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THREE INTERDISCIPLINARY STUDIES ON IT OUTSOURCING

Sonia Gantman (Vilvovsky)

A dissertation
submitted in partial fulfillment of the
requirements for the degree of

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Dedication

To my daughters, Naomi and Shira

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Abstract

Three Interdisciplinary Studies on IT Outsourcing

Sonia Gantman Vilvovsky

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This dissertation provides interdisciplinary insights into the role of client's internal collaborative experience in managing communication during a complex outsourced project, building a quality client-vendor relationship and ultimately achieving success in the project. Each of the three studies in this dissertation identifies a gap in existing scholarship and proposes an interdisciplinary research agenda.

The first essay advances the development of the public sector IT outsourcing (ITO) inquiry by consolidating the existing research into an analytical framework and validating a part of the framework with rich qualitative data collected from collaborative initiatives of public safety agencies ("Public Safety Networks", or PSN). The unique collaborative nature of the PSNs is further used to explore the hypothesized connection between the communication within an outsourcing client and the client's communication with the vendor.

This connection is further investigated in the second essay. The proposed theoretical model makes a unique contribution to the literature by linking different types of communication in an outsourcing organization. Development of a measurement instrument using the boundary spanning conceptual approach and validation of this instrument with survey-based data make an important contribution to the methodology of boundary spanning research.

The third study draws on auditing and IS literature and proposes that communication tools used during an outsourced project also fulfill internal control functions, such as risk assessment and performance monitoring. The usefulness of various tools for different control purposes, as well as the effect of project complexity and contractual specifications, is tested with field data collected through an online survey instrument.

Findings from the three dissertation essays confirm the connection between internal communication in a client organization and its outsourcing behavior. Different tools and practices are found to be better suited for different purposes, depending on a number of factors such as a project's complexity, project phase and contractual specification of a particular communication practice. Data analysis confirms the argument of the previous boundary spanning literature that conscious enactment of communication and control practices is critically important for their effectiveness. Finally, this work supports the theoretical premise that pre-project communication practices contribute to the quality of project related communication.

Keywords: IS development projects, IT outsourcing, client-vendor relationship, communication tools, public safety networks, boundary spanning, instrument development, survey, internal control, COBIT, project complexity.

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INTRODUCTION

Information technology outsourcing (ITO) is a complex and well-studied phenomenon. Dozens of papers on ITO are published every year by researchers representing the Information Systems (IS) and management research communities.

ITO was initially viewed as an economic phenomenon driven exclusively by the desire to cut IT costs. (Dibbern et al., 2004). However, as the practice evolved, its strategic importance gained increased recognition, and the focus of the research moved to analyzing IT outsourcing risks (Ibid.). The newest stream of IT outsourcing research emphasizes human capital issues in organizations and the increasing complexity of outsourcing arrangements. Organizational learning, managing relationships and working through cultural differences are popular subjects of the contemporary ITO inquiry (Hätönen & Eriksson, 2009; Lacity, Khan & Willcocks, 2009). Such factors as knowledge sharing and relationship building are recognized as critically important for ITO success (Cram, 2009)

Three main directions of inquiry can be identified in the ITO scholarship (e.g., Lacity et al., 2009). One direction is dedicated to understanding the antecedents of sourcing decisions. Another stream is concerned with the issues of contract management, such as managing risks and applying control mechanisms. Finally, the most recently emerged research direction is focused on communication between a client and a vendor and building interorganizational relationships. The three studies in my dissertation represent these three directions in ITO research. Data analysis in the first paper is focused on sourcing decisions in the public sector. The second paper proposes a theoretical model of ITO relationship viewed through the communication centered boundary spanning conceptual lens. The main theme of the third paper is control, an important component of contractual governance.

Although ITO is a well-developed subject of IS research, there are still notable gaps in the understanding of some ITO related phenomena, especially those that lie on boundaries with other

research fields. The three presented studies create interdisciplinary connections between the traditional IS-rooted research on ITO and other research fields. The first study bridges IS and Public Administration disciplines, the second one builds on the boundary spanning paradigm initially developed as a sociology theory, and the third study introduces an accounting perspective.

The following paragraphs provide a brief overview of each study, describing its motivation, methodology, and contribution to the literature and practice

The first study addresses IT outsourcing in governmental agencies. It defines public sector ITO as an interdisciplinary research area and proposes an analytical framework based on in-depth analysis of relevant literature from several research disciplines. The framework consolidates the findings and conclusions from the reviewed literature regarding the most pressing issues for outsourcing public agencies. Although the majority of these issues exist in both sectors, many aspects of ITO should be approached differently in the public sector due to its distinct combination of internal and external environmental pressures. The framework covers all three main areas of ITO inquiry: sourcing decisions, contract management and relationship management. The part of the framework related to sourcing decisions is further tested with exploratory data analysis.

The data for this study were collected from eighty-two public safety networks (PSNs) - collaborative initiatives created to facilitate communication and information sharing among first responder agencies at different governmental levels and geographies. The data include comprehensive information about PSNs' history, organizational characteristics and governance practices. This rich dataset provides an exceptional opportunity for analyzing organizational characteristics which according to the analytical framework are especially important in the public sector, that have not been accounted for by previous ITO studies. An additional focus of the data analysis is on the possible impact of the collaborative experience of PSNs on their decision to outsource IT and ITO success.

The study lays a foundation for future development of the public sector ITO research area by identifying the distinct characteristics of public sector ITO and providing an analytical framework that may serve as a starting point for systematic public sector ITO inquiry. The organizational characteristics that affect public sector ITO management and outcomes are not necessarily unique to the governmental context. A deeper understanding of the impact these organizational characteristics may have on the patterns of organizational behavior contributes to outsourcing research and to the research on interorganizational relationships. The study also makes an important contribution to the practice and can be used by public officials and by outsourcing vendors who do business with governmental agencies.

The second study further develops the proposition that interorganizational collaborative initiatives may have advantages in outsourcing relationships due to their collaborative experience. Previous research demonstrates the critical importance of internal communication in a client organization during complex IS development (ISD) projects. The importance of communication between client and vendor is also widely recognized. I apply my theoretical proposition that internal collaborative experience is important for building outsourcing relationships to the context of a single organization, not necessarily an organization that belongs to the public sector of the economy. Since knowledge intensive environments are especially sensitive to the quality of communication (e.g., Carlile and Rebentisch, 2003), this study is targeted at complex outsourced ISD projects.

The boundary spanning theoretical perspective is applied in this study to investigate the interconnection among different types of communication in an outsourcing client organization. My theoretical model connecting client-vendor communication, project related communication within the client organization, and routine communication in the client organization, makes a unique contribution to the literature. In this paper I also propose a measurement instrument for assessing the complex abstract concept of boundary spanning. Drawing on previous, predominantly qualitative, research, I develop a measurement instrument and validate it against

field data with advanced multivariate analysis procedures. Instrument development and validation as well as survey-based data collection contribute to the methodology of boundary spanning research. The paper provides solid grounds for the final step of this research project - fitting the theoretical model with the collected data using the developed and validated instrument.

This research highlights the importance of internal communication in a client organization for building a successful relationship with a vendor. Along with the theoretical contribution to outsourcing research and to the boundary spanning conceptual approach, this study helps practitioners make more informed decisions in regard to vendor selection, building an outsourcing team and developing governance mechanisms for an outsourced project.

The third study in the dissertation focuses on the contract management dimension of ITO research and proposes that improved control can be a possible "side effect" of boundary spanning. An outsourced development project combines the control challenges of a contractual relationship, for which a tight control is recommended, and a creative environment, where overly tight control may impede the desired novelty of the final product. In addition, the passage of the Sarbanes-Oxley Act (SOX) in 2002 introduced new compliance requirements and new IT control assessment responsibilities, which many IT executives are still not fully aware of (Hall & Liedtka, 2007). Non-intrusive and adaptive control mechanisms are the best in such a complex environment; embedding control mechanisms in routine processes is very helpful (Gelinas & Dull, 2007). I propose that communication tools ("boundary objects") used for client-vendor communication during outsourced IS Development (ISD) projects can also fulfill internal control functions, such as risk assessment and performance monitoring. This proposition is tested in the paper with special attention to different types of project complexity and inclusion of communication tools in the outsourcing contract.

An original contribution of this study is bringing the Accounting and IS disciplines together for a better understanding of possible ways to implement high quality (effective, flexible and efficient)

internal control of complex outsourced IT projects. This is a positivist study based on quantitative analysis, which makes it a valuable addition to existing research.

The three studies comprising the dissertation bring together different approaches and disciplines to expand and deepen our understanding of the complex and multifaceted outsourcing phenomenon. The dissertation is structured in the following way. The first study is covered in the next chapter, "IT Outsourcing in Public Organizations: Lessons from Public Safety Networks." The following chapter, "Client's Boundary Spanning in Outsourced ISD Projects – Theoretical Model and Measurement Instrument", presents the second study. The last, third study is described in the chapter "Communication and Control in Outsourced IS Development Projects." The dissertation concludes with closing remarks.

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CHAPTER ONE. IT OUTSOURCING IN PUBLIC ORGANIZATIONS: LESSONS FROM PUBLIC SAFETY NETWORKS

ABSTRACT

The topic of IT outsourcing (ITO) in the public sector has gained only modest attention from researchers in both the Information Systems and Public Administration disciplines. An extensive database search for public sector ITO publications resulted in a highly fragmented and diverse set of academic works. This paper makes an important theoretical contribution to the public sector ITO inquiry by, first, defining the public sector ITO research area, and, second, consolidating the existing research into an analytical framework for analyzing the public sector ITO issues.

The part of the framework related to sourcing decisions is verified in the paper with analysis of rich qualitative data collected from Public Safety Networks (PSN) - collaborative initiatives among first responder agencies at different governmental levels and geographies. The unique collaborative nature of the PSNs is further used to explore the connection between communication within a PSN and the PSN's behavior as an IT outsourcing client. The paper makes an important contribution to practice by helping outsourcing vendors understand the challenges of doing business with governmental agencies and providing public officials involved in ITO an opportunity to learn about cross-sectoral differences.

1. INTRODUCTION

Information Technology outsourcing (ITO) is a rich and attractive strategy used today by a wide assortment of organizations - large and small, local and multinational, private businesses and governmental agencies. It can introduce many benefits, such as cost savings, strategic advantage, access to higher level professionals, and flexibility required by rapid technological changes.

Designing and managing an outsourcing project in an effective way, however, is a long and complicated process with many pitfalls. Almost any aspect of the IT outsourcing phenomenon, from the goals that organizations pursue to the ways they measure satisfaction, is full of ambiguities and complexities.

It is not surprising then, that IT outsourcing attracts close attention by scholars. While initially ITO was viewed through purely economic lenses, over the years this approach was replaced by a plethora of concepts and theories, rooted in different disciplines. Characteristics as diverse as an organization's business model and size, industry specifics, organizational culture and external environment, have been found to play a role in IT sourcing decisions, governance and outcomes. With such a wide range of factors, it is natural to hypothesize that sector (public, private or nonprofit) also plays an important role in the patterns and outcomes of IT outsourcing and the accompanying organizational changes. In this study, I focus on a comparison of governmental organizations and privately owned businesses. Outsourcing of public sector IT provision to privately held IT vendors introduces an additional dimension, and therefore, additional complexity, of a cross-sectoral contractual relationship to the array of general ITO issues.

The purpose of this paper is to provide a systematic foundation for public sector ITO research. First, it provides an overview of the main thrusts of the existing public ITO literature and defines the boundaries of the interdisciplinary public ITO research area. Second, an in-depth analysis of the extant ITO literature is summarized in an analytical framework. Finally, an exploratory analysis of a rich dataset on collaborative public safety initiatives is used for testing and expanding the framework. The two broad research questions explored in the empirical part of the study are:

Do the issues indicated by public sector ITO literature affect PSN sourcing decisions?

How is the collaborative nature of Public Safety Networks related to sourcing decisions and the outcomes of outsourcing arrangements?

There is a notable dearth of academic publications that explicitly address the issues of ITO in the public sector. Information Systems (IS) researchers and Public Administration (PA) scholars approach the public ITO phenomenon from different standpoints, with only limited recognition of the work by colleagues from other fields. However, numerous comparative studies on the two sectors and studies on governmental information systems suggest that the differences between the sectors are indeed important, and therefore, ITO in public agencies deserves special attention, which it has not yet received.

Defining public sector ITO research as an interdisciplinary area and combining the concerns of the two research communities – IS and PA - into a single framework provides insights that will enhance the quality of analyses in future public sector ITO studies. The rich and comprehensive dataset used in this study provides a unique opportunity to analyze a range of organizational, political and environmental characteristics of the public sector context mentioned by various previous authors, and to assess their impact on outsourcing decisions and performance. Combined together, the in-depth literature analysis, analytical framework and data analysis presented in this paper create solid ground for more systematic future research of public sector ITO.

My analysis of sector specific ITO issues highlights more than just sectoral differences. It also emphasizes the impact of organizational characteristics such as bureaucracy and informal communication capability on the patterns of an organization's decision making and project management. Understanding the influence of an organization's internal characteristics on its ITO behavior makes an important contribution to general ITO research and to research on interorganizational relationships, not just ITO. Finally, this study will benefit both public sector practitioners and ITO vendors that work with public agencies.

The paper is structured as follows. In the next two sections I present an overview of the background and the current state of research on ITO in governmental agencies, followed by a definition of public sector ITO research as an interdisciplinary research area. Then the existing

public sector ITO literature is analyzed and an analytical framework is developed, concluding the theoretical part of the paper. I proceed with a description of the context of the Public Safety Networks project, from which the data is drawn, and sets the goals for my data analysis. After presenting the findings, the paper concludes with a discussion of identified trends, potential contributions and limitations of the study along with directions for future research.

2. BACKGROUND

ITO research has existed for almost as long as the practice itself. In thirty years, rich empirical evidence has been accumulated, and the research paradigm evolved from a mostly economic perspective to an assortment of theoretical lenses borrowed from various fields, such as management, strategy and even sociology. Today ITO research is represented by a plethora of publications, a variety of theoretical lenses and a number of developed models and frameworks (e.g., Dibbern, Goles, Hirschheim & Jayatilaka, 2004; Gonzalez, Gasco & Llopis, 2006).

Early ITO research was focused almost exclusively on the economic aspects of the practice, and considered the desire to cut IT costs as the primary motivation to outsource. Dibbern et al. (2004) noted that this theme faded by the end of the 1990s, giving place to "a subtle shift in research objectives from why an organization outsources to should an organization outsource" (p.44). The strategic importance of ITO was recognized at this stage, and as a result, analyzing outsourcing risks became a popular theme. Later, IT outsourcing research emphasized organizational learning, managing relationships and overcoming cultural differences (Hätönen & Eriksson, 2009; Lacity, Khan & Willcocks, 2009). Cram's (2009) meta-analysis of outsourcing research indicates a changing focus toward human capital issues and increasing complexity of outsourcing arrangements, and names knowledge sharing and business relationship as the most often mentioned factors of ITO success.

ITO research is represented today by hundreds of publications; it offers deep analyses of ITO decisions and ITO risks, theoretical developments and frameworks. Almost all ITO studies, however, imply that client organizations are privately-owned businesses striving for profits and acting in the context of the competitive market. Few papers address the specifics of ITO in public agencies (Marco-Simó, Macau-Nadal & Pastor-Collado, 2007).

At the same time, an entire branch of academic research is devoted to studying the various processes unfolding in the public sector of the economy. In particular, there are several scholarly periodicals focused solely on information management in government agencies (e.g., "Government Information Quarterly"). Comparative studies point out that governmental agencies and privately held businesses differ significantly in almost every aspect, including such core concepts as organizational goals, values and ethos (e.g., Rainey, Backoff & Levine, 1976; Van Der Wal, Huberts, Van Den Heuvel & Kolthoff, 2006).

2.1. The distinctive nature of public organizations compared to private businesses

Comparison of public agencies and businesses has drawn the attention of researchers for decades. Political scientists, Public Administration (PA) researchers and organizational theorists apply the perspectives of their respective disciplines to various aspects of the sectors' similarities and differences, both in ideological and operational domains. The different goals pursued by the two types of organizations are reflected in their ethics and values. A long debate on the two sectors' moral values is rigorously summarized by Van Der Wal et al. (2006) who analyzed about one hundred publications and documents and presented the reader with a cross-sectoral "values panorama" (Figure 1.1). The values are sorted by importance. For example, social justice is the most important value in the public sector; sustainability is the most desirable for private companies; the values in the middle of the spectrum are moderately important for both sectors. In the diagram, public and private sectors share some core values (incorruptibility, responsiveness, honesty and accountability); however, the main priorities in private sector are

profitability and sustainability, while the strongest values of the public sector have little to do with financial performance.

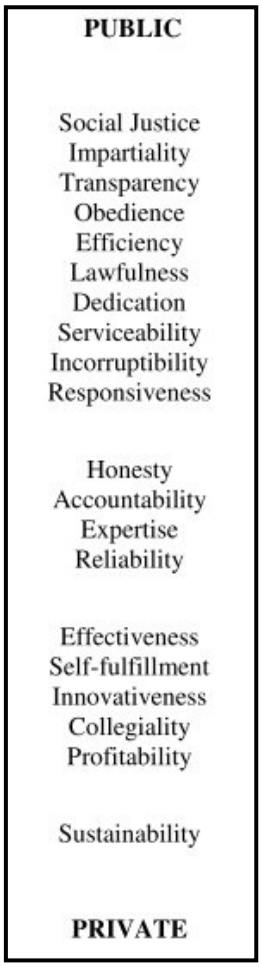

Figure 1.1. "Value panorama" by Van der Val et al. (2006) compares the private and public sectors

Sustainability and profitability as the main organization's goals are implied by almost all theoretical lenses used for analyzing outsourcing decisions. This approach is well suited to private companies but is much less applicable in the governmental context.

Over the last several decades, governments around the world moved to stress cost efficiency and businesslike performance measurement of public agencies at all levels. It is often proposed that practices similar to those routinely used in private corporations should be introduced in governmental organizations. Many voices, however, warn that such adoptions should be handled with great caution. The ideological bases of the two sectors, their stakeholders and the target populations remain different. Even those private sector metrics that are applicable in the public sector environment may have different priorities. For example, quality of service was found to be a more important metric in the private sector (Parhizgari & Gilbert, 2004); at the same time, public agencies are much more concerned with the degree of citizen's privacy protection (Bozeman & Bretschneider, 1986; Ward, 2006).

Public sector organizations are also known for more developed bureaucracy and higher risk aversion than private ones. An organization's approach to risk is connected to bureaucratic routine (so called "red tape"), formalization, low goal clarity, weaker links between performance and promotion, and higher involvement with elected officials (Bozeman & Kingsley, 1998).

Dawes, Pardo, Simon, Cresswell, LaVigne, Andersen and Bloniartz (2004) construct a "layer of risks unique to public sector" (p.10), which includes divided authority and other legal and

political constraints, multiple stakeholders with competing goals, short-term budgets, high regulation of procurement, reduced capability to design or operate integrated programs, and, again, risk aversion. This impedes decision making, especially for high-cost and high-risk decisions (Rocheleau & Wu, 2002). Moreover, there are cross-sectoral differences even in everyday routines. For example, Johnson, Leenders and McCue (2003) examined one isolated business process (purchasing) and found notable differences in responsibilities distribution, reporting, and level of centralization.

Rocheleau and Wu (2002) describe examples of independent and risk tolerant public sector organizations (military) and "public-like" private companies (those working on governmental contracts). They argue that although formalization and bureaucracy historically prevailed in the public sector culture, public agencies are able to adapt to new requirements of their external and internal environments. Indeed, governmental agencies' involvement in ITO is a salient example of their ability to adapt and pick up new practices. The abovementioned organizational characteristics and the ability of public agencies to adapt suggest that, first, a public organization's outsourcing behavior may have some unique characteristics that are worth consideration, and, second, that studying public sector ITO issues makes an important contribution to practice.

High interdependence of governmental agencies and the wide variety of stakeholders with different vested interests add complexity to decision making in the public sector context. At the same time, public agencies notably share the tendency to collaborate, which may be to their advantage in many situations (e.g., Fedorowicz, Gogan & Williams, 2007; Linden, 2002). While a shortage of resources increases competitive pressures in the private sector, governmental agencies react with increased interorganizational collaboration to reduce costs and share scarce resources (Johnson et al., 2003). The noncompetitive nature of the public sector allows for forms of collaboration that are hardly possible in the business world. Linden (2002) offers many diverse examples, such as a joint effort between the police and social services for treating child

abuse, and collaboration of five states, six federal agencies and thirteen Indian tribes for saving rare species of salmon.

2.2. Information management in public organizations

An argument for significant differences between public and private sector IS was first made as early as in 1986 (Bozeman & Bretschneider, 1986). Along with specifics of organizational structure and culture, public agencies have distinct information needs and special requirements for information management. For example, the public sector devotes much more attention to accountability and openness; the priority of information security is much higher in the public sector (Ibid.)

Despite the importance of the topic, little attention has been paid by the research community to the cross-sectoral differences with respect to IS (Rocheleau & Wu, 2002). The limited findings can be summarized along several dimensions.

First, public organizations act in a complex external environment and interact with other organizations. It is likely that the introduction of new information management tools in one public agency will affect others (Ibid.). Information systems used in the public sector have multiple stakeholders with differing political power and often with conflicting goals. Traditionally, there has been a structural separation in governments between strategic policy decision making and operations (Holley, Dufner & Reed, 2002). As a result, different needs and priorities are observed at different government levels – local agencies focus on transaction processing, while IS at state and federal levels are more suited to oversight missions (Caudle, Gorr & Newcomer, 1991). Though corporations see IT as a strategic asset managed at the top executive level, in most states IT planning is rather a middle-up than a top-down process (Holley et al, 2002).

Second, the approach to information management and its perceived importance may be affected by an organization's internal characteristics, such as structure and culture. According to surveys,

top managers in both sectors value the importance of IT equally high (Rocheleau & Wu, 2002; Ward, 2006). Governmental organizations show an even more developed knowledge management philosophy than private companies (McAdam & Reid, 2000). Despite this high awareness of IT importance, the investments of public agencies in both IT and in IT training are significantly lower compared with the private sector (Rocheleau & Wu, 2002). This may be due to legal, political and budget constraints faced by governmental agencies. The most frequently mentioned impediments to successful management of IT projects are regulated procurement and short time budgets (Bozeman & Bretschneider, 1986; Rocheleau & Wu, 2002).

Finally, the nature of public service provides the public sector information systems with some distinctive traits. One of these traits is the increased need for data security and customer privacy, since governmental databases store sensitive personal and governmental data (Bozeman & Bretschneider, 1986). A more conceptual difference lies in the overall mission of the IS in an organization. In the public sector, IT helps in costs cutting rather than profit generation. Rocheleau and Wu (2002) illustrate this by comparing a private bank using IS for filtering out its unprofitable customers to programs such as Medicaid specifically aimed at people who cannot afford the services. This freedom from competition combined with the pressure for efficiency creates a base for IT-related collaborations of the public sector. As early as 1991, Caudle et al. noted an interest in technology transfer and shared applications in the public sector, which would be impossible in the business world. This tendency is confirmed by Rocheleau and Wu (2002): "Public officials are often willing to share the most intimate details of the systems of which they are most proud" (p.384). Moreover, "public sector officials can gain prestige and professional opportunities by sharing such information" (Ibid.).

Although the willingness of public agencies to collaborate is mentioned in several publications, it merely refers to collaboration with other public agencies, where all participants have similar ideology, pursue similar goals and face similar constraints. An interorganizational relationship with a private business introduces added complexity, and, therefore, additional difficulties.

2.3. Working with private businesses

Not long ago, a lasting business relationship between a public sector organization and a market-oriented company was considered impossible by some theorists (Van Der Wal et al., 2006). A move toward increased focus on efficiency, result-oriented performance metrics and market-oriented strategies for governmental agencies helped to reduce the gap between them and privately held companies (Fedorowicz et al., 2006; Rocheleau & Wu, 2002; Ward, 2006). Different forms of cross-sectoral collaboration emerged and gained popularity during the last few years – such as outsourcing of public services to private vendors and public-private partnerships. However, this new and promising phenomenon faces a spectrum of problematic issues. They range from conflicts of ethics and values (Mulgan, 2005) to mismatches in behavior expectations (Chen & Perry, 2003a). Regulations and legal constraints often prevent public agencies from adopting managerial practices that are common in the private sector. This makes cross-sectoral interorganizational collaborations much more complex to manage than collaborations of public agencies or businesses alone.

The deep ideological differences between the business world and the public sector, the high complexity and interdependency of the governmental information environment, the unique role of information in public services and unique requirements for its proper use: all these characteristics of public organizations and public sector IT support the proposition that public sector ITO is a complex phenomenon that deserves special attention.

3. LITERATURE OVERVIEW AND RESEARCH AREA DEFINITION

Although a considerable amount of research is devoted to ITO in general and to the specifics of public sector IT, the specifics of public sector ITO have been addressed by a surprisingly limited number of academic publications. The nature of the public sector ITO suggests that it may be approached from several disciplines' standpoints and, therefore, different views and arguments

may be represented in the literature. I undertook an analysis of these ITO publications in order to create a comprehensive picture of the subject and to determine the ITO issues, risks and concerns that are unique to the public sector, according to the literature. In this section, I review the current state of academic inquiry into public sector ITO and define the place and the scope of this interdisciplinary research area in relation to existing research fields.

3.1. The state of academic inquiry into public ITO

IT outsourcing research is an established field represented by hundreds of academic publications. These works are based on various theories and investigate different aspects of ITO. Almost all of publications, however, imply that client organizations are privately owned businesses acting in the context of free market. Even authors who conduct case studies in public agencies often fail to address sectoral specifics or only barely mention them (e.g., Bridgman & Willmott, 2005).

On the other hand, there are at least two streams in Public Administration (PA) research that are particularly relevant to the issue of public sector ITO. First, along with the traditional theme of public management information systems, the theme of electronic, or digital, government (eGov) emerged in the early 1990s, and has demonstrated a dramatic growth since then (e.g., Yildiz, 2007). The present scope of eGov research points at significant interest of both academic and practitioners' communities in the specifics of IS in public organizations. However, the interests of the eGov research community seem not to include the subject of public sector ITO. Second, following the privatization tendencies of the 1980s, governments around the world adopted a "businesslike" view of public agencies' performance and introduced result-oriented metrics and market-oriented strategies (e.g., Mulgan, 2005; Rocheleau & Wu, 2002; Ward, 2006). As a result, new public management strategies emerged and new organizational forms, including inter-organizational and even inter-sectoral collaborations, evolved. A variety of academic and practitioner oriented works describe and analyze this ongoing transformation of the public sector (e.g., Gray, 2000; Hood, Logsdon & Thompson, 1993; Linden, 2002). However, discussions of

outsourcing public services to privately held companies usually overlook the specifics of IT compared to other functions and treats ITO in the same manner as the outsourcing of other functions, such as catering or cleaning (e.g., Kakabadse & Kakabadse, 2001).

I performed an extensive two-stage search to identify research papers that, first, were published in academic outlets or presented at academic conferences, and, second, explicitly address the specifics of ITO in public agencies. In the first stage, several databases covering all major academic periodicals in the IS and PA fields were searched. Only a few of hundreds of publications identified by the search engines fit the inclusion criteria. To identify the relevant publications, database findings were filtered manually. The second stage of the search was based on the "snowball sampling" method, and included a thorough review of references in the papers collected in the first stage. Additional papers not identified by the database search were revealed in the second stage. Overall, thirty publications, spread across countries, contexts and disciplines, were found that fit the inclusion criteria. They are summarized in Appendix A and discussed in the following subsections.

3.2. Overall tendencies in public sector ITO research

The evolution of public sector ITO research closely follows the tendencies of general ITO research. In line with trends in general ITO research, early public sector ITO works adopted a purely economic view on outsourcing and focused on assessing cost benefits from ITO (e.g., Globerman & Vining, 1996). This concentration on economic justification fits well with the trends of the time toward privatization and replacing government structures with free market enterprises. However, the approach to outsourcing is different in the IS and PA literature. IS scholars view ITO as a new way to manage IT in an organization, which introduces new challenges to IT governance and project management. As they study ITO in public agencies, IS researchers depart from the general view on ITO and focus on sectoral differences. This is why they note the "implicit ideological assumptions that markets are inherently more efficient" (De

Looff, 1996b, p.91) which dominated many public sector ITO decisions of the time. Currie (1996) criticizes governments for “fixation on competition, performance, measurement, value for money and market testing" (p.232). Her case study shows how the belief in market superiority led to signing several large long-term contracts, followed by elimination of clients’ internal IT departments, loss of control over IT and subsequent grand failures (Ibid.). A clear argument was made in the 1990s against total outsourcing strategies, and this theme rarely appears in later publications.

