Research Program.

Neuman, L. W. (2003). *Social research methods: Qualitative and quantitative approaches* (5th ed.). Boston, MA: Allyn and Bacon.

Nohria, N., & Eccles, R. G. (Eds.). (1992). *Networks and organizations*. Boston, MA: Harvard.

Nylen, U. (2007). Interagency collaboration in human services: Impact of formalization and intensity on effectiveness. *Public Administration, 85*(1), 143-166.

O'Leary, R., & Bingham, L. B. (Eds.). (2009). *The collaborative public manager*. Washington, DC: Georgetown University Press.

O'Toole, L. J. (1986). Policy recommendations for multi-actor implementation: An assessment from the field. *Journal of Public Policy, 6*(2), 181-210.

O'Toole, L. J. (1997). Treating networks seriously: Practical and research-based agendas in public administration. *Public Administration Review, 57*(1), 45-52.

O'Toole, L. J. (2000). Research on policy implementation: Assessment and prospects. *Journal of Public Administration Research and Theory, 10*(2), 263-288.

OECD. (2005). Joint evaluations: Recent experiences, lessons learned and options for the future *DAC Evaluation Network Working Paper*. Paris: Organization for Economic Cooperation and Development.

Olsen, J. P. (2007). Understanding institutions and logics of appropriateness: Introductory essay. Centre for European Studies: University of Oslo.

Olsen, M. (1965). *The logic of collective action: Public goods and the theory of groups*. Cambridge, MA: Harvard.

Orchard, C. A., King, G. A., Khalili, H., & Bezzina, M. B. (2012). Assessment of Interprofessional Team Collaboration Scale (AITCS): Development and Testing of the Instrument. *Journal of Continuing Education in the Health Professions, 32*(1), 58-67.

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

Ostrom, E. (1998). A behavioral approach to the rational choice theory of collective action. *American Political Science Review, 92*(1), 1-22.

Ostrom, E. (2005). *Understanding institutional diversity*. Princeton, NJ: Princeton University.

Ostrom, E. (2007). Instituitional rational choice: An assessment of the institutional analysis and development framework. In P. A. Sabatier (Ed.), *Theories of the policy process* (2nd ed., pp. 21-64). Boulder, CO: Westview.

Parmigiani, A., & Rivera-Santos, M. (2011). Clearing a path through the forest: A meta-review of interorganizational relationships. *Journal of Management, 37*(4), 1108-1136.

Parsons, T. (1960). *Structure and process in modern societies*. Glencoe, IL: Free Press.

Perry, J. L., & Thomson, A. M. (2004). *Civic service: What difference does it make?* Armonk, NY: M.E. Sharpe.

Pfeffer, J. (1982). *Organizations and organization theory*. Marshfield, MA: Pitman.

Pfeffer, J. (1997). *New directions for organization theory: Problems and prospects*. New York, NY: Oxford University.

Pollitt, C., & Hupe, P. (2011). Talking About Government The role of magic concepts. *Public Management Review, 13*(5), 641-658.

Provan, K. G., Fish, A., & Sydow, J. (2007). Interorganizational networks at the network level: A review of the empirical literature on whole networks. *Journal of management, 33*(3), 479-516.

Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management and effectiveness. *Journal of Public Administration, Research and Theory, 18*(2), 229-252.

Provan, K. G., & Lemaire, R. H. (2012). Core concepts and key ideas for understanding public sector organizational networks: Using research to inform scholarship and practice. *Public Administration Review, 72*(5), 638-648.

Provan, K. G., & Milward, H. B. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative science quarterly, 40*(1), 1-33.

Putnam, R. (2000). *Bowling alone: The collapse and revival of American community*. New York, NY: Simon and Schuster.

Raadschelders, J. C. (2011). The future of the study of public administration: Embedding research object and methodology in epistemology and ontololy. *Public Administration Review, 71*(6), 916-922.

Raadschelders, J. C., & Lee, K. H. (2011). Trends in the study of public administration: Empirical and qualitative observations from Public Administration Review, 2000–2009. *Public Administration Review, 71*(1), 19-33.

Rainey, H. G. (2003). *Understanding and managing public organizations* (3rd ed.). San Francisco, CA: Jossey-Bass.

Randolph, J. (2009). A guide to writing the dissertation literature review. *Practical Assessment, Research and Evaluation, 14*(13)

Raymond, L. (2006). Cooperation without trust: Overcoming collective action barriers to endangered species protection. *Policy Studies Journal, 34*(1), 37-57.

Rethemeyer, R. K. (2005). Conceptualizing and Measuring Collaborative Networks. *Public Administration Review, 65*(1)

Rethemeyer, R. K., & Hatmaker, D. M. (2008). Network management reconsidered: An inquiry into management of network structures in public sector service provision. *Journal of Public Administration Research and Theory, 18*(4)

Ring, P. S., & Van de Ven, A. H. (1994). Development processes of cooperative interorganizational relationships. *Academy of Management Review, 19*(1), 90-118.

Ritchey, T. (2006). Problem structuring using computer-aided morphological analysis. *Journal of the Operational Research Society, 57*(7), 792-801.

Ritchey, T. (2011). *Wicked problems - social messes: Decision support modelling with morphological analysis*. Berlin: Springer.

Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences, 4*(2), 155-169.