The PA research approaches ITO from a different standpoint. It views outsourcing as a form of privatization, and IT as one of many functions that should be sent out if it is cost efficient. Only a few PA publications in the 1990s paid specific attention to the unique characteristics of IT compared to other outsourced functions (e.g., Graham & Scarborough, 1997).

In the late 1990s, the discussion in the IS outsourcing literature expanded beyond the cost saving approach, and evolved to strategic considerations such as risk assessment, retaining expertise in-house and building a long-term relationship with the vendor (Dibbern et al., 2004). These tendencies take place in the public sector IT outsourcing literature as well (e.g., Beyah & Gallivan, 2001; Peled, 2000). However, there is still little interaction between the fields. Bibliographies of papers in IS outlets include references to IS, management and economics works, but few citations from PA publications (Willcocks & Currie, 1997, is a notable exception). Similarly, the publications in PA journals rarely cite previous works from IS scholars and do not undertake a cross-sectoral analysis. One exception worth noting is the work by Chen & Perry (2003b), whose analytical framework draws insights from studies on contracting from both IS and PA fields.

An ITO scholar from the IS field would find themes in the PA research that are not considered by IS studies, but may be important for understanding the processes in government agencies. First of all, policies are an intrinsic part of public management, and public officers make decisions in accordance with the ideology of the funding government (Young, 2005). Government guidance

documents are the main subject of some analyzed articles (e.g., Sullivan & Ngwenyama, 2005); all others mention politics and regulations at least once. The specifics of public sector values, priorities and organizational goals also affect the practice of public sector ITO. While the main drivers behind outsourcing decisions are common for both sectors, public officers may have additional considerations, such as contribution to community development and job creation (Gordon & Walsh, 1997; Hancox & Hackney, 1999).

The loose connection between the IS and PA research fields and the differences in their approaches to ITO in public agencies suggest that public ITO is a complex phenomenon, and it should be approached as an interdisciplinary research area, as shown in Figure 1.2.

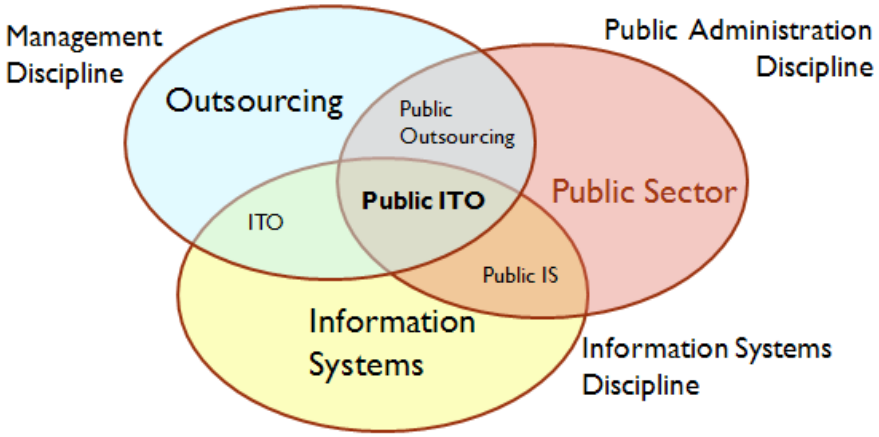

Figure 1.2. The ontology of public ITO research area

3.3. Defining public sector ITO as an interdisciplinary research area

Public sector ITO is an interdisciplinary phenomenon which belongs ontologically to several research fields. As Figure 1.3 illustrates, public sector ITO research overlaps at least three large and deeply researched phenomena. First, any public sector ITO arrangement is an outsourcing contract representing a special type of relationship between two parties and so is related to the science of Management. Second, this contract is specifically related to information management and information technologies, thus it is a subject of the Information Systems research field.

Finally, a special trait of public ITO is that at least one of the contracting organizations belongs to the public sector of the economy, and therefore is of interest to PA researchers. Notably, three research areas have emerged at the boundaries between these three fields. ITO is an established research stream belonging mostly to the IS discipline; however, ITO studies can also be found in Management outlets. Outsourcing of public services to privately owned vendors ontologically lies at the overlap of Management and PA research fields. However, this theme is developed predominantly in the PA literature. The same can be said about the public IS field.

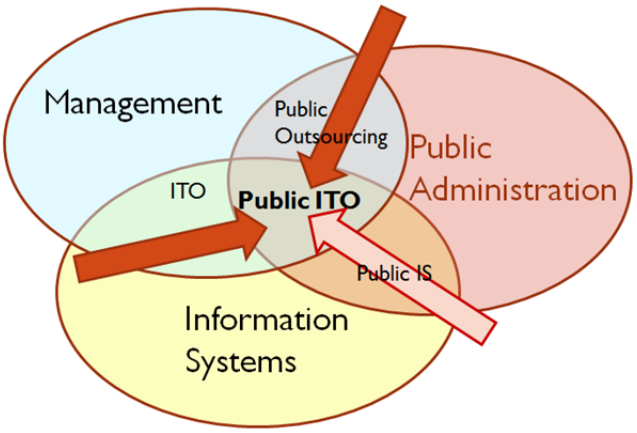

Figure 1.3. The epistemology of Public ITO research area

The epistemological variety enabled by the unique ontological position of the public sector ITO research area brings extant findings from different fields and facilitates the depth of analysis by allowing for combining theories and insights from different disciplines. This is well illustrated by the evolution of ITO to a research field on its own. As IT became probably the most commonly studied outsourced function, ITO research developed at the boundary between the Management and IS disciplines, combining the approaches and analytical tools of both. In a similar manner, public outsourcing and public IT are two interdisciplinary research areas between Management and PA, and IS and PA respectively. These two research areas are “shifted” towards the PA discipline which is naturally focused on processes and events in governmental agencies.

The following section describes the results of my in-depth analysis of the extant public sector ITO literature; these findings are accumulated and developed into an analytical framework.

4. LITERATURE ANALYSIS AND FRAMEWORK DEVELOPMENT

My focus in this analysis is on issues and concerns in the public sector ITO that are notably different for public and private organizations or exist only in a governmental context. The results of this analysis of previous research are presented below. Appendix B contains a summary of the most frequently mentioned public sector ITO issues and concerns.

4.1. The drivers of IT outsourcing decisions in the public sector

Cost efficiency was initially the main purpose of ITO and the main driver of organizations' decisions to outsource. However, outsourcing may also help in achieving strategic goals and access to valuable resources. As ITO gained popularity and was often considered a best practice, many organizations experienced pressure to outsource from either competitors or stakeholders. Decisions to outsource therefore have economic, strategic, and institutional drivers in both private and public organizations. However, some arguments for or against outsourcing are more prevalent in one sector or the another. Also, drivers that are common to both sectors may have different priorities in each sector.

4.1.1. Costs as the only reason to outsource

Cutting costs was the initial motivation for ITO, and remains the first and the most important reason to outsource. Over the years, other important considerations, such as the need to retain technical expertise in-house, switching costs and ability to adequately monitor a vendor's performance, became obvious. While private businesses analyze a whole set of criteria before the decision to outsource is made, this is not the case for most public agencies.

The strong political belief in the efficiency of market mechanisms led to state and federal legislation that leave local agencies with no choice but to outsource. For example, British public agencies are legally required to outsource anything that can be done by outside contractors at a lower cost than in-house (Burnes & Anastasiadis, 2003). This requirement does not distinguish between IT and other functions, leaving no space for any considerations besides cost. Vendors often can be selected only through a strictly regulated tendering process; a public organization must sign a contract with the lowest bidder. At the same time, it was found that when direct negotiations are allowed instead of tendering, the tendered contracts are no cheaper than negotiated ones (Domberger et al., 2007).

4.1.2. Strategic solutions for technology changes and the challenging job market

Probably the most distinctive trait of IT compared with other outsourced functions is its rapid evolution and accompanying changes in its underlying economics (Lacity & Willcocks, 1995). It is not surprising then that both sectors mention access to technical expertise and resources as a driver of outsourcing decisions almost as often as the need to cut costs (e.g., Leimeister & Krcmar, 2008).

Gaining access to technical expertise is extremely challenging for governmental agencies. The public sector, with its rigid employment regulations, cannot offer competitive salaries to high quality IT professionals. Moreover, technical experts are not easy to retain. Timbrell et al. (1998) mention a strategy that is popular in the financial industry: legacy functions are outsourced so that the in-house staff can work on new technologies. In these circumstances, outsourcing may be the only real opportunity for a public agency to gain access to high-level professionals and technologies (Khalfan & Gough, 2002; Willcocks & Currie, 1997).

At the same time, employment regulations are also reported as an obstacle to outsourcing. Various restrictions and policies make downsizing of an internal IT department hard and costly. The widespread outsourcing practice of transferring client's IT employees to the vendor company

is also challenging. Formally, staff should be still laid off from the public agency in order to become employees of a private vendor. The challenges of employment policies are combined in this case with employees' resistance to transfer and low retention rates (Ruzzier et al., 2008; Graham & Scarborough, 1997).

4.1.3. Institutional pressures on public organizations

Along with economic and strategic factors, institutional pressures infer considerable influence on organizations' behavior in general and on decision making in particular. Institutional pressures are often classified as normative, mimetic and coercive (DiMaggio & Powell, 1983). Normative pressures direct organizations to act in accordance with their declared values and with the norms of surrounding society. In situations of economic and political uncertainty, organizations tend to choose an industry leader and simply follow the leader's behavior (Ibid.). Since the leader's behavior is often declared a best practice and becomes a norm, it is not always easy to distinguish between normative and mimetic pressures.

Institutional pressures are traditionally much stronger in the public sector than in the business world (Rainey et al., 1976), and the public sector ITO literature provides rich evidence of this. The ideology of the market's inherent efficiency created expectations for public agencies to outsource everything possible. As many public agencies outsourced, others felt a strong pressure to follow them. A salient example of pure normative pressure is De Looff's (1996a) observation that Dutch government officials were expected by governments of larger countries (the UK and the US) to follow their privatization course. Mimetic effects were especially strong in the mid-1990s, when businesses and governments alike enthusiastically joined "the outsourcing bandwagon" (Lacity & Hirschheim, 1993). Willcocks and Currie (1997) reported that in public organizations the response to the hype was stronger than even cost considerations.

The prevalence of institutional pressures over cost considerations is supported by the fact that existing internal IT capabilities were not considered when making an outsourcing decision. Many

decision makers clearly favored the outside bids over in-house proposals, or even did not consider internal proposals at all (Currie, 1996; Lacity & Willcocks, 1997).

After a number of large-scale total ITO projects signed by governments in the 1990s turned to large-scale failures, public agencies experience much less normative and mimetic pressure to outsource. Recent studies show, however, that, despite lessened pressure, political considerations are still among the strongest drivers for public IT outsourcing (Ya Ni & Bretschneider, 2007). Coercive institutional pressures require compliance with externally imposed requirements, usually laws or regulations. Regardless of the economic and strategic considerations of public agencies, the decision to outsource most often comes from higher level authorities. Many ITO projects, especially large-scaled ones, are simply imposed on local or regional public agencies by the federal government (Hancox & Hackney, 1999; Seddon, 2001). An overall mandate from the government underlay the outsourcing contract of British Inland Revenue signed in 1993 - the largest outsourcing agreement in Europe at the time (Willcocks & Currie, 1997). Several Dutch public IT departments were privatized "regardless of the possible consequences" (De Looff, 1995). Similar evidence comes from Australia (Gordon & Walsh, 1997) and Israel (Peled, 2001). Not surprisingly, satisfaction from outsourcing arrangements is much higher in organizations making the decision to outsource independently, without pressure from higher authorities (Edguer & Pervan, 2004).

Public officials justify their outsourcing projects with economic and strategic reasons, similar to those in the private sector. Cutting costs and gaining access to technology expertise are the two reasons to outsource most often mentioned by private organizations. Public agencies pursue these two goals as well. However, institutional pressures turn out to prevail in decisions to outsource public sector IT. Many public agencies are simply forced to outsource by higher authorities regardless of their own considerations. Businesses also experience institutional pressures: normative and mimetic from customers and competitors, coercive from laws and regulations.

Nevertheless, businesses make outsourcing decisions on their own, which is not the case for many public organizations.

4.2. The Unique Perils of Managing Public ITO

Improper project management is the leading reason for failure of public sector ITO initiatives (Lin, Pervan & McDermid, 2007). The governmental approach to project management is defined by its dominant organizational structure and culture, along with the complexity of its external context.

4.2.1. Uncertainty caused by short-term budgets

Unlike private companies which have full control over their assets, public agencies get short-term budgets from external authorities. Not only are the budgets short-term (usually a year), they also may change abruptly with any political event, such as an election. This is a serious obstacle for long-term planning and for managing a complex outsourcing project (Burnes & Anastasiadis, 2003; Willcocks & Currie, 1997). Most ITO projects require an initial investment from both the client and the vendor. The uncertainty of a project's future increases risk and discourages vendors from entering the project (Gordon & Walsh, 1997; Willcocks & Currie, 1997). Currie (1996) quotes a public manager who describes his job as "managing in the dark." Survey respondents in her study repeatedly complained that budget uncertainty does not allow for planning more than a year ahead.

4.2.2. "Procurement paradigm"

"Senior politicians were invariably not knowledgeable of IS and were little concerned about the IS implications of their decisions." Lacity and Willcocks (1997, p.101) observed this pattern in both the UK and the US. In private companies ITO is often a strategic move where top executives are closely involved. In the public sector, project success is also affected by top management attitude (Moon et al., 2007). However, many public organizations still perceive outsourcing,

including ITO, as an administrative activity similar to procurement. The responsibility for ITO is then delegated to middle management with limited decision making authority. The harmful consequences of this approach are aggravated by public organizations' lessened flexibility in managing relationships. Chen and Perry (2003b) studied the influence of management practices on ITO performance in three federal agencies and concluded that the role of top officials in managing ITO relationships is critical. They argue that public managers should take a strategic approach to ITO and shift their perspective from a traditional procurement view to making a long-term commitment which involves contract management and building a partnering relationship.

4.2.3. Contract Management and Guidance Documents

ITO literature recognizes the critical importance of contract management for the success of an outsourcing endeavor. This includes, in particular, risk assessment and performance monitoring. The major issues related to public sector ITO contract management are presented in Appendix B. An ITO contract creates interdependence between the client and the vendor and makes the client vulnerable to possible vendor opportunism. Overreliance on a vendor's expertise and goodwill may result in loss of control over the technology and the current project status to the vendor or to a mediating consultant (Peled, 2001). Such loss of control is the most common ITO risk for both businesses and public organizations. It is argued, however, that public agencies have a higher risk of losing control over their IT to a vendor. According to Burnes and Anastasiadis (2003), it is common for businesses to align their knowledge about a project with the vendor's; public agencies often overlook this opportunity. Failure to retain enough technical expertise in-house is considered the main reason for loss of control by public agencies (Lin et al., 2007; Willcocks & Currie, 1997). Two publications by Peled (2000, 2001) discuss why a technically incompetent public officer cannot lead an ITO project and illustrate how the process of losing control to an external consultant unfolds.

Another key to successful management of an outsourcing relationship is a client's ability to monitor and evaluate performance. Although many methodologies exist for evaluating ongoing projects, their complexity and costs make them have little value for practitioners (Lin et al., 2007). At the same time, public agencies, especially those involved with elected public officers, have an increased need for performance monitoring. Formalized and documented procedures for overseeing ITO projects are a necessity when decision makers change frequently (Gordon & Walsh, 1997). Many governmental jurisdictions provide their subordinates with guidance documents for managing ITO risks and evaluating performance. Sullivan and Ngwenyama (2005) studied three risk assessment guidelines from different countries, and found differences in scope, approach, style and level of detail. There are also commonalities; in particular, all three analyzed documents fail to fully address the ITO risks indicated by the literature (Ibid.).

Public managers see in prescriptive documents a legal constraint rather than an aid (Burnes & Anastasiadis, 2003; Currie, 1996). At the same time, being required to follow such guidelines, they stop any other attempts to identify and adopt effective control mechanisms (De Looff, 1995; Lin et al., 2007; Sullivan & Ngwenyama, 2005). The quality and completeness of official prescriptive documents is therefore critically important. However, the evidence from different countries suggests that they are usually of little help or even counterproductive.

4.3. Controversies in cross-sectoral collaboration

The argument from the extant literature that the noncompetitive nature of public agencies makes them more collaborative, at least among themselves, does not find much support in the analyzed publications. Three works mention co-sourcing projects of disparate agencies (De Looff, 1995; Edguer & Pervan, 2004; Seddon, 2001); these projects did not foster collaboration among the participants.

Building collaborative relationships with a private vendor arises from the public sector ITO literature as especially challenging. The difficulty is rooted both in differences of organizational ethos and in the over-formalized approach of public organizations with respect to communication.

4.3.1. Differences in organizational ethos

The idea that "public service organizations are best managed as if they were businesses," (Cordella & Willcocks, 2010, p.83) which was actively supported by governments over the past several decades, is seen by some authors as being at odds with traditional public sector ethos of service to the community (Currie, 1996). Newer works admit that the goals of providing better service and reducing budget and staff may conflict, and that public organizations may be forced to provide services regardless of economic or strategic considerations (Lin et al., 2007). It is also not clear what the scope of applicability for public ethical norms is. Do they apply to a privately owned vendor company? Mulgan (2005) gives an example: the practice of hiring family members is considered unethical in the public sector; in the business world it is normal and sometimes even encouraged. He further argues that the blurring borders between the two sectors make definition of the "public scope" more vital and more complicated at the same time (Ibid.).

4.3.2. The primacy of contract over partnership

Government agencies are accustomed to detailed and inflexible contracts that include formalized procedures for communication and define penalties for any breach of contract. Businesses, on the other hand, often use informal communication to resolve minor conflicts and misunderstandings and align with each other's expectations (Ruzzier et al., 2008). Public organizations lack the flexibility of informal information exchange; one immediate consequence is that they often have unrealistic expectations (Domberger et al., 2007). Burnes and Anastasiadis (2003) are convinced that in some situations a public agency would terminate a contract while a private company would resolve the issue informally to mutual satisfaction. In addition to contractual rigidity, public organizations have a suspicious perception of vendor's profit motives (Hancox & Hackney,

1999) which makes them more prone to conflict. Vendors' experience and capability to work with governmental agencies is therefore an important factor in relationship quality, and as a result, in project effectiveness (Kim, 2005).

The quality of an outsourcing relationship is a critical factor for ITO success. Moon et al. (2007) confirm that this is true for public organizations as well. However, due to differences in organizational culture and values, public clients and private vendors rarely develop partnering relationships (Guah & Currie, 2007; Hancox & Hackney, 1999).

4.4. The analytical framework

The general ITO research has developed in three main directions: IT sourcing decisions, contract management and relationships management (e.g., Lacity et al., 2009). Although the sets of problems addressed by each of these three core research streams overlap, each stream has its own focus and own repertoire of theories, approaches and frameworks. Given the assorted spectrum of problems covered by each of these three research directions, their attention to the specifics of the public sector should have different foci. Thus, based on this trichotomy, I propose an analytical framework summarizing the issues and concerns specific to public sector ITO as they emerge from my review of the literature in Section 4.

I classify the unique and special traits of public sector ITO as "internal" - coming from the nature of the public service and its organizational culture, and "external" - coming from policies and regulations developed by higher authorities. It is important to keep in mind that this classification is not a dichotomy; policies and regulations are an intrinsic and often formative part of the public sector managerial practice and organizational culture. My framework maps the most pertinent issues in public sector ITO (also presented in Appendix B) into three core areas of the ITO inquiry, as illustrated in Figure 1.4.

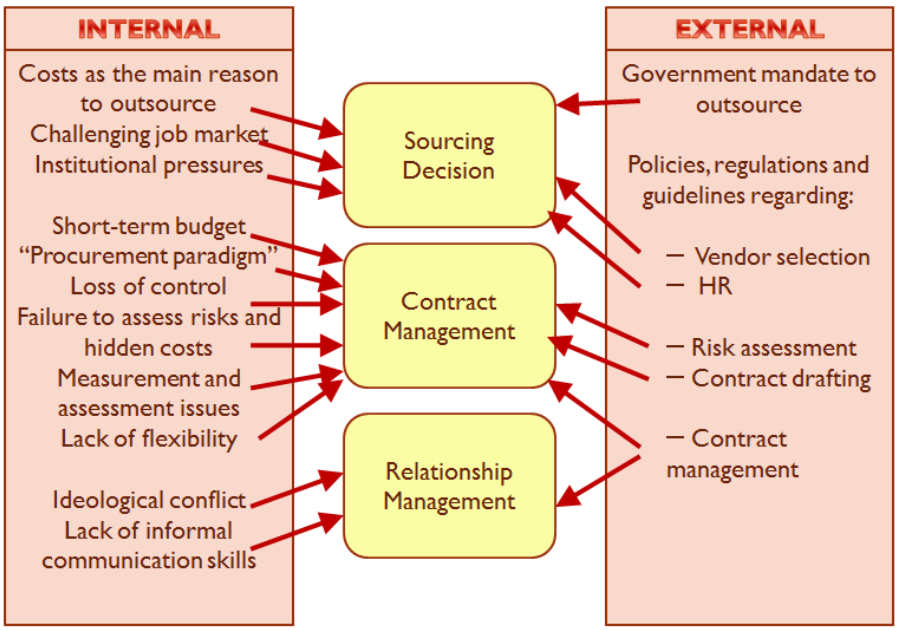

Figure 1.4. Framework of issues and concerns unique to public ITO

In general, ITO research, both academic and practice-oriented, offers a whole spectrum of theoretically sound and empirically tested models and frameworks of ITO. My framework, however, is the first to address the unique traits and perils of public sector ITO. It is not meant to replace existing analytical tools, but is intended to be used in combination with any of them. Some areas are not yet covered by existing public sector ITO literature. For example, informal communication between a client and a vendor has gained significant attention from ITO researchers, but is not yet reflected in the public sector ITO research. Moreover, some ITO related phenomena are supported by the governmental organizational context but are not possible in the business world. In particular, the growing use of interorganizational systems by public agencies has led to the emergence of ITO arrangements in which the client is a collaborative initiative of several organizations. Paradoxically, the collaboration of business market players is significantly impeded not only by competition but also by anti-trust regulations; at the same time, the overall highly regulated public sector provides a much more supportive environment for information exchange and interorganizational collaboration. Managing ITO with a complex multi-

organizational client is, therefore, a relevant theme for the public sector ITO research but not for ITO research in general.

It is important to note that the proposed framework is based on an analysis of highly fragmented literature. I expect it to be expanded and refined as public sector ITO research develops. Also, it should be tested empirically.

The next section presents the results of my data analysis which had a twofold goal. First, I used the data to verify the pertinence of issues indicated by part of the framework. Second, I explored a new dimension in the public sector ITO research - behavior of a collaborative interorganizational initiative as an ITO client.

5. THE CONTEXT OF THE EMPIRICAL STUDY

Governmental interorganizational collaborations – and in particular those collaborations that involve interagency information systems - are becoming more and more popular (e.g., Riggins & Mukhopadhyay, 1994). In terms of the seminal work of Santos and Eisenhardt (2005), who discuss various types of organizational boundaries, participation in a collaborative initiative allows for expanding an organization's boundaries of competence, power and identity without changing its formal legal boundaries. PA researchers argue that the public sector has a higher propensity for technology-centered interorganizational collaboration than the business world. Businesses see their IT as a strategic asset which has to be guarded and not shared. Governmental agencies, on the contrary, "are often willing to share the most intimate details for the systems they are most proud of" (Rocheleau & Wu, 2002, p.384). Moreover, sharing technology and reusable software may be a source of prestige and professional opportunities for governmental officials (Ibid.). Johnson, Leenders and McCue (2003) note that resource scarcity leads to tighter competition in the private sector, while public organizations react to cutbacks with increased inter-organizational collaboration and centralization, such as forming purchasing consortia.

Studying public collaborative initiatives as ITO clients will potentially provide a deep insight into patterns of interorganizational communication in the public sector - both among the members of a collaborative initiative, and between a governmental body and a privately owned outsourcing vendor. In particular, I expect the collaborative organizational philosophy and internal managerial practices to have an impact on IT sourcing decisions, contract management and relationship building. For my analysis, I use a rich descriptive dataset collected as a part of a large-scale NSF funded[1] study investigating inter-organizational collaborations enabled by ICT in support of the information sharing and interoperability needs of police and associated public safety organizations (Fedorowicz et al., 2007), further referred to as Public Safety Networks (PSNs). The overall goal of the large-scale study is to help public safety organizations realize the value of joining together and establishing shared IT-based resources for information exchange and communication. Broadly, the two main research questions of the PSN study are:

Why do public safety collaborations occur in some places and not others?

What makes public safety collaboration successful?[2]

I use the PSN study data to verify the relevance of issues comprising the "sourcing decision" part of my analytical framework. Out of the three main dimensions of ITO research, sourcing decision is the most represented in the literature (27 of 30 public sector ITO papers summarized in Appendix B address at least one issue related to sourcing decisions). Sourcing decisions create the foundation for the contract and relationship management that follow; therefore, issues related to sourcing decisions are likely to affect all stages and aspects of the outsourced arrangement. The relevant part of the analytical framework is depicted in Figure 1.5.

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[1] *National Science Foundation grants NSF-0852688 and NSF-0534877.*

[2] *For additional information on the PSN study and its current status, please consult the study website http://www.publicsafetynetworksstudy.org/*

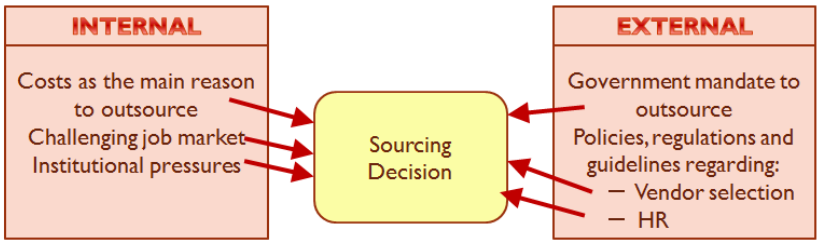

Figure 1.5. The "Sourcing decision" part of the analytical framework

The richness of the PSN study data set allows for exploratory analysis of a whole spectrum of organizational characteristics. In particular, these data offer a unique opportunity to gain insight into the behavior of a collaborative interorganizational initiative as an ITO client.

In this study, therefore, I focus on the following research questions:

> ***Do the issues indicated by public sector ITO literature affect PSN sourcing decisions?***
>
> ***How is the collaborative nature of PSNs related to sourcing decisions and the outcomes of outsourcing arrangements?***

The remainder of the paper describes the methodology, presents the results of preliminary data analysis and discusses findings, limitations and expected benefits of the study.

6. RESEARCH METHODOLOGY

The data set collected as a part of the PSN study captures various aspects of the inception, development and governance of a large number of PSNs that are spread across all the United States and operate on both state and local governmental levels (Williams et al., 2009). The geographic distribution of PSNs is depicted in Figure 1.6. Table 1.1 summarizes the functional types of the participating PSNs. Additional descriptive statistics on PSNs – their overall goals, supported functional areas, technology objectives and the types of data and technology PSNs work with – are available in Appendix E. Over half of the interviewed PSNs outsource some of their IT functions or have outsourced in the past (Table 1.2).

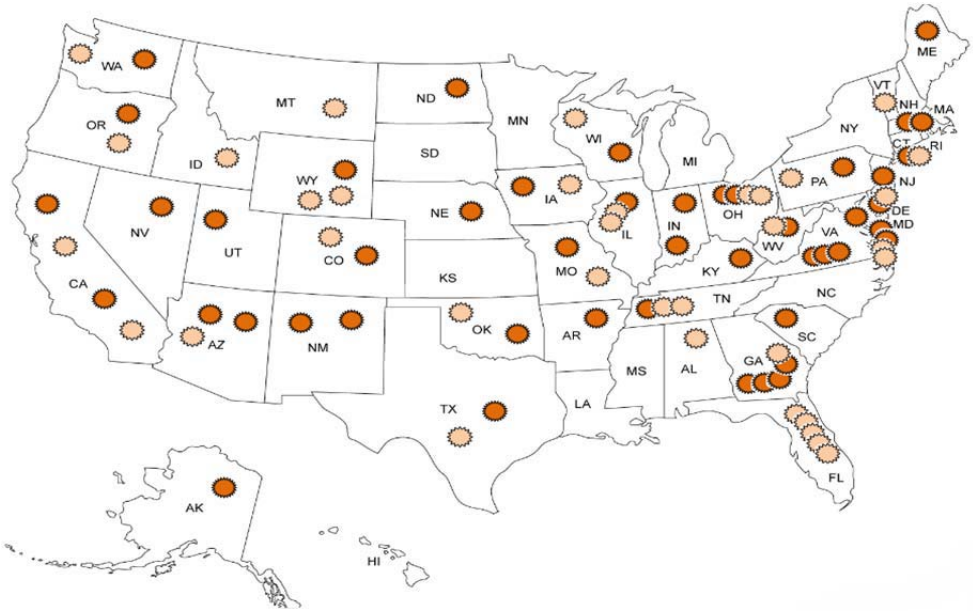

Figure 1.6. Geographic distribution of outsourcing and non-outsourcing PSNs

	Frequency	Percent
Homeland security/emergency management	15	18.3
Integrated policing system	13	15.9
Integrated Criminal Justice Information System (ICJIS)	34	41.4
Communications interoperability project	10	12.2
Other (including combinations of other functional types)	10	12.2
Total	82	100.0

Table 1.1. Functional Types of PSNs (coded by the research team)

Outsource now	32
Outsource now and have past outsourcing experience	10
Do not outsource now but outsourced in the past	5
Never outsourced	35
Total	82

Table 1.2.Total outsourcing PSNs

6.1. Data collection

The preparation for data collection commenced with locating PSNs through web sites, newspaper articles and trade press publications. Other secondary sources included public safety oriented conferences, research centers and professionals at governmental agencies. These efforts resulted

in a list of 136 federal, state, metropolitan and local initiatives. For each PSN, contact information was found and a contact person identified.

Interviewing the PSN representatives started in May 2009 and was completed in April 2010. The contact persons from the list were first notified via e-mail about the study. Shortly after the e-mail notification, trained interviewers from the Pennsylvania State University Survey Research Center (SRC) initiated contact with the pre-screened participants by phone. The data were then collected through structured telephone interviews. During the interviews, the participants were encouraged to follow along with a read-only version of the script on the Web. Each interview took 45 to 60 minutes to administer. An overview of the main interview themes is presented in Appendix C.

The final cleaned data set includes a total of 82 full interviews (60.3% response rate) representing 39 states and Washington DC. Over 400 variables, predominantly categorical, provide a comprehensive overview of the PSNs' characteristics, including their history, organizational structure, governance, IT architecture and ITO experience. A research team consisting of four professors and six PhD students manually coded several key characteristics of each PSN (such as functional type and administrative level) as well as answers to optional open response questions.

6.2. Research design

The purpose of the data analysis in this study is twofold. First, the issues related to sourcing decisions that are indicated in the analytical framework are verified using the PSN data. Second, the relationship among a PSN's decision to outsource, its satisfaction with outsourcing outcomes, and patterns of communication within the PSN are tested.

The data for some of the analyses (such as the reasons for outsourcing and the reasons for terminating the outsourcing arrangements) have been collected only from those PSNs that outsource their IT now or have been doing so in the past. When analyzing sourcing decisions, only those PSNs that made the decision to outsource voluntarily (i.e. not forced by policies or mandate) are considered.

Other analyses are based on comparing outsourcing PSNs with those that never outsourced. Analyses related to outsourcing success juxtapose successful outsourcers to less successful ones using PSNs' self-reported satisfaction with achieving outsourcing goals (Table 1.3). A total of 33 respondents see their outsourcing goals as achieved, and an additional ten respondents report that their goals were achieved in part. The three failed cases are excluded since all three did not make their sourcing decision on their own. A case where the answer "too early to tell" was given was also dropped from the analyses.

	All outsourcers		Current outsourcers	
	Frequency	Percent	Frequency	Percent
Outsourcing goals have been achieved	33	70.2%	30	71.4%
Outsourcing goals have been achieved in part	10	21.3%	9	21.4%
Outsourcing goals have not been achieved	3	6.4%	2	4.8%
"Too early to tell"	1	2.1%	1	2.4%
Total	47	100%	42	100%

Table 1.3. Success in achieving outsourcing goals

7. FINDINGS

It is widely known that ITO projects are not always successful. For example, nearly 70% of the Dun and Bradstreet Barometer of Outsourcing respondents reported that their relationships with vendors failed (Felton, 2006). The extreme complexity of collaborative interorganizational IT and the unique challenges of public sector ITO suggest even lower success rates for PSNs. At odds with these expectations, PSNs' satisfaction rates (summarized in Table 1.3) are relatively high.

7.1. Issues related to sourcing decisions

Table 1.4 summarizes three primary reasons to outsource as reported by the study participants. Ten respondents identified both cost cutting and issues related to hiring and retaining high quality IT professionals as the drivers for outsourcing. Four others claimed that all three reasons were

important for their decision to outsource. Interestingly, no respondents identified cost cutting as the only reason for outsourcing. This finding is consistent with trends in private sector ITO where strategic and technological considerations are now just as important reasons to outsource as cost cutting (e.g., Leimeister & Krcmar, 2009; Gonzalez et al., 2010).

The increasing importance of gaining access to technical expertise as a reason to outsource is also in line with the abovementioned outsourcing trends. Within PSNs, however, this reason clearly dominates: all outsourcing PSNs (with the exception of three PSNs forced to outsource, see below) list IT staff issues as a reason to outsource. For 63.1% of all outsourcing PSNs technical expertise considerations are the only reason. When asked about general problems experienced in the collaboration, outsourcers expressed higher concern than non-outsourcers regarding the helpfulness, availability and skills of IT staff (responses to these three items are summarized in Table 1.5). “Insufficient IT staff” is identified as a problem more often than problems with IT staff skills or helpfulness. Moreover, as can be observed in Table E-6 (Appendix E), “Insufficient IT staff” is the most widespread problem for the whole population of PSNs, not only outsourcers.

	Frequency	Percent
Availability or expertise of staff alone	29	63.1%
Policies, regulations or mandate alone	3	6.5%
Cost cutting alone	0	0.0%
Availability or expertise of staff and cost cutting	10	21.7%
All three reasons (availability of expertise or staff, policies and regulations and cost cutting)	4	8.7%
Total	46	100%

Table 1.4. Distribution of three main reasons to outsource

	Non-outsourcing		Outsourcing		Total
	Frequency	Percent	Frequency	Percent	
Unhelpful IT staff	2	5.7%	4	8.5%	6
Not enough IT staff	12	34.3%	29	61.7%	41
Missing IT skills	7	20%	18	38.3%	25

Table 1.5. PSNs reporting on IT staff-related problems

While private outsourcing companies tend to complain about limited availability of high quality professionals, PSNs' problems with technical expertise lean toward an overall shortage of IT staff. This supports the proposition found in the literature and reflected in my analytical framework that the IT job market is more challenging for public organizations due to their rigid employment and compensation policies (Ruzzier et al., 2008; Graham & Scarborough, 1997).

	Frequency	Percent
No longer needed	4	28.6%
Excessive costs	3	21.4%
Low quality	1	7.15%
Problematic relationship	3	21.4%
Other reason: the vendor was not the lowest bidder on new RFP	2	14.3%
Other reason: both excessive costs and problematic relationships	1	7.15%
Total valid responses	14	100.0

Table 1.6. Reasons for terminating past outsourcing relationships

Table 1.6 summarizes the answers regarding termination of past outsourcing relationships. Two PSNs reported that their vendors failed to submit the lowest bid for a new RFP, which was the only reason for the termination. Although cost cutting does not appear to be the only reason to outsource for any agency in the sample, some may be forced to hire the lowest bidder even if it means switching from a known vendor with an established reputation to a new unknown one. Several findings suggest a significant role for institutional influences on PSNs' sourcing decisions. An important finding is the complete match between policies, regulations or mandate as the only reason to outsource and a failure to achieve outsourcing goals. Three PSNs in the sample indicated policies and regulations as the only reason to outsource (Table 1.4); the same three PSNs report that their outsourcing goals were not achieved (Table 1.3). This is a salient example of coercive institutional pressure.

	Non-outsourcers	Outsourcers	Total	Percent of outsourcers
Federal level	0	7	7	100.0%
State level	15	25	40	62.5%
County level	9	4	13	30.8%
Local level	7	6	13	53.8%
Other	4	5	9	55.6%
Total	35	47	82	74.5%

Table 1.7.The level where PSN initiator was/is located

	Non-outsourcers		Outsourcers		Total
	Frequency	Percent	Frequency	Percent	
Federal agencies	23	65.7%	40	85.1%	63
State agencies	33	94.3%	46	97.9%	79
Local agencies	34	97.1%	46	97.9%	80
Private companies	9	25.7%	19	40.4%	28

Table 1.8.Intended users of PSNs

Tables 1.7 and 1.8 show that PSNs initiated at higher administrative levels (federal and state levels versus county and local levels) and PSNs used by federal agencies have a higher propensity to outsource. Federal and state level authorities are more likely to require outsourcing: six of the seven PSNs that indicated policies and regulations as their reason to outsource were initiated at the federal or state level. It may be that PSNs initiated at state and, especially, federal levels, are likely to experience normative pressures to outsource even if they are not explicitly required to do so.

Along with coercive and normative pressures, institutional theory suggests mimetic behavior as a possible reason for institutional isomorphism. Many PSNs, both outsourcing and non-outsourcing, report that they collaborate with other PSNs. Fourteen of the respondents were also able to name organizations used by their PSN as a model. This evidence suggests that PSNs are generally prone to mimetic institutional isomorphism, but does not provide specific information about mimetic pressures to outsource.

The findings presented in this subsection support all of the issues related to sourcing decisions that were included in the proposed analytical framework (Figures 1.4 and 1.5), with the exception of costs as the primary reason to outsource. The next step in my data analysis aims to understand

how the collaborative nature of PSNs affects their behavior as an outsourcing client. In particular, I will focus on the sourcing decisions and outsourcing arrangement outcomes.

7.2. Sourcing decisions, satisfaction with PSN and satisfaction with outsourcing

The outsourcing literature reports that both companies and public organizations may view IT outsourcing as a way to get rid of the "troublesome" IT function (Lyytinen & Robey, 1999) rather than as a conscious strategic move. Collaborative initiatives need to manage multiple inter-organizational relationships within the collaboration and, therefore, are especially vulnerable to managerial difficulties. When asked about problems in his PSN, one respondent described them in a single word: "Chaos." The context of troublesome governance increases the chance that the IT outsourcing decision is not backed up with a proper understanding of the PSN's IT related needs and the ability to work on these needs with the vendor (e.g., Chen & Perry, 2003). This suggests testing the relationship among a PSN's decision to outsource, its satisfaction with outsourcing outcomes, and satisfaction of its members with the way the PSN is managed.

Table 1.9 summarizes comparisons of PSNs' overall "wellbeing" for outsourcing and non-outsourcing PSNs and for successful and less successful outsourcers.

Measure	Interview question	Answer choices	Comparing outsourcers and non-outsourcers	Comparing successful and less successful outsourcers
Overall number of problems in PSN	"Please indicate if these problems exist with the PSN"	Total of selected items in a list of 14 possible problems.	Outsourcing PSNs report more problems. (Table 1.10a)	"Achievers" report fewer problems than "partial achievers" (Table 1.10b)
Overall satisfaction of PSN participants	"How satisfied are members with the PSN's activities and accomplishments?"	(1) Majority are satisfied (2) Mixed: some satisfied/some dissatisfied (3) Majority are dissatisfied	No difference	No difference
Overall effectiveness of PSN governance	"In general, PSN is effectively governed"	5-point Likert scale: (1) strongly agree (3) neither agree nor disagree (5) strongly disagree	No difference	Successful outsourcers are more satisfied. (Table 1.11)

Table 1.9. Overall satisfaction with PSN's functioning

PSNs that opted to outsource their IT report having more problems than non-outsourcers (Table 1.10a). As noted in Section 7.1, human resource considerations are the most popular reason for IT outsourcing, and the three items in the list of potential problems (helpfulness, availability and skills of IT staff) are mentioned by outsourcing PSNs much more often than by non-outsourcing ones (Table 1.5). Also, PSNs that partly achieved their outsourcing goals experience notably more problems compared to successful outsourcers (Table 1.10b).

	N	Mean	St.dev.	Median	Min	Max
Outsourcers	38	3.68	2.762	3	0	10
Non-outsourcers	24	2.71	2.528	2	0	11

Table 1.10a. Number of problems reported by outsourcing and non-outsourcing PSNs

	N	Mean	St.dev.	Median	Min	Max
Outsourcing goals achieved	30	3.47	2.82	3	0	10
Outsourcing goals achieved in part	7	5.71	3.20	6	1	11

Table 1.10b. Number of problems reported by outsourcing PSNs that achieved their outsourcing goals in full and in part (from a list of 14)[3]

Organizations participating in PSNs are generally satisfied with PSN activities and achievements regardless of the role of ITO. No respondents selected “Majority are dissatisfied” for this question. Some 20-35% of the results were mixed, while other respondents reported that the majority of PSN participants are satisfied. This observation is consistent across all compared groups (outsourcing/non-outsourcing, successful/partially successful).

Overall effectiveness of PSN governance was assessed with a reverse Likert scale question, with “1” meaning strong agreement and “5” meaning strong disagreement. As Table 1.11 shows, sourcing decisions are not related to satisfaction with PSN governance, but less effective PSN governance is associated with less successful outsourcing.

	N	Mean	St.dev.
Outsourcers	41	1.83	.892
Non-Outsourcers	32	1.84	.884
Outsourcing goals achieved	30	1.70	.702
Outsourcing goals achieved in part	10	2.30	1.252

Table 1.11. The effectiveness of PSN governance (1 – "strongly agree", 5 – "strongly disagree")

These findings confirm that outsourcing PSNs are not less successful compared to non-outsourcing PSNs. While, according to the literature, IT outsourcing is often a desperate attempt to solve non-IT related managerial problems (e.g., Lyytinen & Robey, 1999), this is not the case with PSNs. The findings also show that more problematic PSNs with less effective governance mechanisms do not get what they want from outsourcing arrangements. It is likely that ineffective governance mechanisms lead to ineffective management of client-vendor relationships. Failure to analyze requirements and set realistic outsourcing goals is another possible consequence of poor governance (Domberger et al., 2007).

In this section, I analyzed connections between the outsourcing behavior of PSNs and the quality of the communication between the PSN's governing bodies and organizations participating in the PSN. This type of communication is often referred to in the literature as "vertical communication." In the next section, I focus on the relationship between a PSN's sourcing behavior and communication among the PSN's participating organizations ("horizontal communication"). My ultimate goal is to understand the relationship between these two types of internal (within a PSN) communication and the ways the PSN builds its external communication (with outsourcing vendors).

7.3. Communication within a PSN, its sourcing decisions and outsourcing success

Public Safety Networks are, by definition, IT-focused interagency collaborations of public safety organizations. Systems and infrastructures developed by outsourcing vendors for PSNs serve a

variety of members and stakeholders, with different needs and often different backgrounds. Therefore, communication among outsourcing stakeholders within the PSN is essential for outsourcing success.

Measure	Interview question	Answer choices	Comparing outsourcers and non-outsourcers	Comparing successful and less successful outsourcers	Table (App F)
Internal communication in PSN	“How does the governance body of the PSN solicit input from stakeholders?”	(1) Informally only (2) Formal process only (3) Both (4)Neither	Outsourcers are slightly more balanced between formal and informal.	No difference	F-1
Previous collaboration among PSN members	"Was this the first time PSN’s members collaborated on a public safety initiative?"	(1) Yes (2) No (3) Don't know	No difference	No difference	F-2
	"Was data sharing a commonly accepted practice among PSN participants before the PSN was initiated?"	(1) Yes (2) No (3) Among some members (4) Don't know	No difference	No difference	F-3
	"Was it a relatively recent or longstanding practice?"	(1) Recent (2) Longstanding	PSNs with a longstanding data sharing outsource slightly more	PSNs with a longstanding data sharing are more successful in outsourcing	F-4
Propensity to collaborate with PSN members	"Have any new initiatives among PSN participants as a result of this PSN?"	(1) Yes (2) No	Outsourcers participate in new collaborations more	No difference	F-5
Propensity to collaborate with non-PSN members	"Does the PSN collaborate with other public safety networks?"	(1) Yes (2) Planned (3) No	No difference	No difference	F-6

Table 1.12. Collaboration and informal communication

Table 1.12 summarizes measurements capturing PSNs’ approach to collaboration and informal communication. Tables with detailed statistics for each item can be found in Appendix F. There are only two PSNs in the whole sample that do not use informal communication channels within the PSN (Table F-1). By contrast, few PSNs communicate only informally. Most

informants reported they employ a more balanced approach. The percent of those using both formal and informal communication is higher for outsourcing PSNs compared to non-outsourcers. A comparison between successful and less successful outsourcers did not show any observable difference.

Only 37% of PSNs' founding members report having similar previous collaborations; a higher percentage (49%) were involved in data sharing before the initiation of a PSN (Tables F-2 and F-3). As Table F-4 shows, PSNs with longstanding data sharing practices are slightly more likely to outsource, and much more likely to achieve their outsourcing goals compared to those PSNs that started to share data recently. Participation in a PSN facilitates new collaborations - 74% of respondents report that new collaborative initiatives have been created among PSN members. Members of PSNs that reach out to outsourcing vendors are more likely to participate in new collaborative initiatives (Table F-5). However, reaching out to outsourcing vendors does not affect a PSN's propensity to collaborate with other PSNs (Table F-6).

These findings show that previous collaborative experience affects the propensity to outsource and outsourcing success. PSNs with a balanced approach to communication outsource slightly more often. Interestingly, PSNs with previous data sharing experience do not appear to outsource more or be more successful in outsourcing than PSNs without such experience. However, there is a difference between longstanding and relatively recent practices of previous data sharing. PSNs with a long history of previous data sharing clearly outperform those with a shorter data sharing experience. This may be due to trust issues, which are extremely pressing for public agencies involved in data sharing. Overall, the findings suggest that communication quality in a PSN and the previous collaborative record of its members have a mild, but noticeable effect on sourcing decisions, and, to a lesser extent, on success of outsourcing arrangements.

8. DISCUSSION

The topic of ITO in public organizations has gained only modest attention from researchers in both the IS and PA disciplines. While hundreds of research papers explore ITO in general, an extensive database search for public ITO publications resulted in a highly fragmented and diverse set of academic works. The theoretical contribution of this study is, first, definition of the public sector ITO research area both ontologically and epistemologically, and, second, consolidation of the existing research into an analytical framework which may serve as a starting point for systematic public sector ITO inquiry.

The framework consolidates findings and conclusions from the reviewed literature regarding the most pressing issues of outsourcing public organizations. ITO issues that are unique for public sector are created by both the internal and external environment of governmental agencies, and relate to all three main aspects of ITO inquiry: sourcing decisions, contract management and relationship management. Some of the public sector ITO issues do not exist in the private sector settings. Short-term budgets, often linked to political events, and governmental regulations may serve as examples of unique public sector ITO issues. However, most of the problems indicated in the public sector ITO literature can also be found in the private sector in one form or another. The proposed framework captures only those issues that should be approached differently in the two sectors due to either their pertinence (for example, “Procurement paradigm” is much more widespread in the public sector compared to the private one) or differences in the underlying reasons (for example, the challenges of IT job market are amplified by public sector’s rigid HR policies and inflexible compensation schemes). The academic research on public sector ITO is scarce, and international and interdisciplinary in nature. This makes empirical validation of the resulting framework especially important. In this paper, I aim to validate only the part of the framework related to sourcing decisions.

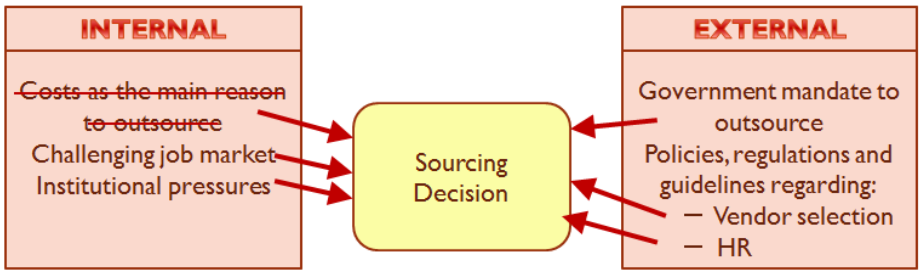

Figure 1.7. Adjusted "Sourcing decision" part of the analytical framework

Field data on eighty-two public safety collaborative initiatives provide empirical support for the relevance of all framework items related to sourcing decisions with one exception. Case studies in the 1990s reported a tendency in public agencies to outsource their IT in order to reduce costs while completely overlooking other, often more critical, considerations. Today, this once widespread and important problem seems to be outdated. However, additional testing is required before it can be removed from the analytical framework. As an interim step, I tentatively altered the "sourcing decisions" part of the framework as illustrated in Figure 1.7.

The data set contains rich data capturing a wide spectrum of PSNs' characteristics, and allows for exploration in many directions. In this study, I focused my attention on two aspects of sourcing decisions and their contribution to the success of outsourcing arrangements. First, I wanted to confirm that sourcing decisions of PSNs are conscious strategic moves and not a desperate search for a quick fix. According to the literature, the latter is a popular scenario. The data reveals that outsourcing PSNs and PSNs that do not outsource have very close rates of overall success, therefore defeating the proposition that less successful PSNs would outsource more often in hopes to resolving some of their internal problems this way. At the same time, the findings show that more problematic PSNs with less effective governance mechanisms are less likely to achieve their outsourcing goals in full. The quality of internal vertical communication in a client organization, therefore, contributes to the performance of an outsourcing arrangement. Using this finding as a starting point, I proceeded to analyze the impact of horizontal communication in a

client organization on sourcing decisions and outsourcing success. The dataset provides information on both past collaborations of PSN participants and new initiatives created by PSN members after working together in the PSN. Data analysis shows that past collaborative experience by itself is not a differentiator. However, a balanced combination of formal and informal communication within a PSN, longstanding past practice of information sharing among PSN participants, and interest in additional collaborations are more characteristic of outsourcers compared to non-outsourcers.

There are many additional dimensions that can be explored with the PSN data. The unique advantage of these data is that they capture a variety of different aspects of PSN functioning (technical, organizational, even geographic and political) that are rarely combined in one dataset. In particular, I plan to explore the connection between technology used by PSNs, outsourced IT functions, reported problems and outsourcing performance.

Along with advantages, the PSN data also have some limitations. These and other limitations are briefly covered in the following subsection.

8.1. Limitations

While this work will enrich our understanding of ITO in public organizations in general and of the role of collaboration in sourcing decisions and ITO success in particular, it has several inherent limitations.

First, the analyzed public sector ITO publications represent several countries, predominantly English speaking. Since public organizations strongly depend on governmental guidance and the political environment, caution should be used when comparing findings from different countries. The few international comparisons in the analyzed publications provide examples of similarities between countries as well as examples of differences. This mixed evidence brings some concerns about the generalizability of the presented literature analysis. Many issues are shared by public organizations around the world, at least within countries with similar political systems. However,

governments employ different mechanisms for funding and control, and the scope of restrictions and provision of guidelines vary from country to country.

Second, the sample includes those PSNs that agreed to participate in the study, which may lead to self-selection bias. Due to the length of the interviews, some of them had been repeatedly postponed, or interrupted and completed at a later date, which could possibly cause non-response or recollection bias.

Third, the PSNs in the sample vary significantly in many dimensions. Some of these dimensions are size, age, level of maturity, organizational goals and applied governance mechanisms. Although the dataset captures a large number of PSN attributes, it does not completely eliminate the drawbacks caused by the high diversity of participants. One salient drawback stemming from the variety in the PSNs' structures and governance schemes is that people interviewed for the study have different job titles and different formal responsibilities. While a significant effort was made to identify the most knowledgeable person in each PSN, the depth of each interviewee's knowledge and the quality of answers vary from participant to participant.

Another limitation comes not from differences among PSNs but from similarities. All PSNs act in the public safety and law enforcement environment, and are subject to the same federal legislations and regulations. While I expect that most findings on PSNs allow for generalization to other types of public service organizations, their ITO behavior and propensity to collaborate may be affected by the specifics of other types of public service (for example, tax assessment).

8.2. Contributions and outcomes

This work makes a valuable contribution to the academic literature in at least four dimensions. First, it identifies the distinct characteristics of ITO management in public agencies and argues that public sector ITO should be recognized as an interdisciplinary focus area for future research. Second, it provides an analytical framework that may serve as a starting point for systematic public ITO inquiry. This is a critical step for a research area currently represented by a

conceptually dispersed set of discrete publications. Third, findings of the public sector ITO research highlight the impact that certain organizational characteristics have on ITO management and success. These organizational characteristics are not necessarily unique for governmental agencies. Therefore, a deeper understanding of their impact on organizational behavior contributes to ITO research in general and can be potentially applied to the general research on interorganizational relationships, not just ITO. Finally, assessing the role of an organization's involvement in collaborative work in its sourcing decisions and perceived satisfaction with ITO enhances our understanding of ITO success factors. This is especially pertinent for public agencies that, according to previous accounts, experience difficulties in building interorganizational relationships.

This study also makes an important contribution to practice. It helps outsourcing vendors understand the challenges of doing business with governmental agencies. It is also beneficial for public officials who can learn about cross-sectoral differences and work on them with their private sector partners. Finally, this study suggests directions for future research, that will develop public sector ITO as an interdisciplinary research area, contribute to both the IS and PA research fields and even raise questions to be addressed by other fields such as Public Policy.

8.3. Directions for future research

The presented literature analysis makes it clear that the current state of inquiry into public sector ITO warrants future multidisciplinary studies along all three main directions of the general ITO research: sourcing decisions, contract management and relationships, as depicted in Figure 1.4.

In the area of *sourcing decisions*, several alterations to the general ITO approach could be suggested to make it more applicable to the governmental context. First, those who make outsourcing decisions and those who implement them are often de-coupled in the public sector. ITO decisions are often made by a powerful official or organization at the top of political hierarchy, while the actual project is managed locally. However, public agencies are used to

regulations, constraints and arbitrary recommendations. Although common sense suggests that independent decision making improves the odds for success, this influence may turn out to be minor. Testing this hypothesis would make an original contribution to both the IS and PA body of knowledge.

In the area of *contract management*, the role of prescriptive documents and legislation is a rich but almost untapped field of inquiry. The vertical hierarchy of public organizations provides well established communication channels for reporting and delivery of directives. It is an exceptional opportunity to leverage the prescriptive communication to a provision of knowledge and help. Unfortunately, the evidence from public sector ITO research suggests that neither the authors of the policies nor those who comply with them perceive these documents as a venue of support. Further investigation into the role of guiding documents in successful public sector ITO management would make a valuable contribution to practice and also introduce the public sector ITO phenomenon to yet another research field, Public Policy.

The area of *relationship management* is the most underrepresented in the public sector ITO research. Some authors briefly mention the prevalence of formal communication in the public sector which dramatically affects organizations' ability to build a fruitful partnership with an ITO vendor. Bureaucracy, distributed decision making, lack of flexibility, suspicions of vendor's profit motives and legal constraints make public agencies tough business partners. No existing public sector ITO study adopts the relationship perspective or focuses specifically on relationship management. This gap in the literature offers many promising research opportunities. An inquiry into cross-sectoral interorganizational relationships would provide new insights to several research fields and to practice.

The growing popularity of collaborative interorganizational initiatives opens a wide range of research opportunities. In particular, investigating the impact that an organization's involvement in a collaborative initiative has on other aspects of its work, such as ITO, would make a valuable contribution to both research and practice. Are collaborating organizations more willing to

engage in ITO? Are they more capable of effective contract management and building informal relationships with the vendor? What kinds of involvement in collaboration have a transformative impact on an organization? Does the experience gained in governmental collaborative initiatives help in building relationships with a privately owned ITO vendor? These are only a few opportunities for future research into possible "side effects" of an organization's participation in an interagency collaborative effort.

Finally, a collaborative interorganizational initiative which acts as a single client in an outsourcing arrangement provides a unique opportunity to study the connection between client-vendor communication and communication practices within the client organization. A complex IT outsourcing project undertaken by a single organization almost always involves different departments and stakeholders within the client company. The objectives and expectations of stakeholders may be as diverse as those of the public agencies comprising an outsourcing PSN. Therefore, it can be expected that communication among a project's stakeholders is not less important in a single client organization than in a collaborative initiative. Boundaries among a PSN's members are explicit, well pronounced and usually addressed by the PSN governance; this is not always the case for a "classic", single organization outsourcing client. This study shows that PSNs with internal collaborative experience demonstrate a higher propensity to outsource, and also suggests a relationship between the quality of PSN's governance and success with IT outsourcing. In the next chapter I elaborate on the connection between internal and external communication of an outsourcing company, with special emphasis on communication in complex and knowledge intensive outsourced projects.