Ritter, L. A., & Sue, V. M. (2007a). Introduction to using online surveys. *New Directions for Evaluation, 115*, 5-14.

Ritter, L. A., & Sue, V. M. (2007b). The survey questionnaire. *New Directions for Evaluation*, (115), 37-45.

Rodiguez-Pose, A., & Gill, N. (2003). The global trend towards devolution and its implications. *Environment and Planning C: Governance and Policy, 21*(3), 333-351.

Rodríguez, C., Langley, A., Béland, F., & Denis, J.-L. (2007). Governance, power, and mandated collaboration in an interorganizational network. *Administration & Society, 39*(2), 150-193.

Romesburg, C. H. (2004). *Cluster analysis for researchers*. Raleigh, NC: Lulu.

Rousseau, D. M. (1985). Issue of level in organizational research: Multi-level and cross-level perspectives. In L. L. Cummings & B. Staw (Eds.), *Research in organizational behavior* (Vol. 7, pp. 1-37). Greenwich, CT: JAI Press.

Sabatier, P. A. (1986). Top-down and bottom-up approaches to implementation research: a critical analysis and suggested synthesis. *Journal of Public Policy, 6*(1), 21-48.

Sabatier, P. A. (1988). An advocacy coalition model of policy change and the role of policy-orientated learning therein. *Policy Sciences, 21*, 129-168.

Sabatier, P. A. (Ed.). (2007). *Theories of the policy process* (2nd ed.). Boulder, CO: Westview Press.

Sabatier, P. A., & Jenkins-Smith, H. C. (1993). *Policy change and learning: An advocacy coalition approach*. Boulder, CO: Westview Press.

Salamon, L. M. (Ed.). (2002). *The tools of government: A guide to the new governance*. New York: NY: Oxford University Press.

Sanders, N. R. (2007). An empirical study of the impact of e-business technologies on organizational collaboration and performance. *Journal of Operations Management, 25*(6), 1332-1347.

Saz-Carranza, A., & Ospina, S. (2011). The behavioral dimension of governing interorganizational goal-directed networks: Managing the unity-diversity tension. *Journal of Public Administration Research and Theory, 21*(2), 327-365.

Schlager, E. (2007). A comparison of frameworks, theories, and models of the policy process. In P. A. Sabatier (Ed.), *Theories of the policy process* (2nd ed., pp. 293-319). Boulder, CO: Westport.

Schmitt, N. (1996). Uses and abuses of coefficient alpha. *Psychological Assessment, 8*(4), 350-353.

Scott, T., & Thomas, C. (2013). *The effect of collaborative partnerships on interorganizational networks*. Paper presented at the 11th Public Management Research Conference, Madison, WI.

Scott, W. R. (2003). *Organizations: Rational, natural, and open systems* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Seidl, D., Becker, K. H., & Luhmann, N. (2005). *Niklas Luhmann and organization studies*. Philidelphia, PA: Liber.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston, NY: Houghton Mifflin.

Sijtsma, K. (2009). On the use, the misuse, and the very limited usefulness of Cronbach's alpha. *Pyshometrika, 74*(1), 107-120.

Simo, G. (2009). Sustaining cross-sector collaborations: Lessons from New Orleans. *Public Organization Review, 9*(4)

Simo, G., & Bies, A. L. (2007). The role of non-profits in disaster response: An expanded model of cross-sector collaboration. *Public Administration Review, 67*(s1), 126-142.

Smith, K. B. (2002). Typologies, taxonomies, and the benefits of policy classification. *Policy Studies Journal, 30*(3), 379-395.

Smith, K. B., & Larimer, C. W. (2009). *The public policy theory primer*. Boulder, CO: Westview.

Sorens, J. (2009). The partisan logic of decentralization in Europe. *Regional & Federal Studies*, *19*(2), 255-272.

Thacher, D. (2004). Interorganizational partnerships as inchoate hierarchies: A case study of the community security initiative. *Administration & Society, 36*(1), 91-127.

Thatcher, C. (2007). *A study of an interorganizational arrangement among three regional campuses of a large land-grant university.* (Ed.D. dissertation), University of Hartford, Hartford, CT.

Thietart, R.-A., & Forgues, B. (1995). Chaos theory and organization. *Organization Science, 6*(1), 19-31.

Thomson, A. M. (2001). *Collaboration: Meaning and measurement.* (Ph.D. dissertation), Indiana University, Bloomington, IN.

Thomson, A. M., & Perry, J. L. (2006). Collaboration processes: Inside the black box. *Public Administration Review, 66*(s1), 20-32.

Thomson, A. M., Perry, J. L., & Miller, T. K. (2008). Linking collaboration processes and outcomes: Foundations for advancing empirical theory. In L. B. Bingham & R. O'Leary (Eds.), *Big ideas in collaborative public management* (pp. 97-120). Armonk, NY: M.E. Sharpe, Inc.

Thomson, A. M., Perry, J. L., & Miller, T. K. (2009). Conceptualizing and measuring collaboration. *Journal of Public Administration Research and Theory, 19*(1), 23-56.

Trist, E. (1977). A concept of organizational ecology. *Australian Journal of Management, 2*(2), 161-175.

Trist, E. (1983). Referent organizations and the development of inter-organizational domains. *Human Relations, 36*(3), 269-284.