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APPENDIX A

Academic publications that explicitly address the specifics of ITO in public organizations

Paper	Year	Countries	Field	Empi-rical	Qual or Quant	Comparative or Longitudinal	Main Themes
De Looff	1995	Holland	IS	N			Decision making process, factors, vendor selection
Globerman & Vining	1996	Canada	PA	N			TCT model to evaluate an ITO decision
Currie	1996	UK	IS	Y	Mixed	Comparative: public vs. private	Outsourcing strategies
Lacity & Willcocks	1997	USA	IS	Y	Qual	Comparative: federal vs. local	Decision making process, factors and management practices
Graham & Scarborough	1997	Australia	PA	Y	Qual		Adoption of ITO by state government agencies
Gordon & Walsh	1997	USA, UK, Canada, Australia	PA	N			Essay on objectives of ITO in public organizations creation. Tax and accountability issues
Willcocks & Currie	1997	UK	Mgt	Y	Qual	Comparative: total vs. selective	Outsourcing strategy in public organizations
Timbrell et al.	1998	Australia	IS	N			A literature review and research proposal
Hancox & Hackney	1999	UK	IS	Y	Qual	Comparative: public vs. private	Applicability of four theoretical frameworks in public sector
Peled	2000	Israel	PA	Y	Qual		Leadership in outsourcing projects

Seddon	2001	Australia	IS	Y	Qual	Longitudinal	"Cluster outsourcing" case
Peled	2001	Israel	PA	Y	Qual		Balance of powers in governmental ITO Projects
Beyah & Gallivan	2001	USA	IS	N			Application of knowledge management framework to a case study
Chen & Gant	2001	USA	PA	N			Influence of outsourcing vendors on eGov
Khalfan & Gough	2002	Kuwait	Mgt	Y	Quant	Comparative: public vs. private	Motivation, risk assessment and evaluation in public and private organizations
Burnes & Anastasiadis	2003	UK	Mgt	Y	Qual	Comparative: catering vs. IT	Two case studies with a focus of unique issues of outsourcing in the public sector
Chen & Perry	2003	USA	PA	Y	Qual		Developing an analytical framework
Edguer & Pervan	2004	Australia	IS	Y	Qual	Comparative: six cases	Success factors
Mulgan	2005	Australia	PA	N			Moral values, quality of service, compliance
Sullivan & Ngwenyama	2005	USA, Canada, Australia	IS	Y	Mixed	Comparative: three countries	Quality and completeness of prescriptive documents
Scholl	2006	USA	PA	Y	Qual	Comparative: IT vs. other functions	Different sourcing options for e-Gov
Domberger et al.	2007	Australia	IS	Y	Quant	Comparative: public vs. private	Modeling the relationship between price and performance in public ITO
Guah & Currie	2007	UK	IS	Y	Qual	Longitudinal	The role of vendors

Lin et al.	2007	Australia	IS	Y	Mixed	Comparative: public vs. private	Performance management practices
Marco-Simo et al.	2007	Spain	IS	Y	Qual		Importance of ITO for PA research
Moon et al	2007	Korea	IS	Y	Quant	Comparative: public vs. private	Testing private sector success factors on public agencies
YaNi & Bretschneider	2007	USA	PA	Y	Quant	Comparative: ITO vs eGov	The role of economic and political rationality in ITO decisions
Ruzzier et al.	2008	Australia	IS	Y	Qual	Comparative: success vs. failure	Mechanisms of control and their impact on ITO success
Cordella & Willcocks	2010	UK	PA	N			Essay on efficacy of ITO in terms of public ethos and enforcement of democratic values
Moon et al.	2010	Korea	Mgt	Y	Quant		Testing FORT (Four Outsourcing Relationship Types) model

APPENDIX B

Major issues unique for ITO in the public sector

	Restricting ITO decisions to cost considerations	Regulations on			Govern-ment mandate to outsource	Depen-dence on political environ-ment
		vendor selection process	salaries	employ ment		
De Looff, 1995	x	x	x	x	x	
Globerman & Vining, 1996						x
Currie, 1996	x		x		x	
Lacity & Willcocks, 1997	x	x	x			
Graham & Scarborough, 1997	x		x			
Gordon-Walsh, 1997					x	x
Willcocks & Currie, 1997	x			x	x	
Timbrell et al., 1998		x		x		x
Hancox & Hackney, 1999					x	x
Peled, 2000				x		x
Seddon, 2001				x	x	
Peled, 2001			x		x	x
Beyah & Gallivan, 2001						
Chen & Gant, 2001						x
Burnes & Anastasiadis, 2003	x	x				
Khalfan & Gough, 2002			x			
Chen & Perry, 2003	x	x	x	x		
Edguer & Pervan, 2004					x	
Mulgan, 2005						
Sullivan & Ngwenyama, 2005	x	x				
Scholl, 2006						x
Domberger et al., 2007						
Guah &Currie, 2007						x
Lin et al., 2007		x				x
Marco-Simo et al., 2007						x
Moon et al., 2007		x				x
YaNi & Bretschneider, 2007						x
Ruzzier et al., 2008	x	x			x	
Cordella & Willcocks, 2010					x	x
Moon et al., 2010						
Total	9	9	7	6	10	14

Table B-1. Issues and Concerns Regarding the Decision to Outsource

	Uncertainty from short-terms budgets	Lack of manage-ment support; "procure-ment paradigm"	Failure to assess risks and hidden costs	Loss of control to opportu-nistic vendor	Monitoring and perfor-mance evaluation difficulties
De Looff, 1995					
Globerman & Vining, 1996			x	x	
Currie, 1996			x		
Lacity & Willcocks, 1997	x		x	x	
Graham & Scarborough, 1997				x	
Gordon-Walsh, 1997	x				x
Willcocks & Currie, 1997	x	x	x	x	x
Timbrell et al., 1998					
Hancox & Hackney, 1999					
Peled, 2000		x		x	
Seddon, 2001					
Peled, 2001				x	x
Beyah & Gallivan, 2001					
Chen & Gant, 2001	x		x	x	
Burnes & Anastasiadis, 2003			x		
Khalfan & Gough, 2002				x	
Chen & Perry, 2003		x			x
Edguer & Pervan, 2004					x
Mulgan, 2005					
Sullivan & Ngwenyama, 2005				x	x
Scholl, 2006	x		x	x	
Domberger et al., 2007					x
Guah &Currie, 2007					
Lin et al., 2007			x	x	x
Marco-Simo et al., 2007					
Moon et al., 2007					
YaNi & Bretschneider, 2007		x			
Ruzzier et al., 2008				x	
Cordella & Willcocks, 2010				x	
Moon et al., 2010					
Total	5	4	8	13	8

Table B-2. Issues and Concerns Regarding the Management of Public ITO Contracts

	Differences in ideology and account-ability	Issues with sensitive data and intellectual property	Inflexible contracts	Failure to establish relation-ships and transfer knowledge	Distrust of vendor due to its profit motives
De Looff, 1995	x	x	x	x	x
Globerman & Vining, 1996					
Currie, 1996	x		x		x
Lacity & Willcocks, 1997	x	x	x		
Graham & Scarborough, 1997	x		x		
Gordon-Walsh, 1997					x
Willcocks & Currie, 1997	x			x	x
Timbrell et al., 1998		x		x	
Hancox & Hackney, 1999					x
Peled, 2000				x	
Seddon, 2001				x	x
Peled, 2001			x		x
Beyah & Gallivan, 2001					
Chen & Gant, 2001					
Burnes & Anastasiadis, 2003	x	x			
Khalfan & Gough, 2002			x		
Chen & Perry, 2003	x	x	x	x	
Edguer & Pervan, 2004					x
Mulgan, 2005					
Sullivan & Ngwenyama, 2005	x	x			
Scholl, 2006					
Domberger et al., 2007					
Guah &Currie, 2007					
Lin et al., 2007		x			
Marco-Simo et al., 2007					
Moon et al., 2007		x			
YaNi & Bretschneider, 2007					
Ruzzier et al., 2008	x	x			x
Cordella & Willcocks, 2010					x
Moon et al., 2010					
Total	9	9	7	6	10

Table B-3. Cross Sectoral Controversies in ITO Relationships

APPENDIX C

Themes covered by the PSN study structured interview

Demographics:

- Geography: city/state where the PSN is located
- Size: full time equivalent (FTE) of the PSN's employees and IT staff
- Age: year of the PSN's creation

Overall mission of PSN:

- Organizational goals (see Table E-1)
- Supported functional areas (see Table E-2)
- The purpose of the project (e.g., standards development, shared services)
- Intended users of PSN (Feds, state, local, private companies)

History

- Reasons for the PSN creation
- Whom the PSN was modeled after
- Initiators, founders, first members of the PSN

Org structure and Governance:

- Current legal authority
- Organizational type of the PSN (e.g., a separate agency, informal working group)
- Authority the PSN reports to
- Participation of organizations and groups (e.g., State agencies, citizens) in the PSN's governance
- Criteria for including agencies into PSN
- Responsibilities of governance body
- Additional oversighting bodies
- Additional entities the PSN's performance data shared with

Use:

- Current operational status (planning/requirements/prototype/release)
- Current level of use (no/pilot/increasing/decreasing)

Funding:

- Current funding status
- Distribution of funding coming from different sources

Technology:

- Technology objectives of the PSN (see Table E-3)
- Details on the PSN's IT architecture
- Details on technologies and devices used by the PSN (see Table E-4)
- Type of used software (e.g., open source, proprietary)

Data:

- Total number of data sources
- Ownership and access to data sources
- Types of data maintained by the PSN (see Table E-5)

Communication within the PSN:

- Ways of getting input from the PSN's stakeholders
- Overall assessment of the effectiveness of the PSN governance
- Disproportional domination of any of the PSN members
- Disagreements among the PSN members that impede the success of the PSN
- Communication among the PSN members before the inception of the PSN

Communication of the PSN members outside the PSN:

- Additional initiatives or collaborations among PSN members
- Collaboration with other PSNs

IT outsourcing (see also Appendix D):

- Current and past outsourcing arrangements
- Reasons to outsource
- Reasons for termination (if applicable)
- Services that are outsourced
- Activities the vendor is involved in
- Satisfaction with achieving outsourcing goals

Performance:

- The impact of the PSN on
  - overall operational performance of the members
  - productivity of the members
  - data sharing among the members
  - reputation of state IT function
- Performance metrics used by the PSN
- Additional governance bodies the PSN's performance data are shared with

Satisfaction with the PSN:

- Match between technology functionality and expectations
- Satisfaction of external bodies (e.g., State agencies) with the PSN's work
- Members' satisfaction with the PSN activities
- Members' satisfaction with their influence in the PSN

Problems

- Problems from a pre-defined list (see Table E-6)

APPENDIX D

Interview questions about outsourcing

1. Does the PSN currently outsource any of its IT services***?***
   (1) Yes ***(2) No***

2. Has the PSN terminated any IT outsourcing relationships***?***
   (1) Yes ***(2) No***

3. Which of the following best describes why the PSN terminated the IT outsourcing relationship?

   (1) No longer needed
   (2) Excessive costs
   (3) Low quality
   (4) Problematic relationship
   (5) Other reason for termination. Please specify [OPEN ENDED RESPONSE]

4. Which of the following IT services have been outsourced by the PSN?

   1. System analysis ***Yes/No***
   2. System design ***Yes/No***
   3. Programming ***Yes/No***
   4. Data Center operation ***Yes/No***
   5. Computer network management ***Yes/No***
   6. Technical support ***Yes/No***
   7. Project management ***Yes/No***
   8. Other. Please specify [OPEN ENDED RESPONSE]

5. Which of the following was a reason to outsource the PSN's IT services?

   1. Policies, regulations or mandate ***Yes/No***
   2. Cost cutting ***Yes/No***
   3. Availability or expertise of staff. ***Yes/No***
   4. Other. Please explain [OPEN ENDED RESPONSE]

6. Have IT outsourcing vendors participated in any of the following?

   1. Sharing technical experience ***Yes/No***
   2. Definition of requirements ***Yes/No***
   3. IT strategy suggestions and advice ***Yes/No***
   4. Other processes. Please describe [OPEN ENDED RESPONSE]

7. In general, have outsourcing goals been achieved?

   (1) Yes
   (2) No
   (3) In part
   (4) Too early to tell

APPENDIX E

Some descriptive statistics on the PSN dataset

		Frequency	Percent
1	Facilitating information sharing within and across agencies	77	93.9
2	Improving officer safety	42	51.2
3	Providing enhanced services to member agencies	43	52.4
4	Fulfilling existing data reporting requirements	21	25.6
5	Identifying and assessing trends	11	13.4
6	Improving public accountability	12	14.6
7	Managing people resources	24	29.3
8	Others	14	17

Table E-1. Top goals of the PSN ("Select three", 82 valid responses)

		Frequency	Percent
1	Patrol/Police	66	80.5
2	Dispatch/Computer-Aided Dispatch/911	49	59.8
3	Fire	32	39.0
4	Large-scale planned events	38	46.3
5	Criminal investigation	59	72.0
6	Courts, probation and correction	52	63.4
7	Routine emergency incident coordination	36	43.9
8	Disaster/crisis coordination	43	52.4
9	Homeland security	62	75.6
10	Planning or scheduling resources	39	47.6
11	Emergency medicine	22	26.8
12	Traffic control/transport	24	29.3
13	Other	26	31.7

Table E-2. Functional areas supported by PSNs (Yes/No, 82 valid cases)

		Primary Objective		Secondary Objective	
		Frequency	Percent	Frequency	Percent
1	Increasing the number of data sources to which users can get access	46	56.1	22	26.8
2	Increasing the number of users who can get access to data	43	52.4	23	28.0
3	Increasing the mobility of data access	36	43.9	33	40.2
4	Increasing data security	51	62.2	17	20.7
5	Consolidating systems	26	31.7	26	31.7
6	Leveraging existing investments in information technology	42	51.2	29	35.4
7	Upgrading or replacing aging IT infrastructure	32	39.0	26	31.7
8	Improving IT infrastructure reliability	39	47.6	25	30.5
9	Increasing in-house control of the system	21	25.6	23	28.0
10	Increasing the extent of outsourcing	3	3.7	9	11.0
11	Increasing the use of commercial, off-the-shelf s/w	8	9.8	21	25.6
12	Increasing the use of open-source software	9	11.0	28	34.1
13	Increasing system ease-of-use	53	64.6	22	26.8
14	Increasing use of data standards	46	56.1	21	25.6
15	Increasing communications interoperability	58	70.7	15	18.3
16	Other	21	25.6		

Table E-3. Technology-related objectives (82 valid responses)

		Frequency	Percent
1	Mobile phones	41	50.0
2	Smart phones	36	43.9
3	Handhelds/PDAs	57	69.5
4	Radio	44	53.7
5	In-car computers	62	75.6
6	In-car touch screen devices	44	53.7
7	In-car e-mail	37	45.1
8	In-car text message	37	45.1
9	In-car maps/access to geographic information systems	51	62.2
10	In-car voice input/output	18	22.0
11	Other	29	35.4

Table E-4. Technologies and devices that are planned for or used in PSNs (82 valid responses)

		Currently		Planned for future	
		Frequency	Percent	Frequency	Percent
1	Fingerprints	28	34.1	4	4.9
2	Mug shots/photographs	48	58.5	5	6.1
3	License records	41	50.0	2	2.4
4	Court records	40	48.8	4	4.9
5	Notifications	40	48.8	5	6.1
6	Wants & Warrants	52	63.4	1	1.2
7	Real time incident data	43	52.4	6	7.3
8	Dispatch/Computer-Aided Dispatch	32	39.0	8	9.8
9	Chain of custody documents	26	31.7	2	2.4
10	Surveillance video	10	12.2	4	4.9
11	Probations/Corrections	42	51.2	2	2.4
12	Maps/GIS	39	47.6	11	13.4
13	Hazmat information	36	43.9	5	6.1
14	Transportation, congestion, accidents	29	35.4	5	6.1
15	Emergency management plans	31	37.8	3	3.7
16	Federal databases	32	39.0	3	3.7
17	Relevant laws/regulations	36	43.9	2	2.4
18	Terrorist data	21	25.6	6	7.3
19	Other	22	26.8		

Table E-5. Technologies and devices that are planned for or used in PSNs (82 valid responses)

		Frequency	Percent
1	Missing functionality	38	46.3
2	Key data are not available via this system	29	35.4
3	Issues with data quality	30	36.6
4	Technology is not reliable	4	4.9
5	Technology is not secure	5	6.1
6	Technology is so secure as to not be useable	4	4.9
7	Technology performance is poor	2	2.4
8	Technology is not interoperable	9	11.0
9	Problems with IT vendors/outsourcers	13	15.9
10	Bandwidth limitations make it unwieldy	12	14.6
11	Not enough storage and server capacity	7	8.5
12	Unhelpful IT staff	6	7.3
13	Not enough IT staff	41	50.0
14	Missing IT skills	25	30.5
15	Other: Lack of funding	6	7.3
16	Other: Reluctance to share	3	3.7
17	Other problems	4	4.9

Table E-6. Problems experienced by PSNs (operational PSNs only, 62 valid responses)

APPENDIX F

Collaboration and informal communication in PSNs

	Informally only	Formal process only	Both formally and informally	Total
Outsourcing	3 (9.7%)	0	28 (90.3%)	31
Non-outsourcing	4 (18.2 %)	2 (9.1%)	16 (72.7%)	22
Total	7	2	44	53
Outsourcing goals achieved	3 (12.5%)	0	21 (87.5%)	24
Outsourcing goals achieved in part	0	0	6 (100%)	6
Total	3	0	27	30

Table F-1. The ways used by PSN governance bodies for soliciting input from stakeholders

	PSN is the first time collaboration	PSN is not the first time collaboration	Total
Outsourcing	18	13	31
Non-outsourcing	20	9	29
Total	38	22	60
Outsourcing goals achieved	13	16	29
Outsourcing goals achieved in part	4	4	8
Total	17	20	37

Table F-2. Collaborations of PSN founding members prior to the PSN

	Yes	No	Skipped	Total
Outsourcing	17	22	4	43
Non-outsourcing	13	19	3	35
Total	30	41	7	61
Outsourcing goals achieved	12	18	0	30
Outsourcing goals achieved in part	5	4	0	9
Total	17	22	0	39

Table F-3. Data sharing among PSN participants before the PSN was initiated

	Recent	Longstanding	Total
Outsourcing	5	12	17
Non-outsourcing	7	5	12
Total	12	17	29
Outsourcing goals achieved	2	10	12
Outsourcing goals achieved in part	3	2	5
Total	5	12	17

Table F-4. Recent vs Longstanding data sharing among PSN participants before the PSN was initiated

	Yes (new initiatives)	**No (no new initiatives)**	**Total**
Outsourcing	31 (81.6%)	7 (18.4%)	38
Non-outsourcing	15 (62.5%)	9 (37.5%)	24
Total	46 (74.2%)	16 (25.8%)	62
Outsourcing goals achieved	24 (82.8%)	5 (17.2%)	29
Outsourcing goals achieved in part	5 (83.3%)	1 (16.7%)	6
Total	29 (82.9%)	6 (17.1%)	35

Table F-5. New initiatives or collaborations among PSN participants

	Currently	**Planned**	**No**	**Total**
Outsourcing	22	5	10	37
Non-outsourcing	13	5	6	24
Total	35	10	16	61
Outsourcing goals achieved	16	5	8	29
Outsourcing goals achieved in part	5	0	2	7
Total	21	5	10	36

Table F-6. Collaborations of PSNs with other PSNs

CHAPTER TWO. CLIENT'S BOUNDARY SPANNING IN OUTSOURCED ISD PROJECTS – THEORETICAL MODEL AND MEASUREMENT INSTRUMENT

ABSTRACT

The critical role of client-vendor communication in outsourced projects is widely recognized by researchers and practitioners. There is also consensus on the importance of internal communication in an organization when it adopts an integrated IS. However, different types of communication in an outsourcing organization have been never compared or studied together. This paper applies boundary spanning theoretical approach to investigating the interconnection among different types of communication in a client organization outsourcing a complex IT project. A theoretical model connecting client-vendor communication, project related communication within the client organization, and routine communication in the client organization, makes a unique contribution to the literature. Building on previous, predominantly qualitative research, I develop a measurement instrument for assessing the complex abstract concept of boundary spanning and validate it using field data collected from IT project managers through an online survey. Instrument development and validation as well as survey-based data collection contribute to the methodology of boundary spanning research. The next step of this research project is fitting the theoretical model with the collected data using the instrument developed and validated in this paper.

1. INTRODUCTION

An outsourced information system development (ISD) project faces the challenges of managing a complex IT project and, at the same time, the challenges of managing an IT outsourcing relationship.

A decision to undertake a complex ISD project is made with a strategic organizational goal in mind, but the new system should meet the everyday needs of its different stakeholders. The ISD project managers therefore are required to understand the business as a whole and also know how the system can benefit prospective users who come from a variety of backgrounds, experiences and professional settings. Development and adoption of a complex system is an iterative process; users' preferences, organizational priorities and technologies may change several times over the project's lifecycle. The analysis of business' and users' needs in such context is an ongoing rather than one-time activity.

Effective management of an outsourced ISD project requires intensive communication of updated needs and concerns, information exchange, negotiations, and often collaborative brainstorming and joint decision making. In particular, all changes in requirements and preferences need to be presented to the vendor and re-negotiated with him (e.g., Gopal & Gosain, 2009; Lacity & Willcocks, 2004). A client's failure to recognize and analyze the needs of its own users or to adequately present the requirements to the vendor compromises a project's quality, timeline and budget. Even when the system is eventually completed, often it is not well aligned with the client organization's real needs. As a result, a system's adoption may pose a significant challenge, being much less beneficial than initially expected (e.g., Peled, 2001).

Researchers and practitioners alike recognize the critical role of collaborative relationships in the success of outsourced information systems development (ISD) projects (e.g., Dibbern, Goles, Hirschheim & Jayatilaka, 2004; Heckman & King, 1994; Quinn, 1999; Sharma, Apoorva, Madireddy & Jain, 2008). A true collaboration however implies mutual understanding;

discussions only can be fruitful and mutually beneficial if the two parties have a “common language” and shared interpretation of the exchanged information and partner’s behavior (Bødker, Ehn, Knudsen, Kyng & Madsen, 1988). It is common practice for client organizations to retain IT competence “in-house” and to designate a manager, or a group of dedicated IT professionals, to manage an outsourced project. These individuals are responsible for maintaining contact with the vendor, communication of requirements and updates, and overall control over the project’s progress. The same people often manage the intra-organizational project related communication which is essential for understanding the needs of different users and aligning the system with them.

The scholarly literature devotes significant attention to the problems of outsourcing relationships, as well as to the problems of IS alignment with the needs of different users in the adopting organization. The main challenge of an outsourcing relationship is the need to collaborate across a variety of boundaries, not only organizational boundaries, but often geographical and cultural ones as well. The existing research suggests that the success of an outsourcing relationship depends on the organizational capabilities of both sides and also on the professional and personal skills of the people who manage the relationship.

Studies on intra-organizational communication argue that people within the same organization are also divided by boundaries. Successful work across internal organizational boundaries is only possible when there are people who are both willing to serve as “boundary spanners” and are encouraged to do so by an organizational culture.

I argue that the problem of maintaining effective communication with different stakeholders and the problem of effective communication with an outsourcing vendor have a conceptual commonality. Both of these problems deal with communication across boundaries: external boundaries between the organization and its outsourcing vendor, or internal boundaries between different occupational groups inside the client organization. I further argue that developed routine boundary spanning practices, those that enable an organization to successfully communicate

internally over the course of its everyday business, also contributes to better internal and external communication during outsourcing projects and contributes to building more successful outsourcing relationships.

In this study, internal and external communication by an outsourcing client is viewed through the boundary spanning theoretical lens. Prior research acknowledges the unique role of organization-wide information systems and of IT professionals in boundary spanning within an organization (Pawlowski & Robey, 2004), the importance of boundary spanning during outsourced projects (Levina & Vaast, 2005), and its effect on the quality of communication between a client and a vendor (Marchington, Vincent & Cooke, 2004; Deng, 2010). To my knowledge, however, there has been no attempt by researchers to juxtapose these two types of boundary spanning. Although many organizational settings and activities involve a variety of different boundaries, no previous research has addressed the distinct roles of different types of boundaries within the same organization or within the same project. My study addresses this gap by looking at the relationship between the ways an organization manages the boundaries between its subunits and the ways it approaches interorganizational boundaries when building its outsourcing relationships.

This paper reports on theoretical model development and creation of a measurement instrument for testing this model with field data. Statistical testing of the whole structural model is the next step of this project which is not addressed in this paper.

There are several contributions this research project makes to scholarship and practice. First, understanding the role of factors that are rooted in an organization's structure and culture beyond the project's lifetime provides deeper insight into the antecedents of a successful outsourcing relationship. Expanding the scope of analysis in this way makes an important contribution to the research on interorganizational collaborations and not just on outsourcing arrangements. Second, uncovering the implications of client boundary spanning capabilities in the outsourcing industry, estimated at about $35 billion in 2007 in cross-functional application development alone (Gopal

& Gosain, 2009), is of great value for practitioners, both those who manage an outsourcing project and those who are considering undertaking one. Findings from this study will help practitioners assess projects' risks and clients' maturity, and ultimately assist practitioners in making better sourcing decisions. Using the results of this study, project managers will be able to consciously leverage the client organization's routine communication experience for better relationships with outsourcing vendors. Finally, the study offers and validates an instrument for assessing boundary spanning in three different communication contexts. This quantitative analysis is built on theoretical reasoning supported so far by qualitative research alone, and therefore provides additional empirical support to the boundary spanning theoretical perspective. The paper is structured as follows. The next two sections provide background on previous outsourcing and project management research, and discuss the boundary spanning theoretical approach and its applicability in the outsourcing context. In section 4 the general research model is introduced. Section 5 explains my research methodology, including the operationalization of model constructs and data collection procedures. In the last two sections I discuss the findings, the implications for theory and practice and plans for future research based on the tested instrument.

2. BACKGROUND

For an IS to be successfully adopted in an organization, the organization's processes and software functionality should be aligned with each other (Ciborra, 2000). Years ago, when technologies had limited flexibility, most of the alignment burden fell on people and organizations. Not surprisingly, the success rate of organization-wide IS was unsatisfactorily low. Modern technologies allow for much more customization and flexibility, making it possible to build complex architectures and "tailor" the interfaces to the various needs of various users. Although a plethora of "off the shelf" applications are available today for purchase, they are often

commercially designed to fit generic rather than specific requirements, and need significant customization to the context of each adopting organization (Wagner & Newell, 2003).

Many organizations decide to implement an integrated information system with the expectation that the new system will support the coordinated work of various user groups, including group members who have not worked together before the IS introduction. Findings of empirical research emphasize the importance of an organization's understanding of its own expectations from the system (e.g., Sawyer, Guinan, & Cooprider, 2008). This understanding can be gained only by communication with different user groups and studying their requirements. In other words, implementation of a complex IS serving different *communities of practice* requires the client organization to have an ability to work across boundaries among its subunits.

2.1. Communities of practice and situated knowledge inside organizations

Distinct groups of a system's end users are considered to be *communities of practice* - groups of people engaged in a joint enterprise and characterized by a shared repertoire of concepts, stories and tools (Wenger, 1998[3]). This shared context is developed by group members while working together and creating tacit knowledge embedded in their working practice. This process, which Lave and Wenger (1991) call *situated learning*, contributes to the group's efficiency and forms its identity; at the same time it creates additional barriers between the group and the rest of the world. Boundaries between different communities of practice are a natural phenomenon caused by specialization (Tushman & Scanlan, 1981; Carlile, 2002). The key to successful collaboration is therefore not in trying to eliminate the boundaries but in recognizing them and learning to work across them while still preserving the situated knowledge developed by each group.

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[3] *A good brief explanation of the concept, written in popular language and supported with examples, can be found at Wenger's home page: http://www.ewenger.com/theory/communities_of_practice_intro_WRD.doc*

The IT department is in a unique position to learn and accumulate a variety of situated knowledge due to its involvement with almost all subunits in an organization. As organization-wide providers of technical support, IT department employees deal with the details of people's everyday work (Pawlowski & Robey, 2004). Evidence shows that when an organization decides on implementing a new IS, access to situated knowledge of different communities of practice may be a no less important contribution of IT staff to the project than their technical expertise.

2.2. The diversity of knowledge and interests in an ISD project

Academics and practitioners agree that collaboration of various groups of stakeholders is vital for any ISD project. In particular, requirements definition, a critical part of system development, requires collaborative work of various individuals (e.g., Sawyer, Guinan, & Cooprider, 2008). First of all, any introduction of a new system to an organization requires both technical and business considerations, and therefore calls for collaboration of technical experts and managers with a strategic understanding of the business as a whole. It is important to note that these two communities of practice feature individuals with extremely different backgrounds, expertise and experience. Moreover, they also have very different views on a project's strategic goals, on the relative importance of existing problems and on the ways to solve them (Volkoff, Strong & Elmes, 2002). At the same time, the successful collaboration of these two groups of stakeholders is essential for the project's success. Tense relationships between company management and the IT department endanger any large-scale IT project the company may decide to undertake (Chen & Perry, 2003; Lacity, Khan & Willcocks, 2009).

Participation of representatives from various users groups in requirements definition, along with technical experts and management, is also important (Bødker et al., 1988; Klepper, 1995). Each user group is also a *community of practice*, with its own situated knowledge and its own boundaries. The diversity of their backgrounds and expertise creates a significant challenge for collaborative work on a project's requirements; diversity of interests may lead to conflicts. It is

not surprising therefore that the ability to coordinate diverse expertise was found to be a more important predictor of ISD project effectiveness than traditional factors such as administrative coordination or development methodologies (Faraj & Sproull, 2000).

Project management in today's business environment is increasingly complex. Outsourcing of ISD has become a widespread practice. Coordination of diverse expertise now means working across both intra-organizational and inter-organizational boundaries and building relationships between communities of practice created by various end users, client's executives, project managers and IT professionals on both client's and vendor's sides.

2.3. The role of communication in outsourced ISD projects

IT outsourcing (ITO) has attracted the attention of researchers for over thirty years. During this time, the research paradigm has evolved from viewing ITO as an economic phenomenon to applying an assortment of theoretical lenses borrowed from various social and business research fields with a strong emphasis on organizational learning, managing relationships and overcoming cultural differences (Hätönen & Eriksson, 2009; Lacity et al., 2009). Cram's (2009) meta-analysis of outsourcing research indicates a shift in focus toward human capital issues in today's organizations, and increasing complexity and pervasiveness of outsourcing arrangements.

Much work focused specifically on the quality of the client-vendor relationship, which was found to directly affect a project's effectiveness (Kim, 2005) and overall success (Lee & Kim, 1999). Though earlier work proposed that well-written contracts and tight control are keys to success, contracts proved to be insufficient for ensuring the desired outcomes, and sometimes even counterproductive. No contract can capture all possible situations, especially in the modern volatile environment where requirements often change during a project and need to be re-negotiated (Gopal & Gosain, 2009). Moreover, overly tight control inhibits a vendor's innovativeness and may result in "quick and tangible" solutions instead of a state-of-the art system (Levina & Ross, 2003). On the other hand, vendor-client teamwork, balanced control and

process agility are found to lead to better outcomes (Goles, 2001; Gopal & Gosain, 2009). Specifically, the positive impact of a good relationship on a project's success has been discussed and empirically tested by several authors (e.g., Grover, Cheon & Teng, 1996; Kern, 1997; Lee & Kim, 1999; Lee, 2001).

An outsourced ISD project, therefore, faces the challenges of communication among different stakeholders like any ISD project, in addition to the challenges of interorganizational communication with the outsourcing vendor. In a typical outsourced project, the technical and business-specific knowledge are concentrated on opposite sides of an organizational boundary: a vendor offers strong technical knowledge but only a superficial understanding of business specifics. The client, on the other hand, has a deep understanding of the business domain but only limited technical expertise (e.g., Carlile & Rebentisch, 2003). When the client completely relies on the vendor's technical expertise, the organizational boundary and the expertise boundary align, reinforce each other and make the task of establishing smooth and fruitful communication over the boundary even more challenging. Figures 2.1 (a) and (b) schematically illustrate the expertise boundary in an in-house project and aligned expertise and organizational boundaries in an outsourced project respectively.

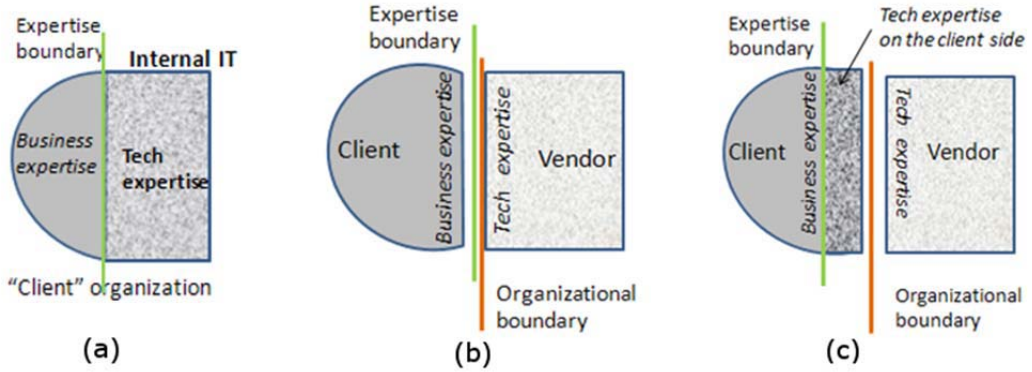

Figure 2.1. Boundaries in ISD projects. (a) in-house project (b) outsourced project with no technical expertise kept in-house (c) outsourced project with technical expertise kept in-house. Chart by the Author.

There is common agreement in the ITO literature on the dangerous implications of a client's over-reliance on a vendor's technical expertise, which makes the client especially vulnerable to vendor opportunism and leads to loss of control over the project. It is often considered the most harmful and, at the same time, most common pitfall of ITO, especially in large-scale and long-term projects (Peled, 2001; Willcocks & Currie, 1997; Lin, Pervan & McDermid, 2007). Indeed, the aligned boundaries create a fault line that effectively inhibits communication, whether it is an informal relationship or formal performance measurement. Figure 2.1 (c) illustrates how keeping some technical expertise in-house allows for "de-coupling" organizational and expertise boundaries and eliminating the strong fault line.

Figure 2.1 (c) also shows that the client's in-house IT team is in a natural position to serve as "communicator" with internal stakeholders on the one side and with the vendor on the other. Thus, the members of the in-house IT team are those who maintain the "knowledge overlap" between the client and vendor known to be critically important in knowledge intensive projects that almost always involve procedural or conceptual novelty (Carlile & Rebentisch, 2003; Tiwana, 2004). Technical expertise helps the team establish a "common language" which means that they share the client's organizational values and goals and have a better understanding of its business domain than the vendor does.

The more understanding of each other's domain specific knowledge, goals and interests the partners have, the higher the chances for effective and fruitful communication. This does not eliminate, however, the need for the client to understand its own goals and interests, which can be multifaceted due to a high number of stakeholders, and sometimes inherently controversial.

2.4. Client's routine business communication

While research points to the strategic importance of outsourced ISD projects and argues that such projects should get close attention from the client's top management (Chen & Perry, 2003; Lacity & Willcocks, 1998; Quinn & Hilmer, 1994), there are still client companies where outsourcing is

seen as just a complex procurement project (Chen & Perry, 2003) or as a way to get rid of the "troublesome" IT function (Lyytinen & Robey, 1999) rather than as a strategic move requiring intensive communication and relationship building with the vendor organization. Nearly 70% of Dun and Bradstreet Barometer of Outsourcing respondents reported that their relationships with vendors failed because vendors "did not understand what was required" (Felton, 2006). At the same time many client organizations do not recognize requirements definition as their responsibility, and subsequently do not understand what is required themselves (Goles, 2001; Leimeister & Krcmar, 2008). A client's lack of strategic vision may have fatal consequences for an ITO project. Among other typical client problems are underestimation of risks, unrealistic expectations, choosing an incompetent or culturally incompatible vendor, drafting inflexible contracts and failure to develop a relationship with the vendor (e.g., DiRomualdo & Gurbaxani, 1998; Edguer & Pervan, 2004). Analysis of the variety of potential pitfalls led researchers to the concepts of client maturity (e.g., Komporozos-Athanasiou, 2007) and organizational capabilities (e.g., Feeny & Willcocks, 1998). Pavlou and El Sawy (2006) introduce a set of *dynamic capabilities* in new project development, which includes, among others, absorptive capacity (Cohen & Levinthal, 1990), effective coordination (Malone & Crowston,1994), and integrating interaction patterns by collective mind (Weick & Roberts, 1993). Although most taxonomies and frameworks of organizational capabilities address relationship management and communication ability, they always take a clear inter-organizational perspective. Internal organizational capabilities or characteristics are not included in these frameworks, even though they are intensively discussed in the research on ITO decisions. Another noticeable gap in the research on client organizational capabilities is that it does not distinguish between different IT functions being outsourced, and does not address the specifics of outsourcing complex and knowledge intensive ISD projects.

An outsourcing client's ability to communicate effectively during its everyday routine business can be expected to have a significant impact on its ability to establish effective communication

among the project stakeholders within the organization and to develop and support communication with the outsourcing vendor. However, only a few studies argue for the interdependence between internal and external communication in outsourcing projects. For example, Pinnington and Woolcock (1997) point to the importance of a client's internal processes for supporting a relationship with the vendor, developing metrics and setting expectations. Goals and expectations developed by a client's project management should be communicated not only to the external vendor, but also internally to the larger end user community. Klepper (1995) argues that this improves understanding of processes and eliminates end user problems before they arise. Developed informal communication (e.g., social networks) in the client organization was also found to positively affect the quality of outsourcing relationships. A high volume of internal interactions leads to higher volume of interactions with the vendor and results in stronger trust and more intensive knowledge sharing (Beimborn et al., 2009, 2010). These examples show how organizational culture (in particular, encouraging communication of employees from different departments) can contribute to the success of outsourcing relationships. However, no inquiry has been made into the impact of internal communication patterns in the client organization on outsourcing relationships and overall project success.

2.5. Summary of research gaps and selection of theoretical approach

Numerous publications from different research fields address various aspects and dimensions of ISD projects management in general and outsourcing ISD in particular. However, there are still notable gaps in the extant literature. My research will address some of these gaps, related to the role of the client's routine internal communication in outsourcing success.

First, the extensive research into client-vendor relationships seems to overlook the role of a client's routine business communication. While the importance of relationship building is widely recognized, there is little understanding of the antecedents of an organization's relationship building skills. The research on sourcing decisions discusses various characteristics of client

organizations and their impact on the decision to outsource or not (and how). At the same time, ITO research concerned with the governance of already signed outsourcing agreements ignores the role of a client's everyday practices. Understanding the impact of a client's routine communication patterns on its relationship with an outsourcing vendor will help fill this gap in the literature. It will also expand our understanding of outsourcing relationships from simply recognizing their critical importance to better understanding how they may be built and enhanced in practice.

Second, the connection between internal and external communication patterns of the same organization is surprisingly understudied. While both communication within organizations and cooperation across organizational borders are popular and well developed subjects in IS and management research literature, these two types of communication are not studied together or compared. A review of literature on internal and external cooperation conducted by Hillebrand and Biemans (2003) reveals two separate streams of research that use different theoretical lenses. Even those works addressing both internal and external communication in the same company usually do not look for any connection between them (e.g., Langerak, Peelen & Commandeur, 1997). Indeed, internal communication in an organization and communication of this organization with external partners, vendors and customers vary significantly in such aspects as goals, interests, trust and power. At the same time, there are also similarities between these two types of communication. Moreover, in contemporary organizations, boundaries are often blurred. Work across organizational boundaries by participants of an interorganizational alliance (Public Safety Networks in Chapter I of this dissertation represent an example of such an alliance) may resemble internal communication more than interactions between subunits of a large-scale and geographically dispersed multinational company. In both cases, the organizations are interested in making the communication as effective and efficient as possible. Understanding the impact of an organization's communication patterns on its ability to work with external partners, not necessarily outsourcing providers, is a highly relevant and very timely subject for a study.

Internal communication in organizations and outsourcing relationships are two expansive research areas, each accounting for dozens of publications in both the scholarly and popular press. Different theoretical perspectives and approaches may be applied to studying both internal communication and outsourcing project management. Most of these theories, however, are well tailored to specific contexts, such as internal organizational processes or asymmetrical contractual relationships, and lose much of their relevance when taken out of these contexts.

Unlike other theoretical lenses, the boundary spanning conceptual approach allows for comparing or juxtaposing internal and external communication patterns despite their contextual differences. Moreover, the extant literature drawn on the boundary spanning paradigm shows that this concept is equally applicable to boundaries between organizational subunits (Carlile, 2002; Schwab, Ungson & Brown, 1985), between organizations (Ancona & Caldwell, 1988; Levina, 2005), and between subunits of different organizations (Levina & Vaast, 2005). Sometimes internal and external ("organizational") boundaries are even mentioned interchangeably within the definition of a single concept (Pawlowski & Robey, 2004). This flexibility makes the boundary spanning approach a good fit for my research which is concerned with bridging the ways in which an organization communicates internally and the ways it chooses to communicate across its external boundaries. In the next section I review some of the previous theoretical developments and empirical findings on boundary spanning and their applicability to the outsourced ISD context.

3. THE BOUNDARY SPANNING APPROACH AND ITS APPLICABILITY TO THE OUTSOURCING CONTEXT

The boundary spanning approach to information exchange is based on the open view of organizations and focuses on communication among people representing different communities of practice. Communication is conceptualized as activities occurring on the boundaries among communities of practice. These boundaries are natural and even vital for maintaining

specialization (Carlile, 2002). At the same time, spanning them is essential for information diffusion within an organization (Schwab et al., 1985), and should be viewed as a key organizational competence (Carlile, 2002; Grant, 1996).

3.1. Ways to conceptualize boundaries and boundary spanning

The notion of boundaries and conceptualization of activities performed across them vary significantly from researcher to researcher. Definitions of boundary spanning range from "how group members interact with others outside the group" (Ancona & Caldwell, 1988, p.470) to creation of new joint fields of practice on the boundaries between existing fields (Levina & Vaast, 2005). Accordingly, the activities considered in empirical studies as boundary spanning may be as dissimilar as spending time on work-related communication by individuals (Tushman & Scanlan, 1981; Dollinger, 1984) and being able to work on a complex technology development project as an interorganizational team (Levina, 2005). Frameworks and classifications based on this rich and versatile evidence arise from different standpoints and focus on different aspects of boundaries and boundary spanning. For example, Shwab et al. (1985) draw on earlier classifications of activities and decisions and create a list of thirteen "sectors" separated by boundaries. In other words, they define boundaries by defining the areas divided by these boundaries. Orlikowski (2002) identifies seven types of boundaries and five types of practices for spanning them. Carlile (2004) introduces a concept of boundary complexity. Most often, however, boundary spanning processes are conceptualized through analysis of *boundary spanners* behavior *(*e.g., Ancona & Cadwell, 1992) and adoption and use of *boundary objects.* The following subsection discusses these two terms in more detail.

3.2. Boundary objects and boundary spanners

Earlier publications were focused predominantly on knowledge transfer (Carlile, 2004) and usually considered either boundary spanning by individuals or the use of boundary objects.

Contemporary empirical works view boundary spanning rather as exchange and transformation of knowledge. Since "knowledge may reside in people, or it may be embedded in processes or artifacts" (Carlile & Rebentisch, 2003; p. 1189), boundary spanning individuals and boundary spanning tools ("boundary objects") are often analyzed together.

Boundary spanners are defined interchangeably as "individuals who serve as both filters and facilitators in information transmittal between organization and its environment" (Pawlowski & Robey, 2004, p.648) or as people who play an important role in diffusion of ideas within organization (Schwab et al., 1985). It arises from the literature that effective boundary spanning in an organization includes a variety of activities that cannot be performed by one individual but require people with different personal characteristics playing different boundary spanning roles (Ancona & Cadwell, 1992; Friedman & Podolny, 1992; Tuschman & Scanlan, 1981).

Boundary objects (BOs) are artifacts, abstract or concrete, that are used on both sides of a spanned boundary to establish shared language and syntax, foster learning about differences and dependencies across boundaries, and facilitate the process of knowledge transfer (Carlile, 2002). BOs may have different meanings in different communities of practice. They are, however, "plastic enough to adapt to local needs and constraints of the several parties employing them yet robust enough to maintain a common identity across sites" (Star, 1989, p.46). A wide range of artifacts may serve as boundary objects in different situations. Some examples include repositories, standardized documentation, models (Star, 1989), outsourcing contracts (Gal, Lyytinen & Yoo, 2008), design drawings (Bødker et al., 1988), system prototypes (Bechky, 2003), and systems themselves (Pawlowski & Robey, 2004). Wenger (1998, in Levina & Vaast, 2005) argues for "terms, concepts and other forms of reification" as possible boundary objects. Carlile (2004) even suggests people can be boundary objects! Some empirical works show how such unexpected items as temporal charts (Yakura, 2002) or product yield (Kim & King, 2000, in Levina & Vaast, 2005) may play the role of a boundary object in specific situations. BOs may be classified in various ways, based on their properties or roles. For example, Gal et al. (2008)

discuss the role of BOs in shaping the identity of an organization, while Carlile (2002, 2004) classifies both boundaries and boundary objects at three incremental levels of complexity. Appendix A includes a list of boundary objects introduced by these researchers.

The usefulness of an object as a boundary object is not inherent in its properties but depends on the way it is enacted (Levina, 2005; Levina & Vaast, 2005). In a similar manner, boundary spanning by certain people in organizations is partially tied to their personal characteristics, but mostly to the environment and situation (e.g., Ancona & Cadwell, 1988; Schwab et al., 1985). Some proposed boundary objects become "boundary objects in practice" while others are rejected; similarly, some nominated boundary spanners become boundary spanners in practice while others do not (Levina & Vaast, 2005).

Perceived work-related competence is a more basic determinant of boundary role status than formal position (Tushman & Scanlan, 1981). The person should be also known and respected in all communities on the boundary. In the words of Levina and Vaast (2005, p.353), members of communities should see him or her as "a legitimate but peripheral participant" and also as a legitimate negotiator. Finally, a potential boundary spanner should have a personal inclination to assume this role. Boundary spanners belong to more than one group but do not fully belong to any single group; this is an uncomfortable position. When people feel they are placed "between a rock and a hard place" with no expected benefits, they either avoid the boundary spanning role or use it for their personal purposes not necessarily aligned with the organization's strategy (Volkoff et al., 2002). However, informal boundary spanners often emerge in such a case (e.g., Krasner, 1987).

Boundary spanners reflect on existing objects and practices, look out for artifacts that may serve as BOs, analyze their usefulness and nominate them as BOs in the organization. They use their position and power to promote their BOs; in turn, when a BO is adopted, it empowers the boundary spanner who nominated it (Levina & Vaast, 2005). However, not every nominated object fits the context of a specific organization or specific project. For an artifact to become a

BO in use, it should be locally useful and have a common identity across the fields it bridges (Ibid.). Potential users may ignore a proposed BO, adopt it as is ("add") or "challenge" it – reflect on its usefulness and alter it to fit their local needs. Only "challenged" objects represent the user's knowledge at boundary, argues Levina (2005), and therefore, only a "challenged" BO becomes a BO in practice.

Empirical accounts demonstrate that complexity of relationships among various players in knowledge intensive projects leads to variety in boundary spanning scenarios. An appointed group of boundary spanners with different backgrounds may create their own community of practice with its own boundaries, alienating themselves from their previous identity and thereby failing to function as boundary spanners in practice (Levina & Vaast, 2005; Volkoff et al., 2002, 2004). There are, however, examples of successful proactive behavior. In one case described by Volkoff et al. (2004), a group of appointed boundary spanners was created to learn a new system and champion its use throughout the organization. After the training program failed due to its poor design, the group was able to work together and develop a successful training program for all users in the organization. In another case, a company was forced to adopt a boundary object (3D modeling technology) from one if its vendors, successfully incorporated it in its everyday practice and used it later in other projects even though some of the new vendors resisted adopting the 3D technology (Gal et al., 2008). These examples show that boundary spanning in a project may fail in "vanilla" conditions (with experienced boundary spanners), but may succeed in seemingly unfavorable conditions such as poor fitting BO (training program) or a BO forced on the organization by a powerful external party (3D technology).

Evidence suggests that, while boundary spanning is performed by individuals, the surrounding organizational culture and political climate play a critically important role in this process. The organization's ability to recognize the need for boundary spanning, pick suitable boundary objects, identify good candidates for boundary spanners and support them in this role leads to more intensive and more successful boundary spanning activity. The literature suggest a

distinction between the number of appointed boundary spanners and proposed boundary objects (further referred as ***intensity***) and boundary spanning in practice, characterized by challenging and adoption of proposed boundary objects, reflection on boundary spanning practices and attributing social capital to boundary spanners (further referred as ***quality***).

The literature also suggests that different organizations have different everyday knowledge sharing needs and develop different understanding of these needs. Representation of complex and volatile information on the boundary is essential for knowledge intensive processes such as new product development. It is of little value, however, in stable industries with simple and routine processes (Schwab et al., 1985; Tiwana, 2004). Therefore, the boundary ***complexity level*** should be taken into account when defining organization's approach to boundary spanning, along with boundary spanning intensity and quality.

Carlile (2002, 2004) introduces and elaborates on the notion of boundary complexity in a theoretical framework for knowledge management across boundaries. This framework is highly relevant for my study for two reasons. First, it ties different components of the boundary spanning paradigm together instead of trying to classify only one of them. Carlile (2004) argues that an organization's conceptual approach to sharing knowledge across boundaries dictates the boundary spanning needs of this organization, and consequently its boundary spanning behavior and selection of BOs with certain characteristics. Second, this framework is specifically tailored to contexts where new products are developed and information novelty is introduced, which nicely fits the ISD setting. The framework is briefly summarized and tied to different types of communication in outsourced ISD projects in the next subsection.

3.3. Conceptual approach to knowledge exchange and three levels of boundary complexity

Drawing on concepts from the classic theory of communication (e.g., Shannon & Weaver, 1949), Carlile introduces three incremental levels of boundary complexity. These levels are not

reflective of "real" complexity of processes in an organization but of an organization's conceptual approach to sharing knowledge across boundaries. A change in approach means that the organization is trying to change its boundary spanning level. Figure 2.2 illustrates how boundaries become metaphorically thicker and harder to span as the novelty in the cross-boundary knowledge exchange increases.

An organization views its knowledge boundaries as *syntactic ("information processing")* when it is mostly concerned with information difference at the boundaries. This approach implies that people across boundaries understand and interpret information in a similar way, and it is enough to organize an effective knowledge transfer. Shared repositories are one example of a boundary object that can be used at this level of boundary complexity.

The syntactic approach to boundary spanning can fit an organization's everyday needs; however, it is only sufficient when shared understandings and interpretations are stable and do not change over time. When novelty is introduced by one of the sides, it needs to be explained to the other. Hence the more complex s*emantic ("interpretive")* approach to knowledge at the boundaries recognizes that sharing knowledge is not sufficient and that in most cases knowledge exchange among people with different backgrounds requires explanation. At this conceptual level, the organization recognizes differences in interpretations and the possibility of misunderstanding and ambiguity. It also recognizes dependencies among people from different communities of practice and therefore the need to translate knowledge created on one side of the boundary to the other. It is still implied at this level that the parties across the boundaries have shared goals and that their interests do not conflict. This may be true for internal communication of project stakeholders in a client organization, where individuals from different communities of practice share and explain their practices to others when working together on requirements for a new IS.

However, integration of different organizational processes uncovers incompatibilities among requirements of different actors (Pan, Newell, Huang & Cheung, 2001), or as stated by Carlile, "the knowledge developed in one domain generates negative consequences in another" (2004,

p.559). This is often the case with internal communication among project's stakeholders and is always the case with external communication with an outsourcing vendor since the vendor belongs to a different organization with its own goals (Levina, 2005; Vaast & Levina, 2006; Gal et al., 2008).

The most complex *pragmatic* (or *political)* approach to boundaries recognizes that introducing novelty at the boundary may create a conflict of actors' interests. Novelty developed in one domain may generate negative consequences in another. Efficient communication at a pragmatic boundary should provide a capacity for transforming the knowledge through negotiation of interests. Tools that support representation of different functional interests and facilitate their negotiation, such as drawings, models, prototypes and maps, are suitable BOs for boundaries of this type (Carlile, 2004).

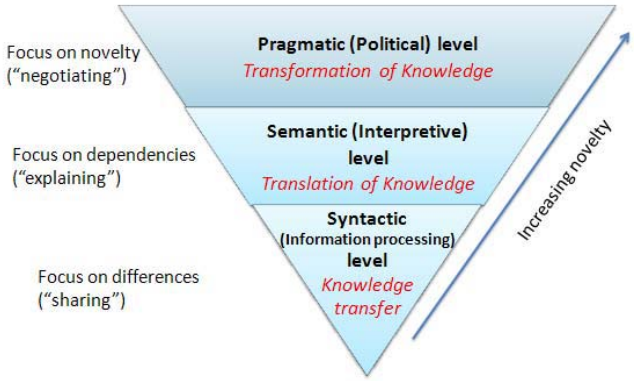

Figure 2.2. An integrated framework for knowledge management across boundaries. Carlile (2004)

Not all organizations face boundaries of all three complexity levels in its everyday routine. Organizations with static environments and without information novelty processing may never have a need for "transformation" or even "translation" of its existing knowledge. They may have developed routine boundary spanning practices but stay at the syntactic level of boundary complexity. Still, the activities needed for an outsourced ISD project require that internal boundaries will be approached at the semantic or pragmatic level, and external boundaries will be

approached at the pragmatic level only, regardless of the nature of the client's organization core business (this argument is further elaborated in section 4.1 below). When entering an ISD project, some companies need to recognize new requirements, re-conceptualize boundaries and adapt or replace previously used boundary spanning practices and objects. Recognition of changing needs and the ability to reconfigure processes and resources to match the new needs is essential for an organization wishing to effectively integrate knowledge in complex settings (Carlile & Rebentisch, 2003; Pavlou & El Sawy, 2006). However, evidence exists that successful boundary spanners at the lower levels may develop "path dependency" (Carlile, 2004) and stick to known successful practices instead of learning from them (Lyytinen & Robey, 1999).

Boundary spanning intensity, quality and boundary complexity level are three dimensions of boundary spanning that arise from the extant literature. Empirical accounts suggest that boundary spanning processes unfold in similar ways in different (internal and external) organizational settings, and that the same boundary objects can be used for spanning different boundaries. I argue that when an organization with an established routine boundary spanning enters an outsourcing relationship for an ISD project, it is better able to apply its previous boundary spanning experience to recognize new boundaries and successfully span them. In the next section I develop a research model for testing the connection between an organization's boundary spanning culture and its ability to span new boundaries, internally and externally, when participating as a client in an outsourced ISD project.

4. RESEARCH MODEL

The main focus of this research is to understand the relationships among different types of boundary spanning in an outsourcing organization and thier influence on outsourcing success. As the previous literature shows, successful boundary spanning is closely tied to organizational context and culture. It is natural to presume that an organization with a developed routine

boundary spanning will be successful in any boundary spanning it needs. However, theoretical and empirical accounts suggest that spanning new types of boundaries may be challenging even for organizations with established boundary spanning practices.

In the next subsection I develop a research model capturing the three types of boundary spanning that are faced by an ISD outsourcing client. Other components of the research model will then be introduced.

4.1. Three boundary spanning contexts

For the purpose of this study, I define *external boundary* as a boundary between two parties signing an outsourcing contract (the *client* and the *vendor*). *Internal* boundaries are those among different communities of practice in the client organization, such as potential users, client's IT department, or project managers. These groups may be subunits of the same large organization, not necessarily geographically co-located. They also can be members of a collaborative network which outsources development of an interorganizational system aimed to support the collaborative work (e.g., Fedorowicz et al., 2007). In terms of this study, communication of participating agencies within such an initiative is considered to be spanning internal boundaries, and the only external boundary is the one between the two parties defined in the outsourcing contract: the collaborative network as the client on one side, and an outsourcing vendor on the other.

I focus on implementations of integrated IS which will be used by individuals with different backgrounds and job responsibilities throughout various departments of the organization. Any organization comprises many communities of practice; in large and geographically dispersed organizations there may be significant variance between local organizational cultures and boundary spanning activities. For the purpose of this study, I consider only those communities of practice in the client organization that are relevant to the outsourced ISD project. This may include all parts of the organization if the developed system is organization wide, or only a few

departments for a relatively local (but still integrated) IS. For example, a billing system in a hospital may integrate several administrative departments; but medical professionals are not end users of such a system and therefore are not considered stakeholders of the project. Another ISD project in the same hospital but with a different set of stakeholders may have different characteristics and lead to different outcomes.