Tsasis, P. (2009). The social processes of interorganizational collaboration and conflict in nonprofit organizations. *Nonprofit Management and Leadership, 20*(1), 5-21.

Tschirhart, M., Amezcua, A., & Anker, A. (2009). Resource sharing: How resource attributes influence sharing system choices. In R. O'Leary & L. B. Bingham (Eds.), *The collaborative public manager: New ideas for the twenty-first century*. Washington, DC: Georgetown University Press.

Ushiro, R. (2009). Nurse-Physician Collaboration Scale: development and psychometric testing. *Journal of Advanced Nursing, 65*(7), 1497-1508.

Vaccaro, A., Parente, R., & Veloso, F. M. (2010). Knowledge management tools, inter-organizational relationships, innovation and firm performance. *Technological Forecasting and Social Change, 77*(7), 1076-1089.

Van Buuren, A., & Gerrits, L. (2008). Decisions as dynamic equilibriums in erratic policy processes. *Public Management Review, 10*(3), 381-399.

Vangen, S., & Huxham, C. (2012). The tangled web: Unraveling the principle of common goals in collaborations. *Journal of Public Administration Research and Theory, 22*(4), 731-760.

Varda, D. P., Shoup, J. M. M. M., & Miller, S. M. (2012). A systematic review of collaboration and network research in the public affairs literature: Implications for public health practice and research. *American Journal of Public Health, 102*(3), 564-571.

Vibert, C. (2004). *Theories of macro-organisational behavior: A handbook of ideas and explanations*. New York: M. E. Sharpe, Inc.

Wagner, C. L., & Fernandez-Gimenez, M. (2008). Does community-based collaborative resource management increase social capital? *Society and Natural Resources, 21*(4), 324-344.

Warren, R. L. (1967). The Interorganizational field as a focus for investigation. *Administrative Science Quarterly, 12*(3), 396-419.

Weick, K. E. (1985). Sources of order in underorganized systems: Themes in recent organizational theory. In Y. Lincoln, S (Ed.), *Organizational theory and inquiry: The paradigm revolution*. Newbury Park, CA: Sage.

Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks, CA: Sage.

Whetten, D. A. (1981). Interorganizational relations: A review of the field. *The Journal of Higher Education, 52*(1), 1-28.

Williams, A. P. (2010). Implications of operationalizing a comprehensive approach: Defining what interagency interoperability really means. *The International C2 Journal, 4*(1), 1-30.

Wilson, J., Q. (1989). *Bureaucracy: What government agencies do and why they do it*. New York, NY: Basic Books.

Wittgenstein, L. (1967). *Philosophical Investigations*. Oxford, England: Basil Blackwell.

Wood, D., & Gray, B. (1991). Toward a comprehensive theory of collaboration. *Journal of Applied Behavioral Science, 27*(2), 139-162.

Woodland, R. H., & Hutton, M. S. (2012). Evaluating organizational collaborations: Suggested entry points and strategies. *American Journal of Evaluation, 33*(3), 366-383.

Wright, D. B., London, K., & Field, A. (2011). Using bootstrap estimation and the plug-in principle for clinical psychology data. *Journal of Experimental Psychopathology, 2*(2), 252-270.

Xia, W., Becerra-Fernandez, I., Gudi, A., & Rocha-Mier, J. (2011). Emergency management task complexity and knowledge-sharing strategies. *Cutter IT Journal*, *24*(1), 20-25.

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage.

Yurdusev, A. N. (1993). 'Level of analysis' and 'unit of analysis': A case for distinction. *Millennium - Journal of International Studies, 22*(1), 77-88.

APPENDIX A: SURVEY INSTRUMENT

Solicitation email to be sent to respondent sample

Dear Colleague,

My name is Andrew Williams and I am writing to request your participation in a survey that asks questions about your experiences working in a multiorganizational project. This survey forms part of my Ph.D. research, directed by Professor John Morris, in the Strome College of Business at Old Dominion University, Norfolk, Virginia, United States.

This research aims to improve understanding of how organizations work together in multiorganizational settings, how these interactions can be described, and which factors in organizations are important in making interactions work. The findings from this study will be used to produce my dissertation thesis and scholarly journal articles.

The survey should take about 15 minutes to complete. Your participation is voluntary, and you can stop taking the survey at any time. The information you provide will be anonymous and will be reported in aggregate only. No identifying information such as individual or organization names will be reported in the study.

If you would like to participate in this study, please click on the following link to complete the survey. You are welcome to forward this survey to colleagues that worked with you in a multiorganizational project, provided they **do not** work for the same organization as you.

SURVEY LINK

Please don't hesitate to contact me if you have any questions. I sincerely thank you in advance for your participation!

Andrew P. Williams
Ph.D. Candidate
School of Public Service
Strome College of Business
Old Dominion University
Norfolk, VA 23529
awill123@odu.edu

Informed Consent Statement (First Page of Survey)

Thank you for agreeing to participate in this study on multiorganizational interaction. This survey asks questions about your experience, as a representative of your organization, in a multiorganizational project in a NATO environment.

Your participation is voluntary, and you can withdraw from the study at any time. Neither your identity nor the identity of the organization in which you may work will be revealed in the publication of research results.

The nature of this study should not be invasive or embarrassing. Questions are confined to ones that address your professional situation, work experiences, and perceptions. Any information provided by you in the study will be afforded professional standards for protection of confidentiality.

By completing this study, you are consenting to the terms of this research as stated above. This notice serves as your copy of the consent agreement. You may also request a copy of these consent terms by contacting the Principal Investigators of the study.

If you have any questions about the study, please contact the Principal Investigators of the study:

Professor John C. Morris (Principal Investigator)
School of Public Service
Strome College of Business
Old Dominion University
Norfolk, VA 23529
jcmorris@odu.edu

Andrew P. Williams (Co-Principal Investigator)
Ph.D. Candidate
School of Public Service
Strome College of Business
Old Dominion University
Norfolk, VA 23529
awill123@odu.edu

If you have any questions regarding your rights as a research subject contact the Human Subjects Research Committee Chair at 757-683-4520 or gmaihafe@odu.edu.

Survey Instrument

Survey Instructions (Second Page of Survey)

Think of a program, project or task, either ongoing or occurring in the past five years, in which your organization interacted as part of a group with one or more other organizations in a NATO-related setting. This will be referred to in this survey as the "multiorganizational interaction."

Answer all the survey questions with the same multiorganizational interaction in mind, and around the same time period.

Make sure that your choice of multiorganizational interaction is one in which you directly participated and with which you are very familiar.

Answer from the perspective of your organization, rather than as an individual or representative of your nation.

The survey asks you to think about different organizations. An "organization" should be understood as a separate legal entity. For example in the NATO case, NATO HQ, IMS, SHAPE, JFCBS, HQ AIRCOM, HQ ARRC, HQ SACT, JALLC, JWC etc. are considered separate and distinct organizations. In a national setting, the UK's Ministry of Defence and its agency DSTL are considered as separate organizations.

☐ I understand that I will answer the survey with the same multiorganizational interaction in mind. I am ready to take the survey.

Q1: Briefly describe the objective of the multiorganizational interaction and your organization’s role.

Q2: Which of the following best describes your work status during the multiorganizational interaction? *Select one*:

1. NATO international civilian
2. Uniformed military service member
3. Government civilian employee
4. Contractor

5. University faculty
6. Other - please describe ________________________

Q3: Which of the following best describes your organization's type? *Select one*:

1. International intergovernmental organization
2. Government defense organization (military services or civilian department)
3. Government organization (non-defense)
4. Educational organization (civilian university or college)
5. Nonprofit organization
6. For-profit business / corporation
7. Other - please describe

Q4: Please select the responses that most closely correspond to the main purposes for the multiorganizational interaction. *Select all that apply*.

1. Create an informal network of communications among stakeholders
2. Generate support for an initiative
3. Conduct joint work with other organizations to ensure tasks are done, but each organization remains mainly autonomous
4. Reach predetermined mutual goals together, while remaining autonomous
5. Share material, personnel or financial resources to address common issues
6. Commit for a year or more to achieve short- and long-term outcomes
7. Create institutional and system change in a policy area

Q5: What total length of time is the multiorganizational interaction expected to exist or did exist?

1. Indefinitely
2. Or, enter number of months ___________

Q6: Think about the various tasks that must be accomplished by the multiorganizational interaction. Please rate those tasks on the scales below:

	Low in number	High in number

How would you characterize the number of distinct tasks conducted by the multiorganizational interaction?	☐	☐	☐	☐	☐	☐	☐

	Very similar						Very different
In general, how similar are the tasks in nature?	☐	☐	☐	☐	☐	☐	☐

	Known and clearly defined						Ambiguous and undefined
How would you characterize the clarity of the tasks?	☐	☐	☐	☐	☐	☐	☐

	Independent from each other						Interdependent
To what extent do tasks depend on one another?	☐	☐	☐	☐	☐	☐	☐

	Routine						Irregular / atypical
To what extent are tasks routine business?	☐	☐	☐	☐	☐	☐	☐

	Agreed by all participants					Highly contested by participants	
How would you characterize the level of agreement amongst participants in the multiorganizational interaction about the required tasks?	☐	☐	☐	☐	☐	☐	☐

Please answer all questions on this section

Q7: Think about the goals of the multiorganizational interaction. Which statement is most applicable to your organization? *Select one*:

1. If required, my organization could achieve the goals independently without support from other organizations
2. My organization requires some assistance from other organizations to accomplish the goals
3. No organization can achieve the goal independently. My organization is interdependent with other organizations.

Q8: Please select the statement that best describes why your organization participates in the multiorganizational interaction. *Select one:*

1. Directly tasked by a higher authority or mandate to participate (e.g. a higher command, organizational policy or mission, organization leader decision, legal requirements)
2. No direct tasking, but not participating would result in either a loss of reputation or an inability to meet organizational goals
3. Participation is voluntary and was initiated primarily by senior management
4. Participation is voluntary and was initiated primarily by the staff level

Q9: Below are several reasons for joining the multiorganizational interaction. Select the response that best indicates how important each reason is to your organization:

	Not at all important 1	2	3	4	5	6	Very important 7
To take advantage of partner organizations resources (for example: money, information, expertise, physical property) to help my organization achieve its goals	☐	☐	☐	☐	☐	☐	☐
To build relationships with partner organizations because we expect to interact with them again in the future	☐	☐	☐	☐	☐	☐	☐

	Not at all important 1	2	3	4	5	6	Very important 7
To enhance my organization's reputation by working with partner organizations that have strong reputations	☐	☐	☐	☐	☐	☐	☐
To enhance my organization's reputation by demonstrating commitment to resolving important problems	☐	☐	☐	☐	☐	☐	☐
To create a common vision among organizations for solving problems too complex for my organization to solve alone	☐	☐	☐	☐	☐	☐	☐
To receive funding or grants that are contingent upon participation	☐	☐	☐	☐	☐	☐	☐
To resolve conflicts that have occurred between my organization and partner organizations	☐	☐	☐	☐	☐	☐	☐

Q10: How many organizations does your organization interact with as part of the multiorganizational interaction?