I consider three situations in which boundary spanning is needed. First, routine boundary spanning practices are those used in the client organization over the regular course of its business. These practices are referred to as *routine boundary spanning (RBS).* During an outsourced ISD project a number of client organization's employees with different job responsibilities work on this project together. Representatives of different internal communities of practice working together on the outsourced ISD project perform project-related *internal boundary spanning (IBS).* Finally, some client's representatives communicate with the vendor, participating in *external boundary spanning (EBS).* These three constructs represent three cases of boundary spanning in three different contexts, and will be measured by a similar scheme, shortly described below.

As discussion in section 3.2 above shows, boundary spanning can be assessed in terms of its intensity and quality. Boundary spanning <u>intensity</u> is determined by the presence and number of appointed boundary spanners and use of boundary objects, as well as by informal communication among people from different departments. I view informal communication as a form of boundary spanning without using objects.

Boundary spanning <u>quality</u> reflects whether the tools used as boundary object are boundary objects in practice. As accounts by Levina and Vaast (2005) and Volkoff et al. (2002, 2004) show, nominated objects and nominated users do not always become objects and users in practice. Therefore, intensity and quality of boundary spanning are two different dimensions, not necessarily highly correlated. An organization may have many objects of low quality or a few well used ones.

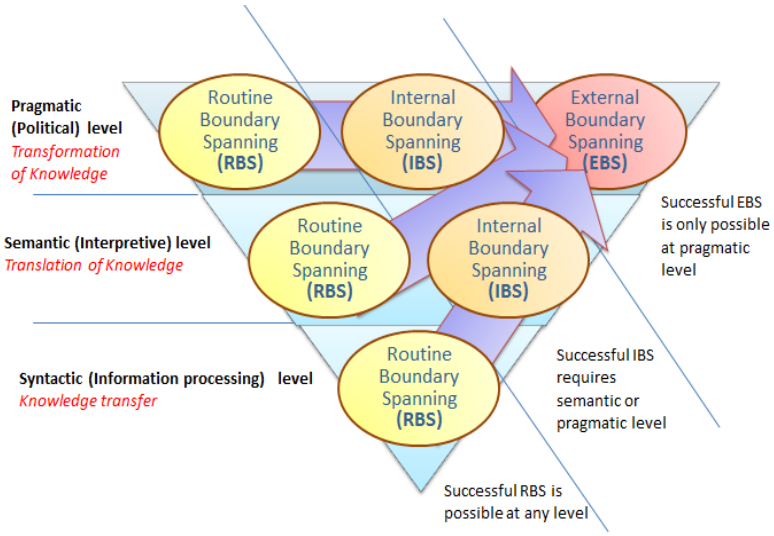

Figure 2.3. Three types of boundary spanning allow for different boundary complexity levels

An additional important dimension of boundary spanning is the level of boundary complexity as it is viewed by the boundary spanners. It arises from the discussion in section 3.3, that minimal requirements for boundary complexity level are different for each of the three boundary spanning contexts. Client organizations belong to various industries. For those who operate in a stable predictable environment approaching boundary spanning at the lowest, syntactic (information processing), level of complexity, is normal and even desirable. Other client businesses, especially those involved with innovation and R&D, develop their internal boundary spanning culture at higher semantic and pragmatic levels. RBS, therefore, can be approached at any of the three boundary complexity levels, depending on the nature of the client's business.

At the same time, internal boundary spanning for the purposes of an ISD project (IBS) inevitably involves explanation of knowledge generated by one community of practice to others, which characterizes the semantic (interpretive) level of boundary complexity. It can also be approached at the highest, pragmatic (political) level as well, but not at the level of simple syntactic (information processing) level.

Finally, neither the syntactic (information processing) nor semantic (interpretive) approach to boundary complexity is sufficient in the context of external boundary spanning (EBS) between a

client and vendor. Unlike RBS and IBS that unfold in a shared organizational context, external boundary spanning means working across a strong political boundary which divides two organizations with different visions, strategies and goals. Moreover, they usually belong to different industries and employ different internal cultures and structures. The actors on the two sides of the boundary clearly have different interests; their communication involves a lot of negotiation and, often, conflict management. Therefore, an interorganizational boundary should always be approached at the highest, *pragmatic (political)* complexity level. Figure 2.3 schematically depicts boundary complexity levels in the three boundary spanning contexts. The impact of these three boundary spanning cases on each other is discussed in the next subsection.

4. 2. The relationship between the three types of boundary spanning

Internal activities for ISD project in the client organization include, although are not restricted to, system analysis, requirements definition, resolving conflicting requirements of different users groups, beta-testing, training and handling users feedback (e.g., Somers & Nelson, 2004). At least some of these activities would not be part of the client organization's everyday business routine. A common practice in organizations is creating a special project team which includes representatives of the vendor, the client's IT group and different user groups (Volkoff et al., 2002; Lacity & Willcocks, 2004). Even though the members of this team work for the same organization, and many of them have communicated in the past, they face tasks that are new and challenging for most of the team members. Volkoff et al. (2002) observed three such cases and noted that, "a variety of different boundary spanning mechanisms was observed, but each was problematic" (p.959). Assuming the client organization has a developed RBS and works routinely across its internal boundaries, it needs to perform new boundary spanning activities across familiar boundaries for IBS.

As noted in subsection 4.1, RBS can be performed at any level of boundary complexity but IBS can be only successful if the boundaries are viewed at the semantic or pragmatic level. Therefore,

a client organization which spans everyday boundaries at the syntactic (information processing) level, now needs to re-conceptualize its approach to boundaries and learn to work at the semantic (interpretive) level, at the least. This is a challenging conceptual shift.

I expect that an established RBS will help the organization overcome challenges presented by new boundary spanning needs and develop successful IBS practices. It is worth noting, however, that boundary spanners at the lower levels have been observed developing "path dependency" (Carlile, 2004) and stick to known successful practices instead of learning from them and leveraging them for developing new practices in novel situations (Lyytinen & Robey, 1999).

***Proposition 1*. A higher extent of routine boundary spanning in an organization, in terms of quality, intensity and boundary complexity level, leads to a higher extent of internal boundary spanning during an outsourced ISD project.**

External boundary spanning for an outsourced ISD project (EBS) involves formal and informal communication with a vendor's representatives and includes such activities as contract management, communication of requirements, knowledge exchange, control of the project's progress, testing beta versions, and providing the vendor with feedback (e.g., Kinnula, 2006). The need to communicate across its organizational boundary is a new challenge for the client organization. The outsourcing literature widely recognizes the importance of building a successful client-vendor relationship (e.g., Leimeister & Krcmar, 2008) and its role in overall project success (e.g., Lee & Kim, 1999).

Unless the vendor is an established business partner and similar projects were successfully accomplished in the past, the need to collaborate with the vendor introduces a novel boundary for spanning. As in the case of IBS, an organization with boundary spanning capabilities should be able to leverage its previous experience, skills and tools for the new boundary spanning task. However, while IBS required new activities across familiar boundaries, EBS involves new boundary spanning activities across new boundaries and is therefore even more challenging. Also

challenging is the conceptual shift in the approach to boundary complexity. Those clients that viewed their internal boundaries as having a complexity level lower than pragmatic (political) are now facing a boundary of the more challenging political type. For successful EBS, the organization has to recognize the boundary novelty and learn to work across it. Well established RBS makes an organization more prepared for this challenging task.

Proposition 2. ***A higher extent of routine boundary spanning in an organization, in terms of quality, intensity and boundary complexity level, leads to a higher extent of external boundary spanning during an outsourced ISD project.***

As mentioned above, both IBS and EBS require a client organization to leverage its boundary spanning experience. IBS introduces novel actions across familiar boundaries; EBS introduces novel actions across novel boundaries. In addition, both IBS and EBS may require re-conceptualization of the client organization's approach to boundary complexity level.

IBS activities, such as analysis of users' needs, usually start before the contract is signed and sometimes even before a vendor is found (e.g., Kinnula, 2006; Lacity & Willcocks, 2004). Also, IBS introduces less novelty than EBS. It can be expected that client companies that successfully leveraged their boundary spanning capabilities for IBS have a higher chance to succeed in EBS as well.

IBS can also be informed by the client's communication with the vendor. One possible scenario is that the client adopts a BO proposed by the vendor and uses it in IBS activities (e.g., Gal et al., 2009). Influence of client-vendor communication on the client's routine communication practices is also possible (Ibid.), but is not considered in this study.

Proposition 3. ***The extent of internal boundary spanning during an outsourced ISD project is positively associated with the extent of external boundary spanning during the same project.***

Figure 2.4 shows the relationship between the three types of boundary spanning. Each of the three boundary spanning constructs can be assessed in terms of intensity, quality and boundary complexity.

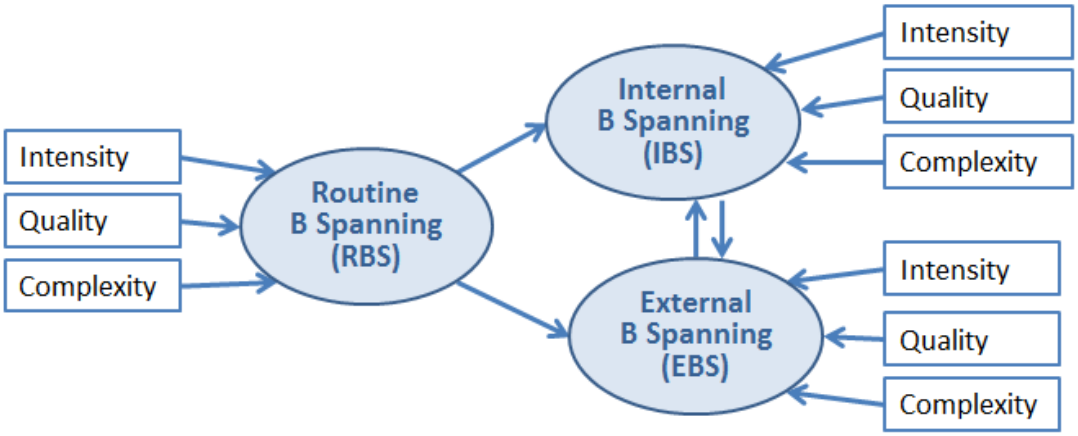

Figure 2.4. The three boundary spanning constructs in the research model

4.3. The role of vendor

Any discussion of an IT outsourcing relationship between a vendor and a client should keep in mind that both the vendor and the client participate in building the outsourcing relationship. The vendor's role in building and maintaining a relationship is critical. Technology projects are the area of specialization for ITO vendors. They often practice more developed project management methodologies, can provide proven boundary objects and suggest effective boundary spanning techniques. At times vendors might even force their BOs and methodologies on the client (Levina & Ross, 2003; Levina, 2005; Gal et al., 2008). At the same time, the vendor is interested in knowledge sharing and obtaining the client's business domain knowledge (Tiwana, 2004). Effective communication and a good relationship therefore are beneficial to the client and the vendor alike. Thus, the vendor can be expected to actively participate in boundary spanning activities. Evidence exists that the client's conceptual approach to boundaries and boundary spanning culture may be changed by using BO forced on them by an outsourcing vendor (Gal et

al., 2008). The vendor's assumption of a boundary spanner role facilitates EBS. Projects in which vendor's representatives participate in IBS can be also expected to benefit from this arrangement.

***Proposition 4*. A vendor's active involvement in boundary spanning during an outsourced ISD project will positively moderate the relationship between the extent of the routine boundary spanning in the client organization and the extent of boundary spanning during an outsourced ISD project.**

4.4. The impact of boundary spanning on the quality of the outsourcing relationship and on the project's success

The inquiry into boundary spanning in outsourced projects is motivated by expectations that it may have a positive effect on projects' outcomes. Several prior works discussed and empirically tested the impact of a good relationship on a project's outcomes (e.g., Grover, Cheon & Teng, 1996; Kern, 1997; Lee & Kim, 1999; Lee, 2001).

There is no clear definition for outsourcing project success. It is affected by different factors and can be measured in different ways. Moreover, the perceptions of project success depend on client's preferences and initial goals. One way to decompose the concept of overall success is to look at the quality of the final product and at the efficiency of project management in terms of time, effort and costs (Gopal & Gosain, 2009). A high quality of communication between a client and a vendor makes a sound contribution to efficiency of the project management (Ibid.). It may be also beneficial to the quality of the final project due to clear communication of requirements and setting realistic expectations (e.g., Lacity & Willcocks, 2004). EBS, therefore, can be expected to have a direct effect on project outcomes in addition to the effect mediated by the quality of relationship.

***Proposition 5*. The extent of external boundary spanning during an outsourced ISD project will positively affect the quality of the outsourcing relationship.**

<u>Proposition 6</u>. The extent of external boundary spanning during an outsourced ISD project will positively affect the outcomes of the outsourcing project in terms of final product quality and project management efficiency.

The full research model (at the first-order constructs level) is shown in Figure 2.5 below. In the next section I discuss the study methodology, operationalization of constructs and validating measurement instrument for this model.

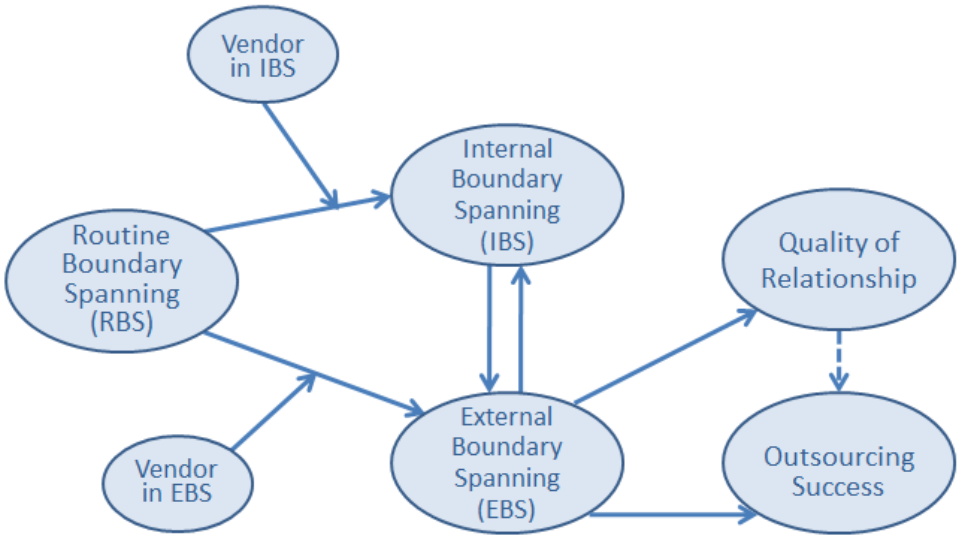

Figure 2.5. Research model

5. RESEARCH METHODOLOGY

With the exception of two early studies on syntactic boundaries (e.g.,Tushman & Scanlan, 1981; Dollinger, 1984) and recently published work by Gopal and Gosain (2009), boundary spanning scholarship relies on qualitative research methods. Case studies of different types provide interesting and deep insights into the nature of the boundary spanning phenomenon. However, caution should be applied when generalizing the findings; controversial accounts from prior literature in particular should be kept in mind. This study aims to analyze general tendencies in outsourcing organizations and thus calls for quantitative analysis. Field survey was selected as the

data collection method because surveys allow for the systematic collection of a rich set of data needed for measurement and evaluation of complex statistical models.

In the rest of this section, I describe the collected data, the process of instrument development, the operationalization of constructs in the final instrument, and the methods used for analysis.

5.1. Study participants and their demographic characteristics

An outsourced ISD project is the unit of analysis. The field data were collected from project managers of recently completed or close to completion outsourced ISD projects through an online survey instrument. A total of 432 valid full questionnaires were collected. Some of the participants represent client organizations, while others work for outsourcing vendors or act as third party consultants (Table 2.1).

	N	%
Client company employee	266	61.6
Vendor company employee	88	20.4
Client side consultant	68	15.7
Vendor side consultant	10	2.3
Total	432	100.0

Table 2.1. The composition of the general dataset

Previous research suggests that clients and vendors have different views on managing outsourced projects (Kern, 1997; Klepper, 1995). One study where dyadic analysis of client-vendor relationship was implemented reports on certain differences in clients' and vendors' approaches to outsourcing relationships. Vendors were found to take a broader, more inclusive view on the relationship and see it as an alliance rather than as a supplier-buyer arrangement. Clients, on the other hand, tend to treat outsourcing relationships as a preferred supplier situation (Goles, 2001, p. 135). Since data collection for dyadic analysis is subject to significant technical constraints, most researchers have based their study design on individual perspectives of client project managers, even when the client-vendor relationship was the main focus of their study (e.g., Kim & Chung, 2003; Lee, 2001; Lee & Kim, 1999).

Comparison of clients' and vendors' responses in my survey revealed some notable differences. The vendors are consistently more optimistic in assessing different aspects of client-vendor relationships and projects' outcomes. Vendors' representatives also report on stronger vendor's influence on client's communication practices, even internal ones, compared to clients. The views of consultants are similar to those of the vendors.

In the light of these observations I chose to use only clients' responses for the further data analysis, to control for the noted differences. The remaining data will be used for future stages of the study. All figures and numbers in the rest of this paper refer to data subset of 266 respondents representing client organizations only. The demographic characteristics of clients' data are summarized below and suggest that the sample is well-balanced.

5.1.1. Demographic characteristics of the participants

Among the 266 study participants, 170 (66.4%) are male and 86 (33.6%) are female. This reflects the general prevalence of men in technology related professions (i.e., US Department of Labor, http://www.dol.gov/wb/factsheets/hitech02.htm). The age and education of the study participants are well balanced, as shown in Appendix B. Additional tables in Appendix B summarize the respondents' managerial experience, IT experience and tenure with the client company.

5.1.2. Characteristics of the projects

The projects characteristics collected in this study were the project duration, complexity and contract type. The target audience was defined as managers of recently completed or close to completion projects. 147 (55.3%) of the projects in the dataset are complete, 60 (22.6%) are close to completion, and yet other 56 (21.1%) are ongoing. The types of outsourcing contracts are summarized in Appendix B.

The duration of the projects is also summarized in Appendix B. For the purpose of this study, I am interested in project length long enough to allow for establishing communication patterns

between the parties. The collected data fits this criterion: 90% of the projects are at least 6 months long.

Another important characteristic of an IS development project is its complexity. Complexity affects different aspects of project management (Bosch-Rekveldt et al., 2010) and project outcomes (Xia & Lee, 2004). Three dimensions of complexity: technical, organizational and interorganizational, were assessed in this study with six binary measurements. This study is focused on complex, knowledge intensive projects. Frequencies summarized in Appendix B confirm that the dataset answers this criterion.

5.1.3. Characteristics of the client organizations

The study participants represent a wide range of projects in different industries. I also captured general and vendor-specific IT outsourcing experience of the client company. All these data are summarized in Appendix B.

5.2. Data collection

This subsection describes the process of instrument development, including the pilot study, and the procedures of administering the survey.

5.2.1. Instrument development

The survey instrument was developed in several stages. First, a pool of items was created, based on a literature review and discussions with field and academic experts. Only items for assessing the quality of outsourcing relationship and project's outcomes could be drawn from previously tested instruments; all other measurements are new. To establish face and content validity of the measures, opinions of several academic and industry experts were obtained through personal and phone interviews. At this stage, the first draft of the survey instrument was compiled, combining the measurement items and suggestions of experts. A number of techniques from the literature on survey development (e.g., Dillman et al., 2008) were employed to minimize possible bias caused

by the order or wording of survey questions and to make the survey as short and interesting as possible in order to increase response rates.

The draft survey was pre-tested on two experienced project managers using the cognitive interviewing technique (Willis, 2005). One of the interviewees represented the client's point of view, while another one works for a vendor company. The interviewees provided detailed feedback on clarity and wording of questions. They also suggested some cosmetic changes and confirmed that the survey is sufficiently interesting and of appropriate total length.

5.2.2. Pilot Study

The pilot survey was created using the Qualtrics online application and was offered to a limited number of IT project managers recruited through my personal network. Each potential participant received a personal e-mail invitation with the URL address of the pilot survey. The participants were encouraged to share comments and thoughts on the survey and also forward the invitation to other people with relevant experience. The pilot resulted in 24 full surveys and 2 additional incomplete surveys that had sufficient number of answered questions and therefore could be included in analysis. Some pilot participants also provided comments and suggestions regarding the questionnaire design and clarity of questions.

The sample of 26 data points was judged to be too low for conducting meaningful factor analysis. An exploratory factor analysis was performed to confirm general convergence of the set of items. Correlations and descriptive statistics were used to check for potential mismatches and identify items that should be reworded or dropped from the instrument. Changes made following the pilot survey results and the feedback of pilot participants are summarized in Appendix C. An important revision was made to the list of tools that are commonly used for communication in IS development projects and can potentially serve as boundary objects. The list of ten tools divided into five categories in the pilot survey was changed to a list of twelve tools representing six categories. The list of boundary spanning activities was slightly reworded.

Pilot participants suggested two additional amendments to the survey. First, they pointed out that a question about tools for routine communication in the client organization was too broad and unclear. There are normally many different communication practices in each client organization, and each pilot participant interpreted this question differently. Subsequently, the questions on routine communication practices and tools in the client organization were removed. Also, the pilot participants noted that many project managers are not aware of the details of the outsourcing contracts, so only very basic contract related questions should be asked.

5.2.3. Questionnaire design

Literature on developing and administering surveys warns about response biases created by questionnaire design and wording. Moreover, clear wording and attractive visual design are critically important for recruiting participants and keeping them interested until the end of the questionnaire. Using a comprehensive guide by Dillman et al. (2009), I addressed a number of issues during the survey development.

To achieve best possible wording of questions, the questions were offered for review to three different people and then tested with the cognitive interviewing method to ensure that they sound neutral and do not suggest the "right" answer. All Likert scale questions use the formula "to what extent do you agree *or disagree* with the following…" Some questions' wording was intentionally reversed, so that respondents with positive experience should select "Strongly disagree" while respondents with problems in their projects are expected to select "Strongly agree".

To achieve a consistency in the questions, the sets of pre-defined answers for all multiple choice questions were reviewed for being exhaustive and mutually exclusive. I avoided including an "Other" option, using a "Don't know" option instead (for example, when asking about the contract type). However, in the question about client organization Industry, the respondents were offered the "Other" option and also could select up to two industries from the list.

The survey structure also may affect responses. Dillman et al. (2009) note, for example, that questions about the overall satisfaction are scored lower when placed at the beginning of the questionnaire and higher when asked at the end of the survey. They recommend starting from asking about overall experience, and then proceed with more detailed questions. Sensitive personal questions, such as personal demographic information, should be placed at the end, since at that time the respondent's commitment to filling the survey already helped her develop a certain level of trust (Ibid.) Following these recommendations, I started the survey with general questions about the project's complexity and duration, and the history of the client and vendor collaboration. After that, there was an assessment of the overall satisfaction with the project. The following three blocks of questions cover interorganizational project related communication, intra-organizational project related communication and routine communication in the client organization respectively. The survey concludes with several demographic questions about the respondent. To personalize the questionnaire, I ask for a project name at the very beginning of the survey, and then insert this name in questions throughout the survey.

In all blocks of questions measured with Likert scales, the order of the questions was randomized.

Minimizing response time. Significant effort was put into making the time commitment of the respondents as short as possible, through intensive use of Qualtrics software features. For most questions, validation rules were set up, forcing the participants to answer most questions and checking for consistency of different answers when possible. Error messages were tested and edited to include information about the reason for the error message and help locate the problematic question on the page. Skip logic was used to avoid exposing respondents to questions that are not relevant for their particular situation. For example, after a participant selects three tools used in her project from a list of twelve different tools, she will see follow up questions about these three tools only.

Qualtrics software allows pausing a survey and then resuming it from the same place at a later time. Although the start and the end time of each survey are provided with the results, there is no

information on pauses the respondent took. This makes evaluating the average time difficult. Among the 14 pilot participants who spent less than 40 minutes on the survey, the average time was 23.15 min. In the final dataset of 266 client-side responses for the main survey, 238 (89%) finished in less than 40 minutes with an average time of 18.5 min.

Visual appearance. To make the survey experience as short and as pleasant as possible, I thoroughly reviewed various components of its appearance: the color scheme, the fonts, consistent use of bold and italics in the text, clear spacing between answers and questions, adequate length of pages and progress indication. The questionnaire was tested in different Web browsers.

I paid special attention to the types of questions used. Blocks of "Agree-disagree" questions with Likert scale options include no more than six statements each. To keep respondents' focus, I avoided putting two blocks of Likert scale questions one after another when possible, separating them with questions of other types and colorful buttons. I strived to provide multiple choice answers for as many questions as possible and refrain from open ended questions that require typing. The resulting survey requires about 100 mouse clicks to complete; only two questions are open ended: the project name at the very beginning of the survey (used later throughout the questionnaire) and the respondent's job title at the very end. I also provided an option to type in the names of communication tools instead of (or in addition to) selecting them from a pre-defined list. These fields were optional; 63 respondents (23.5% of the sample) filled them in.

Finally, I presented most multiple choice questions in a non-traditional form of big buttons with answers, which change their color when selected or de-selected (see the full survey instrument presented in Appendix D). The traditional way of presenting multiple choice questions requires the participant to read the answers one by one and then make precise mouse movements to hit a small circle or square near the desired answer. The spatial "big buttons" presentation makes it easier to grasp all available answers; clicking on a big button requires much less precision of mouse movement. Using big buttons for multiple choice questions throughout the questionnaire

helped reduce the average time spent on filling out the survey and was appreciated by many pilot participants as “entertaining”.

5.2.4. Recruiting participants

The majority of the respondents (87%) were recruited through the Project Management Institute, the world’s leading not-profit membership association for the project management profession, with more than 600,000 members and credential holders in more than 185 countries. After the survey was approved by the PMI Research Review Committee, I contacted the heads of eight of the thirty seven PMI’s Communities of Practice, targeting only those communities that are relevant for managers of complex IT projects. Three communities responded. Two of them (Organizational PM and Healthcare) included the survey link in their monthly newsletters to their members, which resulted in six full questionnaires returned. The IS Community of Practice supported my research by sending a special invitation to its fourteen thousand members and providing an incentive in the form of Professional Development Units – credits required in order to maintain PMP certification granted by the PMI. Following this email, over 200 responses were collected in only three days, July 6-8, 2011.

Additional respondents were recruited through other venues. The complete list of datasets is presented in Appendix E. Overall, the survey was accessible online for three months, from June 1 to September 1, 2011.

No reminder e-mails were sent. Comparing PMI IS CoP members who responded during the first two days after receiving an email with those who responded after this period did not reveal any significant differences, therefore confirming the absence of non-response bias. No differences between the data sets were found either.

The next subsection provides details about the final survey instrument used in this study, including all constructs and their operationalization.

5.3. Operationalization of constructs

Prior literature on boundary spanning, outsourcing relationships and ISD project management, as well as informal interviews with practitioners (see subsection 5.2.1 for details), were used for development of the survey instrument. Several frameworks for operationalizing and assessing the quality of outsourcing relationships and the overall success of outsourcing arrangements exist in the literature. These frameworks are both theoretically supported and empirically tested (e.g., Lee & Kim, 1999; Kinnula, 2006; Kim & Chung, 2003; Goles & Chin, 2005).

Construct	Description	References
Boundary spanning intensity (external or internal)	Variety of tools and practices used for client-vendor communication (external boundary spanning) or communication of project's stakeholders within the client organization (internal boundary spanning).	See Appendix A for a list of boundary objects. Gopal & Gosain, 2009; Levina & Vaast, 2005 Beimborn et al., 2009 Pavlou & El Sawy, 2006
Boundary spanning quality (external, internal or routine)	The extent to which the nominal BOs and boundary spanners can be considered BOs in practice and boundary spanners in practice. The criteria are based predominantly on the work of Levina & Vaast (2005).	Carlile, 2002; Levina & Vaast, 2005; Lyytinen & Robey, 1999; Star, 1985
Perceived boundary complexity (external, internal or routine)	The perception of boundary complexity (syntactic, semantic or pragmatic) by the participants of cross-boundary communication.	Carlile, 2002, 2004
Quality of outsourcing relationship	"…an ongoing, long term linkage between an outsourcing vendor and customer arising from a contractual agreement … with each firm at least in part dependent on the other." (Goles, 2005; p.49)	Han et al., 2008; Goles & Chin, 2005; Lee, 2001; Lee et al., 2008; Lee & Kim, 1999; Blumenberg et al., 2008
Project Outcomes	Meeting the expectations of product quality and project's budget and time constraints.	Gopal & Gosain, 2009; Kinnula, 2004

Table 2.2. Definitions of constructs

Conversely, boundary spanning has never been operationalized, except in the work of Gopal and Gosain (2009) who use boundary spanning as a moderating first order construct in a complex model of control modes. Consequently, findings and recommendations from qualitative studies on boundary spanning were used to operationalize the boundary spanning constructs. The

measures were refined through the pre-testing and pilot testing process. Final construct definitions are provided in Table 2.2. The final survey measures for these constructs are shown in Appendix F.