Q11: What types of organizations are involved in the multiorganizational interaction? *Select all that apply*.

1. International intergovernmental organization
2. Government defense organization (Military service or civilian department)
3. Government organization (non-defense)
4. Educational organization (civilian university or college)
5. Nonprofit organization
6. For-profit business / corporation
7. Other - please describe

Q12: Please rate the following two questions using the scale below:

	Not at all 1	2	3	4	5	6	To a great extent 7
Indicate to what extent organizations involved in the multiorganizational interaction have worked together on previous initiatives?	☐	☐	☐	☐	☐	☐	☐
Indicate to what extent you have previously worked with individual staff from the organizations involved?	☐	☐	☐	☐	☐	☐	☐

Q13: Indicate to what extent you agree with the following statements:

	Strongly disagree	Somewhat disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Somewhat agree	Strongly agree
Generally, people in this multiorganizational interaction are dedicated to the idea that we can make this project work	☐	☐	☐	☐	☐	☐	☐
My ideas about what we want to accomplish with this multiorganizational interaction seem to be the same as the ideas of others	☐	☐	☐	☐	☐	☐	☐

Q14: Indicate to what extent you agree with the following statements:

	Strongly disagree	Somewhat disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Somewhat agree	Strongly agree
My contribution in the multiorganizational interaction is considered part of my “regular duties” by my organization.	☐	☐	☐	☐	☐	☐	☐

Q15: Please select one answer that best describes how financial resources are used by your organization in the context of the multiorganizational interaction. *Select one*:

1. My organization's financial resources are not involved
2. My organization allocates (or has received) funding specifically for participation in the multiorganizational interaction
3. My organization pools financial resources with other organizations into an independent operating fund for the multiorganizational interaction

Q16: Please select one answer that best describes the primary resource shared by your organization with other organizations in the context of the multiorganizational interaction. *Select one*:

1. Information
2. The time and expertise of personnel
3. Financial and material assets
4. Logistical and administrative support to the multiorganizational group

Q17: Select a response that indicates how much you agree with the following statement. ("Leadership" refers to Chief Executive and deputy level, Command Group level, or organization head and deputy):

	Strongly disagree	Somewh at disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Somewh at agree	Strongly agree
My organization's leadership recognizes the benefits of participating in the multiorganizational interaction	☐	☐	☐	☐	☐	☐	☐

Q18: How long did it take to form the multiorganizational interaction to the point where it could achieve objectives? *Enter a whole number of months*.

Q19: Please select the most applicable statement describing the role of your organization's leadership in forming the multiorganizational interaction. ("Leadership" refers to Chief Executive and deputy level, Command Group level, or organization head and deputy). *Select one*:

1. Organizational leadership is not involved in decisions to work together
2. Organizational leadership is openly supportive, but isn't involved in detailed planning of contributions to a multiorganizational interaction
3. Organizational leadership is openly supportive AND is involved in planning contributions to the multiorganizational interaction

Q20: Please select the most applicable statement describing the role of your organization's <u>staff</u> in forming the multiorganizational interaction. *Select one*:

1. Interaction occurs through lower levels of organizations
2. Mid-level management implements and administers organization's involvement in interaction
3. The level of staff involved and their responsibilities adapt to the task at hand; each role is considered equally important

Q21: Please select the statement which best applies to the multiorganizational interaction. *Select one*:

1. All organizations are equal partners
2. One organization leads the group
3. A few organizations share leadership of the group

Q22: Please select the most applicable statement concerning the <u>goals</u> of the multiorganizational interaction. *Select one:*

1. There are no shared goals
2. Some shared goals, in addition to individual organizational goals
3. Shared goals agreed between all participants

Q23: In what ways do organizations in the multiorganizational interaction work together? *Select all that apply*:

1. Informal communications between staff
2. Official communications backed by organizational leadership
3. Regular official meetings between working level staff
4. Regular official meetings between organizational leadership

5. Executive decision boards / committees created especially for the multiorganizational group in which leadership make decisions about the interaction
6. A new joint organization is created to implement the tasks of the multiorganizational interaction

Q24: Please select one answer that best describes the <u>formality of the agreement</u> between interacting organizations. *Select one*:

1. Individual organizations informally agree to work together to achieve individual or mutually-beneficial goals
2. Policy documents (such as terms of reference or memoranda of understanding) identify each organizations roles and responsibilities, and are signed off by leadership
3. Policy documents (such as terms of reference or memoranda of understanding) describe detailed implementation plans in addition to roles and responsibilities, and are signed off by leadership

Q25: Please select the statements that best describe <u>information sharing</u> in the multiorganizational interaction. *Select all that apply*:

1. Information is shared through informal channels and relationships between participants (e.g. staff email)
2. Formal (official documents) and informal communication channels are used
3. Interorganizational communication is formalized, with staff given mandate to share information
4. Formalized communications infrastructures begin to develop (group email lists, shared web-based information repositories etc.)
5. Open and frequent communication through formal and informal channels
6. Interorganizational communication is institutionalized in organizational policies and processes (e.g. policy requirements to share information with partner organizations)

Q26: Please select the statements that best describe <u>decision-making</u> in the multiorganizational interaction. *Select all that apply*:

1. Decisions are made independently by each organization
2. Centralized decision making is practiced; a lead organization(s) dominates the decision making process

3. Senior leadership (chief executive or command group level) conducts collective decision making about the interorganizational interaction
4. Participative decision making based on consensus and compromise generates rules to govern activities and relationships between organizations
5. Organizational representatives have latitude to negotiate rules and discuss agreements to identify common ground
6. Joint decision making occurs at all levels of organization

Q27: Please select the most applicable statement to your organization concerning policies (rules, memorandums of understanding, regulations, terms of reference) related to the multiorganizational interaction. *Select one*:

1. The multiorganizational group does not have policies
2. Policies developed for the multiorganizational group are compatible with my organizations policies
3. Partner organizations jointly develop policies and negotiation is required when they conflict with individual organization policies

Q28: Select responses that indicate how much you agree with the following statements:

	Strongly disagree	Somewh at disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Somewh at agree	Strongly agree
The multiorganizational interaction hinders my organization from meeting its own mission	☐	☐	☐	☐	☐	☐	☐
My organization's independence is affected by having to work with partner organizations on activities related to the multiorganizational interaction	☐	☐	☐	☐	☐	☐	☐

As a representative of my organization, I feel pulled between trying to meet both my organization's and the multiorganizational interactions expectations	☐	☐	☐	☐	☐	☐	☐

Q29: Select the responses that indicate how much you agree with the following statements:

	Strongly disagree	Somewh at disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Somewh at agree	Strongly agree
The people who represent partner organizations in the multiorganizational interaction are trustworthy	☐	☐	☐	☐	☐	☐	☐
My organization can count on each partner organization to meet its obligations in the multiorganizational interaction	☐	☐	☐	☐	☐	☐	☐
My organization feels it worthwhile to stay and work with partner organizations rather than leave or scale back commitments to the multiorganizational interaction	☐	☐	☐	☐	☐	☐	☐

Q30: Please select the most applicable statement concerning the role of <u>trust</u> between organizations in the multiorganizational interaction. *Select one*.

1. Trust relationships are nice to have, but are actually not required for organizations to work together
2. Trust relationships are useful, but must be based on reciprocal behaviors
3. Trust between organizations is necessary; in all levels of staff

Q31: Select the responses that indicate how much you agree with the following statements:

	Strongly disagree	Somewh at disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Somewh at agree	Strongly agree
Overall, the multiorganizational interaction is effective in achieving expected outcomes	☐	☐	☐	☐	☐	☐	☐
Overall, high quality working relationships have developed between my organization and partner organizations as a result of this multiorganizational interaction	☐	☐	☐	☐	☐	☐	☐
Overall, my organizations view of the issue(s)/problem(s) that brought the organizations together has broadened as a result of the interaction	☐	☐	☐	☐	☐	☐	☐
Overall, my organization has increased its interaction with partner organizations as a result of the multiorganizational interaction	☐	☐	☐	☐	☐	☐	☐
Overall, the multiorganizational interaction has helped to make partner organizations' influence on each other more equal	☐	☐	☐	☐	☐	☐	☐

These questions are for control purposes only and do not form part of the analysis.

Q32a: What is your gender?

1. Male
2. Female

Q32b: What is your nationality?

- List of NATO, EU, NATO Partnership for Peace nations, plus Multinational Capability Development Campaign Nations as of 2015

Q32c: How many years of professional working experience do you have?

Q32d: If desired, please provide any comments about the survey, or any relevant information about the multiorganizational interaction:

APPENDIX B: SURVEY QUESTION—DIMENSION MATCHING

Table C – 1 shows which survey questions operationalize the dimensions in the GIIA. Several questions that are not related to the GIIA are omitted from this table:

- Q2 and Q3 capture demographic information about the respondent and their organization;
- Q31 captures 5 interorganizational output/outcome measures
- Q32—the final survey question—is a free text field to allow the respondent to enter any additional information they wish.

Table C-1: Link between dimensions of the GIIA and survey questions

Dimensions	Constructs	Type	Meaning	Survey Question #
Purpose of Interorganizational interaction	Interorg. Policy Objective	Context	The overall purpose of the interorganizational interaction [Adapted from Mandell & Steelman (2003), and Keast et al. (2007)]	Q1 Q4
Time	Interorg. Policy Objective	Context	The length of time that the interorganizational interaction is expected to work together to accomplish the policy objective [modified from McNamara, 2008]	Q5
Difficulty	Interorg. Policy Objective	Context	The complexity of tasks that the interorganizational interaction undertakes to accomplish the policy objective [modified from McNamara, 2008]	Q6