5.3.1. Boundary spanning intensity

As described earlier, boundary spanning intensity is determined by the presence of appointed boundary spanners and use of boundary objects. The survey participants were asked to identify practices and tools used in their projects for external and internal communication. I also collected data about tools that were introduced but not adopted. Informal communication is viewed as a form of boundary spanning without using objects. The list of twelve tools divided into six categories was developed based on prior studies on boundary spanning and ISD project management as well as interviews with practitioners. A list of boundary spanning practices includes six options. Tools and practices are listed in Tables 3 and 4. All eighteen variables are categorical and include three options: “used”, “not used” and “tried and abandoned”. Variables to be used in the analysis were computed as a simple sum of either all tried tools and practices or only tried and adopted (“used”) tools and practices.

Documents and procedures: Standards Documents and procedures: Specifications Documents and procedures: Use cases & business rules Documents and procedures: Design and testing documents
Visualizations: Flowcharts and diagrams (for example, UML) Visualizations: Engineering charts
Issue tracking systems
Project management tools
Prototypes and beta versions
Web 2.0 and groupware: Shared documents Web 2.0 and groupware: Wikis, forums, blogs Web 2.0 and groupware: Social networks

Table 2.3. Twelve tools captured in this study

Informal communication in person, by phone, email or Skype
Chats, messaging, Twitter
Phone and video conferences
Status meetings
Document, product, code reviews
Brainstorming sessions

Table 2.4. Six boundary spanning practices captured in this study

5.3.2. Boundary spanning quality

The usefulness of an object as a boundary object is not inherent in its properties but depends on the way it is enacted (Levina, 2005; Levina & Vaast, 2005). Levina and Vaast (2005) and Volkoff et al. (2002, 2004) provide detailed accounts on how some nominated objects and nominated users become boundary spanners in practice while others do not. Quality of boundary spanning is not directly connected to the number of used tools. One project may rely on many boundary objects of low quality while other may use few tools effectively.

The boundary spanning quality construct measures if the criteria for boundary spanning in practice are met. The use of boundary objects is captured with three items; the presence of a boundary spanner is one item. Two additional items capture reflection of users and spanners on communication practices and boundary objects in use. All items are measured on a 7-point Likert scale, with 7 meaning “Strongly agree” and 1 meaning “Strongly disagree”.

5.3.3. Perceived boundary complexity

Along with introducing the three-level framework for boundary complexity, Carlile (2002, 2004) provides examples of activities that characterize each of these complexity levels. These works were used as the basis for developing survey items to capture the perceived boundary complexity in ISD projects. Six items represented three levels of complexity, two items per each level. However, following pilot testing and expert input, some items were dropped. The resulting constructs are slightly different for external, internal and routine communication contexts.

Following Carlile's (2002, 2004) claim that the level of boundary complexity is defined by approach to the boundary, I ask project managers how important certain knowledge exchange objectives are for their internal and external project related communication and not how well they are implemented. In case of routine communication, however, I capture the implemented practices. Unlike communication in a time constrained interorganizational project, routine communication within an organization reflects the long term values and perceptions of the whole organization, and can provide a better indicator of routine boundary spanning. For External and Internal boundary spanning contexts, all items are measured on an asymmetric 5-point Likert scale, with 1 meaning "Not at all important" and 5 meaning "Very important". This scale is shorter than the 7-points Likert scale used for most questions in the survey, because it includes only "positive" and "neutral" answers. The 7-points Likert scale is symmetrical and offers three "positive", three "negative" and one "neutral" answer option. In the Routine context, 7-point symmetric Likert scale was used, with 7 meaning "Strongly agree" and 1 meaning "Strongly disagree".

5.3.4. Quality of outsourcing relationship

Quality of outsourcing relationship was captured with twelve items that were grouped into three sub-constructs: collaboration (capturing trust and mutual understanding), partnership (capturing reliability and good will) and conflict resolution (capturing level of conflict and mechanisms for resolution). All items are measured on a 7-point Likert scale, with 7 meaning "Strongly agree" and 1 meaning "Strongly disagree".

5.3.5. Project outcomes

Project outcomes were captured with a set of items adapted from Gopal and Gosain (2009). Two items are used for process based outcomes: meeting time and budget constraints. Two other items reflect satisfaction with the project's outcome in terms of quality and functionality of the final product. Finally an additional item captures overall satisfaction with the project results. The items

are measured on a 7-point Likert scale, with 4 meaning “As expected”, 7 - “Much better” and 1 - “Much worse”.

5.3.6. Additional data

Vendor influence was measured with one item for external and one item for internal communication. The respondents were asked if the tools and practices they used for the project were proposed by the vendor.

“Tone of the top”, which is believed to be critically important for success of an outsourcing arrangement (e.g., Lacity & Willcocks, 1998), was measured with one item per each communication type (external, internal, routine). Two items per communication type captured the overall satisfaction with effectiveness and efficiency of communication in the project, to be used for establishing the instrument’s face validity (see Section 6.3.1).

6. DATA ANALYSIS

Confirmatory Factor Analysis (CFA) was used to validate the instrument in this study. CFA is the most appropriate method for assessing the existence and structure of theoretically constructed latent factors and developing measures for those factors (Hair, Black, Babin & Anderson, 2010).

Three CFA models were estimated for the three boundary spanning contexts faced by an outsourcing organization: external, internal and routine. Pairwise correlations of variables for each model were examined first to identify variables that are not correlated with any other variables and therefore should be removed from the further analysis. Descriptive statistics of the boundary spanning variables and pairwise correlations are summarized in Appendix G.

The next data analysis step was performing Exploratory Factor Analysis (EFA) in order to create the initial factors for the following CFA. This step confirmed a good match between theoretically

constructed factors and factors emergent from the data. It also helped eliminate variables that did not load well on any of the factors.

The following CFA was conducted using covariance-based Structural Equation Modeling (SEM), a second generation data analysis technique (Gefen, Straub & Boudreau, 2000). Its significant advantage is in its ability to statistically test theoretically substantiated assumptions against empirical data (Chin, 1998). AMOS 19, a common SEM software package, was used for CFA. All other statistical tests, including descriptive statistics, exploratory factor analysis, computations of factor scores and bivariate correlations, were performed with IBM SPSS 19.0.0. In the next sub-section I review the data requirements of SEM. They are followed by three CFA models representing external, internal and routine boundary spanning. For each model, I report the parameter estimate and goodness of fit indices as well as construct validity metrics, following the comprehensive guidelines of Hair et al. (2010).

6.1. SEM requirements and assumptions

6.1.1. Sample size

Statistical algorithms used by SEM are only reliable with a certain sample size. As SEM matures and additional research is done, the requirements for sample size become less rigid but also less straightforward. Hair et al. (2010, p.643-44) discuss the importance of multivariate normality, estimation technique, missing data and factors' communalities for determining the minimal sample size. Given the complexity of my model and the high quality of the data (the few records with missing values were removed from the analysis), a sample size of 100-150 observations is sufficient for the CFA model in my case. Sample sizes in External, Internal and Routine boundary spanning CFA models are 266, 259 and 254 respectively. These numbers are notably higher than the minimal sample size requirements.

6.1.2. Data continuity and multivariate normality

The most common SEM estimation procedure is Maximum Likelihood Estimation (MLE), known to provide valid and stable results. This algorithm, however, is based on a set of assumptions, which includes, in addition to independence of observations and sufficient sample size, the requirement for the data to be continuous in nature and multivariate normally distributed. Although variables measured with Likert scales are categorical in nature, treating scales with at least five ordered categories as continuous variables is an acceptable and widely used practice (Finney & DiStefano, 2006). I used 5-point Likert scale to assess boundary complexity levels, and 7-points Likert scale for all other variables, therefore meeting the requirement for data continuity.

Multivariate normality is another important concern with SEM. MLE algorithm has been found to produce relatively accurate parameter estimates with multivariate non-normal data, but the indices of model fit and Chi-square may be significantly biased (Ibid., p.273). The only metrics for multivariate normality provided by AMOS is multivariate kurtosis. However, univariate normality of every single variable is a necessary (although not sufficient) requirement for multivariate normality. Univariate skew and kurtosis for all variables in the dataset are listed in Appendix G. It can be easily observed that for many variables in the dataset the standardized kurtosis surpasses the maximal acceptable value of 2. The requirement of multivariate normality of the data is therefore not met, and using MLE algorithm is not appropriate.

Non-normality of empirical data is a common problem in social sciences. Various strategies have been developed to accommodate non-normal and/or categorical data. In my analysis, I use the Asymptotically Distribution Free (ADF) algorithm which is not based on the assumption of data normality underling the most common Maximal Likelihood Estimation (MLE) algorithm. Each CFA model was estimated using both MLE and ADF algorithms. Although some of the model fit indices fell slightly below the recommended levels when MLE algorithm was replaced by ADF, in general, models produced with the ADF algorithm were close to those produced with MLE,

confirming therefore that the lack of data normality did not cause significant issues with the model. The parameter estimates and model fit indices reported in this paper are obtained using the ADF algorithm.

6.2. Confirmatory factor analysis results

The models resulting from CFA for External boundary spanning, Internal boundary spanning and Routine boundary spanning are presented on Figures 2.6, 2.7 and 2.8 respectively. The charts show items path loadings and covariances of the latent constructs. For detailed explanation of each variable please refer to the list of items in Appendix F. Goodness of fit measures for all three models are summarized in Table 2.5.

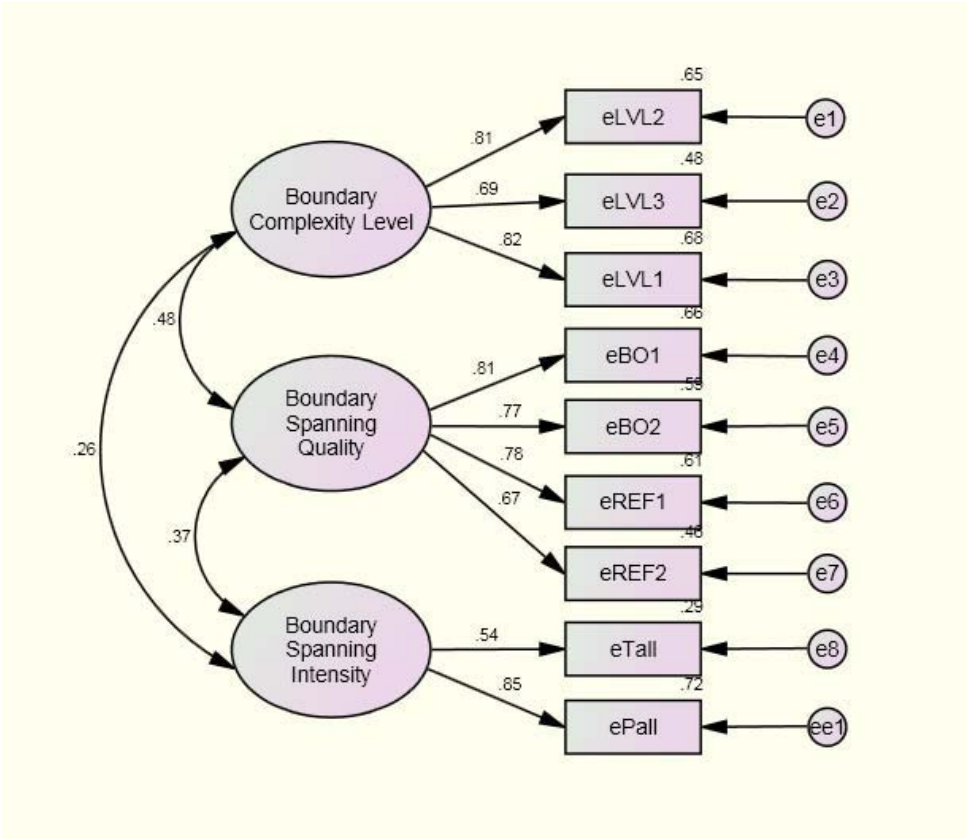

Figure 2.6. CFA for External Boundary Spanning

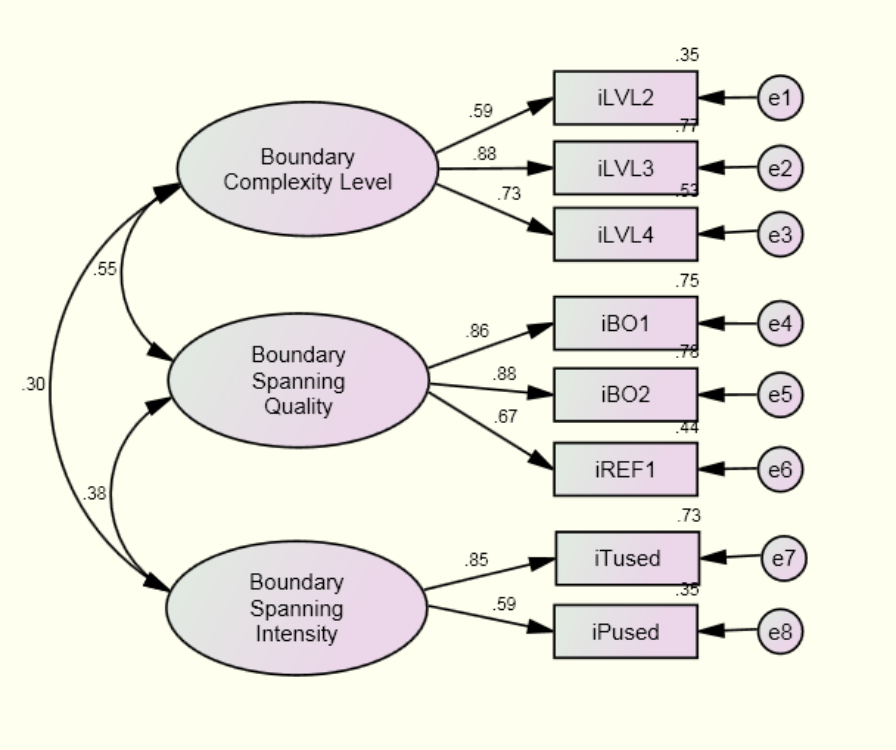

Figure 2.7. CFA for Internal Boundary Spanning

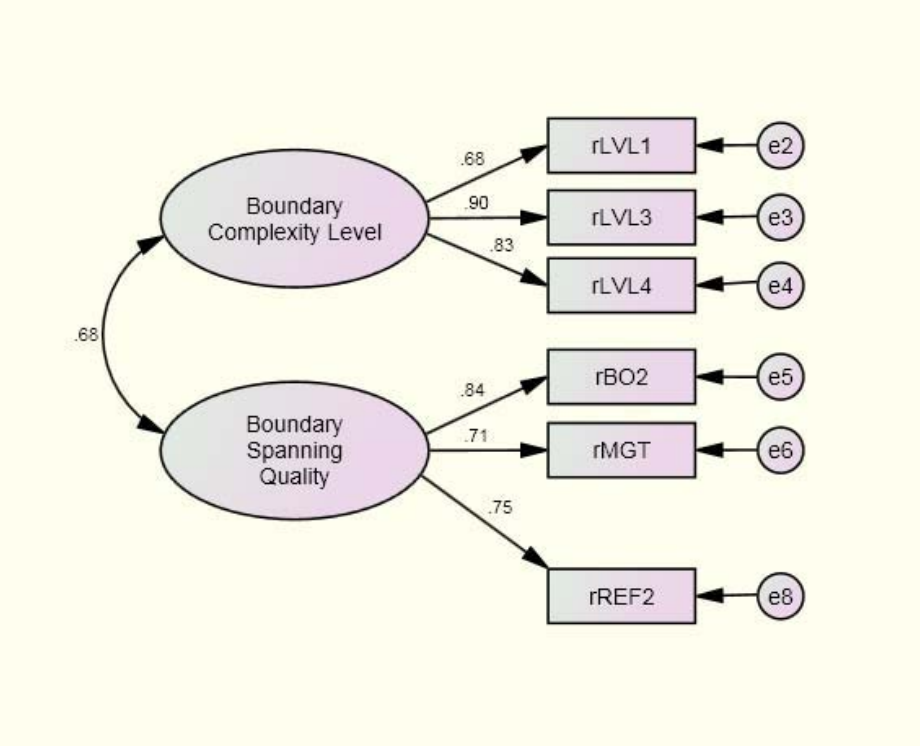

Figure 2.8. CFA for Routine Boundary Spanning

Goodness of Fit Measures	Recommended levels	External (Figure 6)	Internal (Figure 7)	Routine (Figure 8)
Degrees of freedom		24	17	8
No of parameters		21	19	13
Chi-square		53.05	32.83	18.68
P		.001	.012	.017
Normed Chi^2 (Chi^2/df)	**< 3.00**	**2.21**	**1.93**	**2.33**
RMR		.091	.142	.134
GFI	> .90	.959	.962	.956
Adjusted GFI	> .85	.922	.919	.884
Normed Fit Index	> .90	.925	.854	.884
Incremental Fit Index (IFI)	> .90	.957	.924	.930
Tucker Lewis index (TLI)	> .92	.935	.868	.863
Comparative fit index (CFI)	**> .92**	**.957**	**.920**	**.927**
RMSEA	**< .07**	**.068**	**.060**	**.073**

Table 2.5. Goodness of Fit measures for three CFA models

SEM techniques do not rely on a single statistical test that indicates the goodness of model fit. Instead, a whole set of measures are computed, indicating various aspects of the model fit. Several measures of different types should be used for assessing the model fit. However, there is no need for all measures to fit within the recommended limits for the model to be considered an acceptable fit. Hair et al. (2010) suggest Normed Chi-square, CFI or TLI, and RMSEA (all described below) as a sufficient set of measures for assessing a model fit.

There are three main categories of goodness of fit measures: absolute, incremental and parsimony fit measures.

Absolute fit measures. **Chi-square** is the only statistically based SEM fit measure, testing the null hypothesis that the observed and the estimated covariance matrices do not differ. Accepting this hypothesis would mean that the model is of ideal fit, therefore, insignificant Chi-square (>.05) is desired. However, insignificant values of Chi square can be only expected for simple models with less than 12 observed variables (Hair et al., 2010, p.654).

Given the sample size and model complexity constraints of Chi square, **Normed Chi-square** test is preferred as the basic goodness of fit measure. It is computed as a simple ratio of Chi-Square to

the degrees of freedom for the model. Normed Chi-square below 3 is considered a good fit. All three Boundary Spanning models meet this criterion.

Additional absolute fit measures are Goodness-of-fit Index (GFI), Root Mean Square Error of Approximation (RMSEA) and Root Means Square Residual (RMR). The recommended value for GFI is above .9, although some argue that the threshold of .95 should be used (Ibid., p.649). Both RMSEA and RMR are "badness of fit measures", which means that the lower is their value the better is the model fit. Recommendations for RMSEA threshold vary from .05 to .08 (Hair et al., 2011; Arbuckle, 2010). Although some use .1 threshold for RMR (e.g., Goles, 2005), this measure has little meaning in models with non-uniformly measured items (Kline, 2005). Standardized RMR (SRMR) is recommended instead; however, AMOS output does not include this measure of fit.

Incremental fit indices reported by AMOS are the Tucker Lewis Index (TLI) and the Comparative Fit Index (CFI). They can be used interchangeably; Hair et al. (2011) recommend CFI since it is normed and insensitive to model complexity. The recommended values for TLI or CFI are normally .90. However, Hair et al. (2011) suggest CFI or TLI above .92 combined with RMSEA <.07. EBS and IBS models meet this criterion; RBS model falls slightly short on RMSEA (.073).

The most popular ***parsimony fit index*** is Adjusted Goodness of Fit Index (AGFI). It is normally lower than GFI. Accepted values are higher than .85-.90.

6.3. Construct validity

Construct validity is defined as "the extent to which a set of measured items actually reflects the theoretical latent construct those items are designed to measure" (Hair et al., 2010, p.686). Evidence of construct validity confirms that the empirical data in the study obtained from a random sample accurately represent the whole population. In the following subsections, four

types of construct validity are discussed: face validity, convergent validity, discriminant validity and nomological validity.

6.3.1. Face validity

Face validity is the extent to which the content of the items is consistent with the construct definition. In other words, it verifies that the proposed instrument indeed measures the concept it is supposed to measure. In case of theoretically developed constructs for abstract concepts that cannot be measured directly, the only way to establish face validity is through theoretical reasoning and expert opinions. Boundary spanning intensity, complexity and quality are all abstract theoretical concepts representing three dimensions of boundary spanning, another abstract theoretical concept. None of the four can be measured directly in order to assess the face validity of the instrument.

It can be noted, however, that the concept of boundary spanning deals with certain aspects of communication. When wording the questionnaire for the respondents, I did not use the term "boundary spanning", replacing it with the word "communication" in most cases. Therefore, I expect a correlation to exist between boundary spanning latent constructs and variables measuring overall perceptions on communication. Assessing these correlations will help establish face validity of my instrument.

Two variables were used for each of the three contexts (external, internal and routine), measuring effectiveness and efficiency of communication (see variables coded COMM1 and COMM2r in Appendix F). Effectiveness of communication is measured directly as agreement with the statement "Our communication is effective". Efficiency is defined as achieving the desired result with minimal resources. If mutual understanding is achieved after a disproportional amount of effort, the communication is effective but not efficient. Efficiency is assessed as agreement with the reverse statement "We could have better communication considering the effort we put into it".

The values of latent factors were computed using factor score weights that are included in AMOS output (Appendix H).

Pairwise correlations between the factors and the direct measures of effectiveness and efficiency of communication are presented in Table 2.6. These correlations confirm the face validity of the whole instrument in measuring concepts related to communication effectiveness but not to communication efficiency. In addition, it can be observed that Boundary Spanning Quality is correlated with both effectiveness and efficiency of communication in all three contexts, which establishes face validity of the Boundary Spanning Quality construct alone as measuring a concept related to efficiency of communication. Again, the variety of tools used has a limited validity as a part of this instrument – it is correlated with boundary spanning effectiveness in the intra-organizational but not in the inter-organizational context.

		Effective ness	Sig. (2-tailed)	Efficiency	Sig. (2-tailed)
External	B Spanning Quality	**.537**	**.000**	**-.184**	**.003**
	Boundary Complexity	**.314**	**.000**	-.075	.221
	B Spanning Intensity	.063	.309	-.006	.927
Internal	B Spanning Quality	**.526**	**.000**	**-.156**	**.012**
	Boundary Complexity	**.285**	**.000**	.020	.752
	B Spanning Intensity	**.202**	**.001**	-.066	.286
Routine	B Spanning Quality	**.673**	**.000**	**-.231**	**.000**
	Boundary Complexity	**.372**	**.000**	-.104	.099

Table 2.6. Correlations of computed factor scores with control variables reflecting effectiveness and efficiency of communication

Note: efficiency of communication is measured with a reverse item, therefore negative correlations are expected

6.3.2. Convergent validity

Convergent validity of a construct means that its indicators share a high proportion of variance. Convergent validity can be assessed through analyzing factor loadings, average variance extracted (AVE) and construct reliability.

High *standardized factor loadings* suggest that they converge on the latent construct. A rule of thumb is that standardized factor loadings should be .5 or higher, and ideally .7 or higher. All loadings in the three CFA models meet this criterion.

Average variance extracted, or average item reliability, is computed per each construct as follows: $AVE = \frac{\sum_{i=1}^{n} \lambda_i^2}{n}$, where n is the number of measurements in the construct, and λ_i is standardized factor loading.

The recommended baseline value for AVE is .5. This requirement is met by all constructs as presented in Table 2.6.

Finally, the *Construct Reliability* is calculated as $CR = \frac{(\sum_{i=1}^{n} \lambda_i)^2}{(\sum_{i=1}^{n} \lambda_i)^2 + (\sum_{i=1}^{n} \delta_i)}$, where λ_i stand for the standardized factor loadings and δ_i is the standardized error variance term.

The recommended baseline value for CR is .7, while values above .6 are still acceptable. Construct reliabilities are summarized in Table 2.7. Only two CR values fall between .6 and .7, all others well exceed the recommended .7 threshold.

Model	Construct	AVE	CR
External	Complexity	.602	.818
	Quality	.577	.844
	Intensity	.507	.662
Internal	Complexity	.552	.783
	Quality	.654	.848
	Intensity	.535	.691
Routine	Complexity	.654	.848
	Quality	.591	.812

Table 2.7. AVE and CR for all 8 constructs

6.3.3. Discriminant validity

Discriminant validity is the extent to which latent constructs are different from each other. The rule of thumb for assessing discriminant validity is that all construct average variance extracted (AVE) estimates should be larger than the corresponding squared interconstruct correlation estimates (SIC). This indicates that the measured variables have more in common with the

construct they are associated with than they do with the other constructs. As shown in Table 2.8, all AVE estimates are higher than squared interconstruct correlations in all three models.

Model	Construct	AVE	Squared Interconstruct Correlations	
External	Complexity	.602	.230	Complexity<->Quality
	Quality	.577	.134	Quality<->Intensity
	Intensity	.507	.068	Intensity<->Complexity
Internal	Complexity	.552	.305	Complexity<->Quality
	Quality	.654	.148	Quality<->Intensity
	Intensity	.535	.091	Intensity<->Complexity
Routine	Complexity	.654	.465	Complexity<->Quality
	Quality	.591		

Table 2.8. Discriminant validity. AVE and Squared Interconstruct Correlations (SIC)

6.3.4. Nomological validity

Nomological validity is tested by examining whether the correlations between the constructs in the measurement model are significant and theoretically justified. Table 2.9 includes interconstruct correlations for each model. Statistically significant correlations are identified with asterisks. All correlations between boundary spanning quality and boundary complexity are significant. However, the number of tools and practices in use ("Boundary spanning intensity") is correlated significantly only with quality of internal boundary spanning. This supports conclusions from previous studies that effective boundary spanning does not come from inherent properties of artifacts used as boundary objects but rather depends of the way the boundaries and objects are approached and enacted.

Model	Constructs	Interconstruct Correlations	Significance
External	Complexity<->Quality	.480	****
	Quality<->Intensity	.366	
	Intensity<->Complexity	.301	
Internal	Complexity<->Quality	.552	****
	Quality<->Intensity	.385	****
	Intensity<->Complexity	.535	
Routine	Complexity<->Quality	.654	****

Table 2.9. Significant Interconstruct Correlations are indicators of nomological validity
Note: significance is provided by AMOS as "yes/no" identification and not as a numerical test result

7. DISCUSSION

The main goal of this paper is theoretically justifying, developing and validating an instrument for practical assessment of boundary spanning in organizations in different communication contexts. Three models were estimated using the Confirmatory Factors Analysis method. The models successfully meet the criteria for construct validity, and their goodness of fit measures fall within acceptable ranges. Thus the proposed items may be considered a reasonable set of measures for their respective constructs, and to the entire boundary spanning concept.

Along with validating the survey instrument for the next stages of the project and for future research on boundary spanning, the three CFA models provide an insight into boundary spanning in different contexts and suggest new research questions. The rich data collected for the study allow for exploring at least some of these ideas.

Boundary Spanning Intensity is the only construct that falls short of some of the many validity criteria. This construct was completely removed from the analysis of Routine boundary spanning at the pilot testing stage following practitioners' feedback. In External and Internal communication contexts, the Boundary Spanning Intensity construct successfully meets the criteria for convergent and discriminant validity, but its nomological and face validity are low. This means that the construct is a valid part of the model (models for External and Internal Boundary Spanning without Boundary Spanning Intensity construct failed to meet the minimal Goodness of Fit criteria), however, better measurements for this construct can be proposed.

The Boundary Spanning Intensity construct has been modeled in this study with only two indicators: the number of different communication tools used and the number of different communication practices used. A minimum of three indicators per construct is normally recommended as relying on only two indicators might raise some issues regarding measurement reliability. Using only two indicators is still an acceptable practice (e.g., Goles and Chin, 2005), however, it may be considered a limitation of the model.