Dimensions	Constructs	Type	Meaning	Survey Question #
Role of single organization	Interorg.Policy Objective	Context	The roles individual organizations assume to accomplish the policy objective [McNamara, 2008]	Q7
Impetus for collective action	Interorg. Policy Objective	Context	The reason for developing the interorganizational interaction and the way in which it was developed [modified from McNamara, 2008]	Q8 Q9
Numbers of participating organizations	Interorg. Policy Objective	Context	The number of organizations with first degree network ties participating in the interorganizational interaction [Author definition]	Q10
Category of participating organizations	Interorg. Policy Objective	Context	The sector and/or type of organization: federal government, state government, local government, international organization, intergovernmental organization, nongovernmental organization, private sector, academia, think tank, etc.	Q11
History of previous interaction in the problem domain	Organizational Management	Context	The extent to which organizations and participants from those organization have worked previously together on other projects in the problem domain [definition adapted from Mattesich et al., 2001]	Q12
Participant's Problem Orientation	Organizational Management	Org	Reflects the degree to which the members view the problem from a shared or individual perspective. This has to do with members' values and perceptions [Mandell & Steelman, 2003]	Q13

Dimensions	Constructs	Type	Meaning	Survey Question #
Resource allocation	Organizational Management	Org	The contributions allocated by individual organizations to the interorganizational interaction in support of the policy objective [modified from McNamara, 2008]	Q14 Q15 Q16
Incentives	Organizational Management	Org	The intrinsic and extrinsic rewards provided to individuals and participating organizations to encourage support for the interorganizational interaction [modified from McNamara, 2008]	Q17
Time to establish multiorganizational arrangement	Interorganizational Infrastructure	Context	The length of time, relative to the time for implementation of the interaction, that the partnership takes to establish. [Inferred from Keast et al., 2007]	Q18
Key personnel	Interorganizational Infrastructure	Org	Personnel who are responsible for bringing together and implementing the interorganizational interaction [Modified McNamara, 2008]	Q19 Q20 Q21
Orientation of policy objective (Goals)	Interorganizational Infrastructure	Interorg	The agreed and comprehensive nature of goals between interacting organizations [Adapted from D'Amour et al., 2008]	Q22
Design	Interorganizational Infrastructure	Interorg	The administrative structure emerging from the interorganizational interaction [Modified McNamara, 2008]	Q23

Dimensions	Constructs	Type	Meaning	Survey Question #
Formality of the agreement	Interorg. Infrastructure	Interorg	The way in which individual organizations agree on their roles and responsibilities within the interorganizational interaction [modified from McNamara, 2008]	Q24
Information sharing and communications	Interorg. Procedures	Interorg	The ways in which personnel within the interorganizational interaction use information and communication processes to attain the policy objective [modified from McNamara, 2008]	Q25
Decision making	Interorg. Procedures	Interorg	The ways in which the organizations within the interorganizational interaction make implementation decisions pertaining to the policy objective [modified from McNamara, 2008]	Q26
Resolution of turf issues	Interorg. Procedures	Interorg	The process used for solving conflicts between organizations within the interorganizational interaction [modified from McNamara, 2008]	Not testetd
Organizational autonomy	Autonomy	Org	The degree to which each partnering organization independently operates, in terms of the extent that their operating procedures and policies are adapted by the interorganizational interaction, and the extent of authority given to the collective to develop policies that guide operations of the collective. [Modified from McNamara, 2008]	Q27 Q28

Dimensions	Constructs	Type	Meaning	Survey Question #
Trust	Norms of trust and reciprocity	Org	The extent to which trustworthy relationships between organizations within the interorganizational interaction are built [modified from McNamara, 2008]	Q29 Q30

APPENDIX C: VITA

Andrew P. Williams

Curriculum Vita

Awill123@odu.edu
http://www.linkedin.com/in/reachandywilliams
https://odu.academia.edu/AndrewWilliams

EDUCATION

2015 **Ph.D. in Public Policy and Administration**
Old Dominion University, Strome College of Business, Norfolk, United States

2002 **Masters of Science in Theoretical Physics (1st Class Honours)**
University of Manchester, United Kingdom

EMPLOYMENT

2010 - current **Section Head: Solutions Analysis, NATO Allied Command Transformation, Norfolk, United States**

Lead a small team of analysts to conduct problem exploration, business development, feasibility studies, analysis and evaluation of a wide variety of projects in a NATO strategic command. Areas of work include:

- Problem exploration and feasibility studies on autonomous systems, privatization of security forces, civil-military collaboration, military impact evaluation;
- Leading the development of NATO's operations assessment (impact evaluation) methods;
- Developing critical thinking and red-teaming methods for NATO.

2005-10 **Senior Operations Research Analyst, NATO Allied Command Transformation**

Utilised soft-systems methods, systems analysis, business process mapping, qualitative and quantitative research techniques, in analytical and decision support to a wide variety of projects.

2002-05 **Operations Research Analyst, Defence Science and Technology Laboratory, Ministry of Defence, Sevenoaks, United Kingdom**

Provided problem formulation, requirements analysis, business case and cost-effectiveness studies for defense procurement projects. Utilized a variety of analysis techniques including: queuing theory, system dynamics, multi-criteria decision analysis, and discrete-event simulation tools. Developed business case assessment tools.

PUBLICATIONS

Peer-Reviewed Works

Williams, A. P. (2016). The development of collaboration theory: Typologies and systems approaches. In J.C. Morris & K. Miller-Stevens (Eds.), *Advancing collaboration theory: Models, typologies, and evidence.* New York, NY: Routledge.

Williams, A.P. (2016). Paradigms in defence experimentation. In J. de Nijs (Ed.), *Innovation in Concept Development and Experimentation*. Norfolk, VA: NATO Allied Command Transformation.

Williams, A. P. & Scharre, P. (Eds.) (2015). *Autonomous systems: Issues for defence policy-makers.* Norfolk, VA: NATO Allied Command Transformation

Williams, A. P. & Mengistu, B. (2015). An exploration of the limitations of bureaucratic organizations in implementing contemporary peacebuilding. *Journal of Cooperation and Conflict*, *50*(1), 3-28.

Williams A. P., Bexfield, J., Farina, F. & de Nijs, J. (Eds.) (2013). *Innovation in Operations Assessment: Recent Advances in Measuring Progress in Conflict Environments*. Norfolk, VA: NATO Allied Command Transformation

Williams, A. P. & Taylor, J. (2012). Resolving accountability ambiguity in nonprofit organizations. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, 24(*3*), p559-580.

Williams, A. P. et al. (2012). *Processes for assessing outcomes of multinational missions. An exploratory study*. (HFM-185). Paris, France: NATO Science and Technology Organisation.

Williams, A. P. & Giessing, J. (2012). Gamification: Why NATO needs to play the game. *NATO Transformer*, 8*(2*), Fall 2012. http://www.act.nato.int/article-2012-2-8.

Williams, A. P. (2010). Implications of operationalizing a comprehensive approach: Defining what interagency interoperability really means. *International Command and Control Journal*, 4(*1*), 1-31.

Williams, A. P. & Morris, J. C. (2009). The development of theory-driven evaluation in the military: Theory on the front line. *American Journal of Evaluation*, 30(*1*), 62-79.

Selected Conference Presentations

Fenning, D. & Williams, A. P. (2015, June). *Assessing progress in assurance and deterrence.* Paper presented at the 83rd Military Operations Research Society Conference, Alexandria, VA.

Bexfield, J. & Williams, A. P. (2014, June). *Innovation in operations assessment.* Paper presented at the 82nd Military Operations Research Society Conference, Alexandria, VA.

Williams, A. P. (2014, April). *Organizational implications of interagency interaction.* Paper presented at the NATO Science and Technology Organization Symposium on Effective interagency interactions and governance, Stockholm, Sweden.

Williams, A. P. (2012, October). *The theory of joint evaluations: Prospects and challenges*. Paper presented at the 10th European Evaluation Society Biennial Conference, Helsinki, Finland.

Williams, A. P. (2012, August). *Multi-organisational collaboration in operations assessment and evaluation: Prospects, challenges, and implications for practice*. Paper presented at the 29th International Symposium on Military Operations Research, Hampshire, United Kingdom.

Taylor, J., & Williams, A. P. (2010, October). *Nonprofit accountability: A holistic accountability framework*. Paper presented at Southeastern Conference of Public Administration (SECoPA), Wilmington, NC.

Williams, A. P. & Taylor, J. (2010, April). *Nonprofit accountability: Negotiating the network*. Paper presented at the 14th International Research Society for Public Management, Berne.

Williams, A. P. (2009, June). *Paradigms of experimentation.* Paper presented at the 3rd NATO Operational Analysis Conference, Norfolk, VA.

Williams, A. & Denijs, J. (2009, June). *Operationalisation of comprehensive approach*. Paper published at the 14th International Command & Control Research and Technology Symposium, Alexandria, VA.

Denijs, J. & Williams, A. (2008, June). *On the Introduction of Effects Based Assessment into NATO's Processes, Organization and Tools*. Paper presented at the 13th International Command & Control Research and Technology Symposium.

Syms, P. & Williams, A. (2004, April). *Developing Analysis Methods to Assess Decoys and Deception*. Paper presented at the NATO RTO SCI Symposium on "Sensors and Sensor Denial by Camouflage, Concealment and Deception", Brussels, Belgium.

TEACHING

2012 - 2015 *NATO Operations Assessment*

Lead course developer / lead instructor, NATO School Oberammergau, Germany. 1 week full-time residential course for military officers and analysts.

2013 - 2015 *Alternative Analysis*

Lead course developer and instructor at NATO School. Course covers analytical techniques for innovative thinking. 1 week full-time residential course.

2007 - 2011 *Introduction to Analysis, Analysis in Concept Development, Analysis in Experimentation, Modeling and Simulation*

Class modules during the 1 week NATO Concept Development and Experimentation Course, Czech Military School, Praque, and NATO School Oberammergau, Germany

2002 – 2005 Home tuition of high school students in Maths, Physics and Spanish with a private company *Oxford Graduate Tutors.*

PROFESSIONAL MEMBERSHIPS

- American Association for the Advancement of Science
- American Evaluation Association
- European Evaluation Society
- The Policy Studies Organization
- American Society for Public Administration

AWARDS AND HONORS

- Public Administration and Urban Policy Doctoral Student of the Year 2014-15
- Wolfgang Pindur Endowed Scholarship in Applied Research, School of Public Service, 2013-14
- Inducted into Phi Kappa Phi, 2015 (Int. honors society for academic excellence)
- Inducted into Pi Alpha Alpha, 2015 (Intl. honors society for public administration)