The two indicators used for modeling Boundary Spanning Intensity construct are two indices created from eighteen categorical ("used", "not used", or "tried and abandoned") variables as plain sums of selected tools and selected practices. While the ability of a tool to become a boundary object in practice depends more on the way the tool is enacted in the specific context than on the properties of the tool itself, the tool's properties still play an important role. This is especially true in the case of complex software tools purposely designed for project management and issue tracking (Pavlou & El Sawy, 2006; see also Chapter III of this dissertation for discussion on usefulness of different tools). A revision of the items measuring the Boundary Spanning Intensity construct may help improve the proposed instrument. For example, simple sums of tools used can be replaced with weighted indices where more complex tools have higher weights than plain documents.

Another interesting observation about Boundary Spanning Intensity is that the best model fit in External and Internal communication contexts is achieved with different indices. In the External Boundary Spanning model, the Intensity indicators are based on all tools used or tried during the project. In the Internal Boundary Spanning model, the best fit is achieved when only tools that were tried and adopted are taken into account. Trying and abandoning tools may be interpreted as a manifestation of flexibility and certain level of intellectual freedom that are essential for creative environments (Levina & Ross, 2003). In contrast, rejection of a proposed boundary object may hint at failure to challenge and enact the object and therefore on low boundary spanning quality (Levina & Vaast, 2005). Different reasons seem to prevail in External and Internal communication contexts. This interesting finding is worth further investigation.

Boundary spanning quality construct is the only one of the three constructs that is related to both effectiveness and efficiency of communication. All its validity metrics are well above the recommended levels. The measurement items for assessing the Boundary Spanning Quality are predominantly based on criteria indicated by Levina and Vaast (2005) in their in depth comparative case study. These criteria cover the perceptions on boundary objects use,

qualifications of appointed boundary spanners and reflection on communication tools and practices. Several items were dropped from the models at either the EFA or CFA stage. Ease of boundary object's use and qualification of boundary spanners (items BO3-R and SPN, Appendix F) were not deemed to contribute to the quality of boundary spanning in either context. Notably, the final Boundary Spanning Quality constructs are similar in all three contexts, featuring boundary objects' ability to help people explain their points of view to each other and a conscious approach to selection and use of communication tools and practices. Some difference across the three contexts can still be observed. Thus, the freedom to decide on the best ways to manage communication (item REF2) is important during an outsourced project for both Internal and External communication. At the same time, in the Routine communication context, where communication practices are used intensively for long time by many different people, the freedom to decide on communication practices does not contribute to Boundary Spanning Quality. Instead, involvement and encouragement of top management (item MGT) helps create organization-wide communication practices that allow people from different backgrounds to communicate and collaborate. Involvement of top management in an outsourced project is known to be important for the project's success (e.g., Lacity & Willcocks, 1998), however, my data analysis shows that it has little effect on the quality of boundary spanning.

Boundary complexity level construct is formed by items reflecting semantic and pragmatic boundary complexity levels (Carlile, 2002, 2004) in all three contexts (items LVL2, LVL3 and LVL4). It is unexpected, however, that item LVL4 ("creating opportunities for different people to work together") which represents the highest, pragmatic, level of boundary complexity, did not load on Boundary Complexity construct for External communication. In addition, items representing higher boundary complexity have the highest loadings on Boundary Complexity construct in Internal and Routine communication contexts; in the External communication context, the highest loadings belong to items representing lower levels of boundary complexity (See Figure 2.9 and Table 2.10).

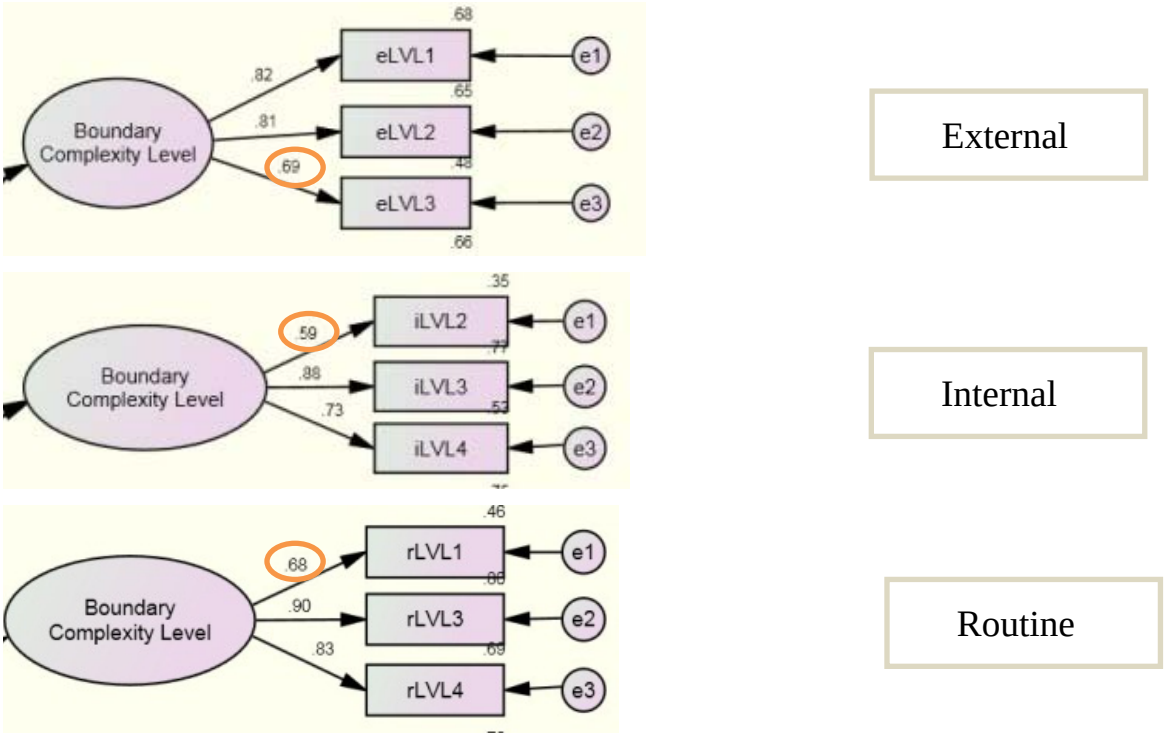

Figure 2.9. Boundary Complexity Level construct from the three CFA models. The lowest loading in each construct is circled.

	EXTERNAL	INTERNAL	ROUTINE
LVL-1	Effective coordination of efforts	*Effective coordination of efforts of all people involved*	Effective coordination among people working for different departments
LVL-2	Clear understanding of each other's tasks and responsibilities	Understanding requirements of different people from the new system	
LVL-3	Helping and supporting each other in everything that is project related	Encouraging people with different backgrounds to help and support each other	Encouraging people with different backgrounds to help and support each other
LVL-4	*Creating opportunities for people with different perspectives to work together on complex problems*	Creating opportunities for people with different perspectives to work together on complex problems	Creating opportunities for people with different perspectives to work together on complex problems

Table 2.10. Boundary Complexity items with significant loadings in three communication contexts (excerpt from Appendix F)

Items listed in italic were dropped during EFA/CFA. The empty cell represents an item dropped at the pilot stage

These observations suggest differences in approach to boundary complexity between intra- and interorganizational communication. In communication among co-workers, whether routine or project based, creating an environment where people with different perspectives work together on complex problems contributes to successful boundary spanning. In a temporary contractual relationship, however, the ability to establish smooth communication on syntactic and semantic levels in a timely manner and involve existing expertise and resources seems to be more critical than creating an inclusive environment. The importance of tools that were tried and abandoned (External Boundary Spanning Intensity construct) and the inclusion of reflection item REF2 ("During the project, we reflected on our communication practices and changed them as needed") in the External Boundary Spanning Quality construct suggest that approaching the boundaries at the highest, pragmatic complexity level is still important for successful External Boundary Spanning, despite the exclusion of LVL4 item ("Creating opportunities for people with different perspectives to work together on complex problems") from the External Boundary Complexity Level construct.

7.1. Implications for research and practice

Previous research demonstrates the critical importance of client-vendor communication during complex outsourced projects. The importance of project related communication within the client organization is also widely recognized. However, the connection between these two types of communication has never been conceptualized. The theoretical model presented in this paper connects client-vendor communication, project related communication within the client organization, and routine communication in the client organization, making a unique theoretical contribution to the literature.

The boundary spanning research paradigm was selected for simultaneous analysis of communication in three different contexts. The flexibility of the boundary spanning approach and its applicability to various types of organizational communication make it a good conceptual

lens for studying collaborative projects. However, only a few studies (e.g., Gal et al., 2008) explore an organization's ability to leverage its boundary spanning experience in one project or context to another project or context. Moreover, most contemporary research which draws on the boundary spanning paradigm is based on case studies and uses qualitative methods of data collection and analysis. This study proposes a measurement instrument for assessing complex qualitative concepts of intensity and quality of boundary spanning, and boundary complexity. Operationalization and validation of this instrument as well as survey based data collection make an original methodological contribution and provide solid grounds for fitting the theoretical model.

Finally, this research makes an important contribution to practice by highlighting the importance of internal communication in an outsourcing organization. It will help practitioners make more informed decisions when choosing a vendor, forming an outsourcing team, investing in communication with various stakeholders and developing governance mechanisms for an outsourced project.

7.2. Limitations

The study is subject to some inherent limitations related to the survey design, measures and sampling methods.

First, the study is based on the survey data collection method; each project is represented by a single informant. Although boundary spanning by definition involves representatives from different communities of practice, collecting full evidence from all boundary spanning participants with a survey instrument is not feasible. The data is therefore subject to higher than usual self-reporting bias and prone to bias created by social desirability.

Second, the survey was offered to thousands of people, mostly through emails and newsletters from special interest groups. The participation rates, therefore, cannot be adequately assessed, and

the resulting sample may be affected by the self-selection of respondents to participate in the special interest group, and their subsequent self-selection to participate in the study.

Third, the study only focuses on outsourcing arrangements for IS implementation. The quality of communication and the parties' ability "to find common language" are critically important in projects of this type due to their knowledge intensive nature. The findings however may have a limited generalizability for other types of outsourcing arrangements (for example, outsourcing of support services or data centers) and for other types of interorganizational collaboration.

7.3. Next steps for this project

The theoretical model developed in Section 4 of this paper addresses the interconnection among the three types of communication contexts in a client organization involved in an outsourced ISD project. It also addresses the impact of different types of boundary spanning on the quality of client-vendor relationship and the outcomes of the project. The next step in this project is fitting this model using the data and the instrument from this paper and a set of propositions for the theoretical model.

The Quality of Relationship latent construct measurements were developed using previously tested and published instruments (Goles, 2005; Lee & Kim, 1999) and validated with CFA technique following same procedures as the three Boundary Spanning models. The resulting model is shown in Appendix I.

Fitting different parts of the theoretical model with SEM technique is the next stage of this project. The nature of the three dimensions of boundary spanning validated in this paper suggests that boundary spanning should be specified as a formative second order construct rather than a reflective one. The use and specification of formative constructs have gained increased attention recently (e.g., Diamantopoulos & Siguaw, 2006; Andreev, Heart, Maoz & Pliskin, 2009), after years of prevalence of reflective models in IS research. Several authors proposed guidelines for

distinguishing formative constructs from reflective ones (e.g., Jarvis, McKenzie & Podsakoff, 2003; Petter, Straub & Rai, 2007).

First, the causality in a formative model is from the indicators to the construct. Second, changes in any of the formative measures influence the formative construct, while a change in the construct does not necessarily impact all observed items. Third, formative measures represent different dimensions of the construct, are not interchangeable, and ideally have very low correlation. Dropping any one of the formative measures might impede the content validity of the construct.

The instrument validated in this paper provides a strong basis for creating a second order formative Boundary Spanning construct. Boundary Spanning Intensity, Quality and Boundary Complexity are three dimensions that define boundary spanning in External and Internal contexts; Boundary Spanning Quality and Boundary Complexity are two dimensions defining the Routine boundary spanning. Increase in any of these three metrics indicates a higher extent of boundary spanning but does not affect other formative measures. The constructs are not interchangeable; they are correlated, but not all correlations are significant. Therefore, the validated instruments will be used to create a structural model with three Boundary Spanning latent constructs modeled as second order formative constructs.

7.4. Directions for future research

Understanding the connection between an organization's ability to manage internal communication among its communities of practice and its ability to build successful relationships with other organizations, specifically with outsourcing vendors, is a step toward a deeper understanding of how an organization's internal culture shapes its external behavior, and how specific practices can facilitate interorganizational communication. The connection between internal and external communication has been almost completely overlooked by the research

community and leaves many opportunities for further inquiry. This study provides a foundation to examine additional detailed questions about boundary spanning activity.

The data collected for this study provides a unique opportunity to juxtapose boundary spanning practices that occur simultaneously in the same organization in different contexts. Another unique characteristic of this dataset is that it includes responses from client organizations' employees, vendors' representatives and third party consultants. They have differing opinions on the client-vendor communication and the processes that unfold within the client organization. Comparing these three groups of respondents will provide an additional insight into boundary spanning in outsourced projects and perceptions of different types of client company communication by different parties participating in the outsourced project.

A more focused insight into successful cases may provide useful details on how an organization's routine boundary spanning practices inform the process of spanning a new boundary. What helps decision makers recognize the novelty of a new boundary? What kinds of internal boundary objects can be most successfully reused for new types of boundaries? Are there special concerns associated with leveraging an internal boundary spanning practice for interorganizational use (for example, security)? These are only a few questions that may interest a future researcher in the field.

A move beyond managing outsourced ISD projects may also provide new insights into the role of boundary spanning in different types of outsourcing projects. When outsourced processes are simple and routine, knowledge exchange between a client and vendor has been found to be unnecessary and even detrimental (Tiwana, 2004). Future researchers can explore the role of project complexity, as well as other characteristics such as the client organization's industry. Different types of outsourcing activities may or may not benefit from certain boundary spanning practices.

Another promising direction is a move beyond outsourcing to analyzing the role of boundary spanning in other kinds of interorganizational relationships, such as supply chains or acquisitions,

or specific kinds of organizations: public agencies, non-profits, cross-sectoral collaborative initiatives. Expanding the presented theoretical reasoning to a more generic relationship between internal and external boundary spanning could make a very valuable contribution to understanding interorganizational relationships and the role of an organization's routine practices in its external communication. It can also help in developing guidelines for making interorganizational collaborations successful and mutually beneficial.

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APPENDIX A
Boundary Objects indicated in previous literature

Source	Object or Practice	Level	
Levina, 2005; Brown & Duguid, 2001	Shared documentation	transfer	1
Star, 1989; Star & Griesemer, 1989;	Standardized forms and methods	transfer translate	1-2
Carlile 2002; Star, 1989; Star & Griesemer, 1989;	Repositories	transfer translate	1-2
Barrett & Oborn, 2010	Specs	transfer translate	1-2
Levina, 2005	Unstructured requirements: "wish lists", "a day in user's life" etc	transfer translate	1-2
Brown & Duguid, 2001	Business processes	transfer translate	1-2
Levina, 2005	Use case scenarios (in UML)	translate	2
Star, 1989; Star & Griesemer, 1989; Levina, 2005	Maps of boundaries, site maps	translate	2
Levina, 2005	Sales presentations	translate	2
Gopal & Gosain, 2009	Code inspections, design reviews	translate transform	2-3
Bechky, 2003; Bødker et al., 1988; Henderson, 1991	Design drawings; engineering sketches	translate transform	2-3
Laumann & Rosenkranz, 2009	Domain Specific Languages	translate transform	2-3
Bechky, 2003; Carlile 2002	Prototypes	translate transform	2-3
Gal et al., 2008	Modeling technology (CAD)	translate transform	2-3
Levina, 2005	Brainstormings, joint and separate	translate transform	2-3
Volkoff et al., 2004	Power users; interdisciplinary teams	translate transform	3
Levina, 2005	"Wireframe design"	translate transform	2-3
Brown & Duguid, 2001; Yakura, 2002	Timelines, schedules	translate transform	2-3
Barrett & Oborn, 2010; Pavlou & El Sawy, 2006; Brown & Duguid, 2001	PM tools	translate transform	2-3
Gal, Lyytinen & Goo, 2008	Contract	all three	1-3
Bødker et al., 1988; Pawlowski & Robey 2005	Computer systems and applications	all three	1-3
Levina, 2005	Vendor's methodology	all three	1-3

APPENDIX B

Demographic characteristics of the study participants

Age	N	%
<35	44	17.1
35-45	91	35.4
45-55	78	30.4
55+	44	17.1
Total	257	100.0

Table B1a. Age of study participants

		N	%
Bachelor		125	47.9
Masters	M.S.	58	22.2
	MBA	71	27.1
PhD		2	.8

Table B1b. Highest degree earned

Note: 7 respondents have both M.S. and MBA degrees

	Managerial experience		IT experience		Tenure in the client company	
	N	%	N	%	N	%
None	3	1.2	2	.8	11	4.3
1-2 years	12	4.7	5	1.9	31	12.1
3-5 years	33	12.9	16	6.2	53	20.7
5-10 years	90	35.2	33	12.8	65	25.4
10+ years	118	46.1	201	78.2	96	37.5
Total	256	100.0	257	100.0	256	100.0

Table B1c. Study participants' experience in IT, as managers, and with the client company

Projects' characteristics

	Frequency (N)	Percent
Fixed Price (FP)	101	38.0
Time and Materials (TM)	67	25.2
50% FP, 50% TM	21	7.9
75% FP, 25% TM	28	10.5
75% TM, 25% FP	17	6.4
"I don't know"	32	12.0
Total	266	100.0

Table B2a. Contract types

	Completed		Close to completion		Ongoing		Total	
	N	%	N	%	N	%	N	%
3 months	1	1%	2	3%	6	11%	9	3.4%
3-6 months	5	3%	7	12%	3	5%	15	5.7%
6 months -1year	18	12%	16	27%	19	34%	53	20.2%
1-2 years	49	33%	16	27%	12	21%	77	29.3%
2-4 years	45	31%	16	27%	6	11%	67	25.5%
5+ years	29	20%	3	5%	10	16%	42	16.0%
Total	147	100%	60	100%	56	100%	263	100%

Table B2b. Projects' length

	N	%
Organizational complexity	**178**	**66.9**
Business Process re-engineering	159	59.8
Organizational changes	94	35.3
Technical complexity:	**233**	**33**
Users from multiple business units	203	76.3
Integration of multiple platforms	163	61.3
Interorganizational complexity:	**107**	**40.2**
Significant off shore	58	21.8
Multiple vendors	75	28.2

Table B2c. Project complexity metrics

Complexity types	N	%
0	7	2.6
1	74	27.8
2	111	41.7
3	74	27.8
Total	266	100.0

Table B2d. Project complexity

Characteristics of the client organizations

	N	%
Finance	66	25.3
Manufacturing and Construction	31	11.9
Hi tech and Bio tech	28	10.7
Healthcare	24	9.2
Transport and Energy	21	8.0
Tourism and Entertainment	2	.8
Professional Services	18	6.9
Communication and Media	17	6.5
Public Administration	13	5.0
Wholesale and Retail	13	5.0
Education	5	1.9
Other	23	8.8
Total	262	100.0

Table C3a. The client companies industries

	N	%
First time	12	4.6
1-2 years	14	5.3
3-5 years	31	11.8
5+ years	188	71.5
Don't know	18	6.8
Total	263	100.0

Table C3b. Clients' experience in IT outsourcing

	N	%
First time	85	34.4
1-2 years	34	13.8
3-5 years	56	22.7
5+ years	62	25.1
Don't know	10	4.0
Total	247	100.0

Table C3c. Clients' experience with the project's IT outsourcing vendor

APPENDIX C
Changes in variables after the pilot survey

EXTERNAL		INTERNAL		ROUTINE	
eBO1	KEPT	**iBO1**	KEPT		
eBO2	KEPT	**iBO2**	KEPT	**rBO2**	KEPT
eBO3	REVISED	**iBO3**	REVISED	**rBO3**	REVISED
eSPN	REVISED	**iSPN**	REVISED	**rSPN**	KEPT
eREF1	REVISED	**iREF1**	REVISED	**rREF1**	NEW
eREF2	REVISED	**iREF2**	REVISED	**rREF2**	NEW
		iLVL0	KEPT	**rLVL0**	DROPPED
eLVL1	KEPT	**iLVL1**	KEPT	**rLVL1**	KEPT
eLVL2	KEPT	**iLVL2**	REWORD	**rLVL2**	KEPT
eLVL3	KEPT	**iLVL3**	KEPT	**rLVL3**	KEPT
eLVL4	KEPT	**iLVL4**	REWORD	**rLVL4**	REWORD
eLVL5	DROPPED	**iLVL5**	DROPPED	**rLVL5**	DROPPED
eMGT	NEW	**iMGT**	KEPT	**rMGT**	KEPT
eV1	KEPT	**iV1**	DROPPED		
eV2	KEPT	**iV2**	DROPPED		
		iV3	KEPT		

APPENDIX D
Survey Instrument

Knowledge Management Tools in Outsourced ISD Projects

By Sonia Gantman (Vilvovsky), Bentley University

Do communication tools matter in IT projects?

We are conducting a study on communication and knowledge management in outsourced IS development projects. We thank you for contributing your experience and will be glad to share the results with the PMI community.

The survey is completely anonymous. Only an aggregate level analysis will be performed.
The data will be stored securely and never shared with any third party.

You may pause the survey at any time and resume within two weeks; the application will take you to the beginning of the page where you stopped. Please use same browser and do not delete cookies.

Any questions or comments may be directed to the principal investigator of this study:
Sonia Gantman (Vilvovsky)
Bentley University, IPM Department, SMI 324, 175 Forest Street, Waltham, MA 02452
Phone: 781-526-0508
Email: svilvovsky@bentley.edu

If you feel that your rights as a research participant have not been honored, you may contact the office of Bentley University Institutional Review Board, Adamian Academic Center 315, Bentley University, 175 Forest Street, Waltham, MA 02452, or email the Chair of Bentley Institutional Review Board Anthony Buono at abuono@bentley.edu.

Please, press the "Next Page" button to start the survey

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page break

We ask you to share your experience and opinions on a project which involves development, implementation or integration of an information system, and has been outsourced to an external contractor or vendor.
The project should be either completed or in an advanced stage. We use the present tense throughout the survey to simplify the language.

Please, choose a project you are most familiar with, regardless of its size or performance. If multiple vendors are involved, answer the questions only with respect to the primary vendor.

Please provide a short name for your project:

_____

Note: the project name is used throughout the survey. It is indicated in this text as <The Project>

The project is: ❍ Completed ❍ Close to completion ❍ Ongoing

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We start with four short questions about <The Project> background.

Q1

How long ago did <The Project> begin?

Up to 3 months	3-6 months	6-12 months	1-2 years	2-4 years	5+ years

Q2

What is your involvement in <The Project>? (Select one)

Client company employee	Vendor company employee
Consultant hired by the client company	Consultant hired by the vendor company

Q3

What is the client company's experience in IT outsourcing?

Years total					Years with this vendor				
First time	1-2	3-5	5+	Don't know	First time	1-2	3-5	5+	Don't know
❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Q4

Select the best description of the contract for <The Project>

Time and materials (TM)	75% TM 25% FP	50% TM 50% FP	25% TM 75% FP	Fixed Price (FP)	Don't Know

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Note: starting from this point, the questions are worded slightly different for clients, vendors and consultants. The questions presented here are addressed to outsourcing clients.

Q5

Compare the performance of <The Project> so far to your initial expectations

	Much Worse	Worse	Some what Worse	As Ex-pected	Some what Better	Better	Much Better
<The Project>is within budget	❍	❍	❍	❍	❍	❍	❍
<The Project>is within the planned schedule	❍	❍	❍	❍	❍	❍	❍
The expectations for product quality have been met to date	❍	❍	❍	❍	❍	❍	❍
The expectations for product functionality have been met to date	❍	❍	❍	❍	❍	❍	❍
Overall satisfaction with <The Project>	❍	❍	❍	❍	❍	❍	❍

Q6

Click on all that is relevant to <The Project>.
(if nothing applies, skip this question)

Users from multiple business units	Integration of multiple platforms	Multiple vendors
Business process re-engineering	Organizational changes in the client company	Significant off-shoring

Q7

How much do you agree or disagree with the following statements about <u>your company and the outsourcing vendor?</u>

	Strongly Dis-agree	Dis-agree	Some what Dis-agree	Neither Agree nor Dis-agree	Some what Agree	Agree	Strongly Agree
We both are reliable partners	❍	❍	❍	❍	❍	❍	❍
We have a global understanding of each other's business objectives	❍	❍	❍	❍	❍	❍	❍
We understand each other's business processes	❍	❍	❍	❍	❍	❍	❍
We have a "common language"	❍	❍	❍	❍	❍	❍	❍
We have compatible organizational cultures and policies	❍	❍	❍	❍	❍	❍	❍

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Q8

How much do you agree or disagree with the following statements about <u>your relationship with the outsourcing vendor?</u>

	Strongly Dis-agree	Dis-agree	Some what Dis-agree	Neither Agree nor Dis-agree	Some what Agree	Agree	Strongly Agree
We make decisions that are beneficial for each other	❍	❍	❍	❍	❍	❍	❍
We willingly provide assistance to each other	❍	❍	❍	❍	❍	❍	❍
We treat each other with respect	❍	❍	❍	❍	❍	❍	❍
We both do our best to maintain a good relationship	❍	❍	❍	❍	❍	❍	❍
Overall, the level of disagreement in this business relationship is high	❍	❍	❍	❍	❍	❍	❍
Most of our disagreements with the vendor are successfully resolved	❍	❍	❍	❍	❍	❍	❍
There is an effective process in place for resolving conflicts between us and the vendor	❍	❍	❍	❍	❍	❍	❍

Q9

How important are the following aspects of working together for you and your vendor?

	Not at all important	Of low Importance	Some what important	Important	Very important
Effective coordination of efforts	❍	❍	❍	❍	❍
Clear understanding of each other's tasks and responsibilities	❍	❍	❍	❍	❍
Helping and supporting each other in everything that is project related	❍	❍	❍	❍	❍
Creating opportunities for people with different perspectives to work together on complex problems	❍	❍	❍	❍	❍

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The next questions focus on <u>tools and practices that you use in your communication with the vendor.</u>

Q10

<u>Click once</u> on all communication mechanisms that you and your vendor used during <The Project>

<u>Click twice</u> on communication mechanisms that were tried or proposed during <The Project>, but have not been adopted for any reason (the buttons will turn purple).

Make at least one selection.

Q11

How much do you agree or disagree with the following statements about <u>your communication with the vendor during <The Project></u>?

	Strongly Disagree	Dis-agree	Some what Disagree	Neither Agree nor Disagree	Some what Agree	Agree	Strongly Agree
The client representatives in the project are well known and respected in the company	❍	❍	❍	❍	❍	❍	❍
Top management encourages communication with the vendor	❍	❍	❍	❍	❍	❍	❍
Overall, our communication with the vendor in <The Project>is effective	❍	❍	❍	❍	❍	❍	❍
Overall, we could have better communication with the vendor considering the effort we put into it.	❍	❍	❍	❍	❍	❍	❍

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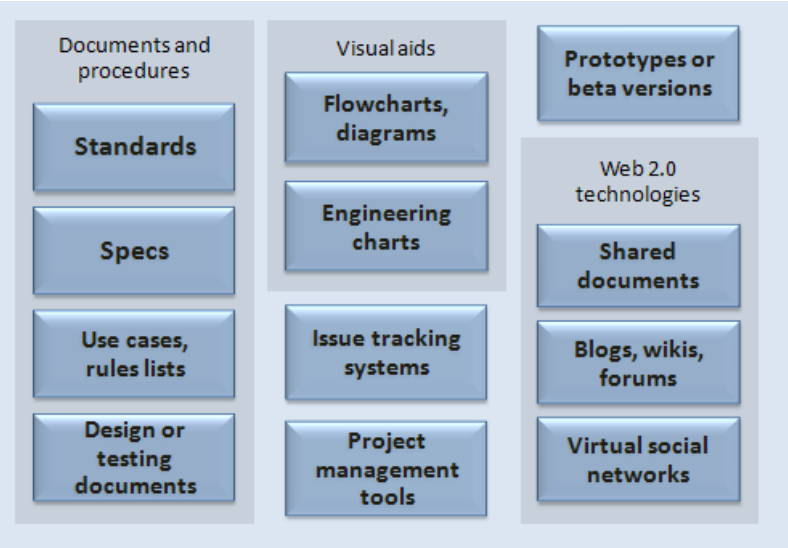
Please think about tools and aids that you used or are still using to document, explain and manage various technical and managerial issues <u>between you and your vendor</u> during <The Project>.

Q12

<u>Click once</u> on tools and aids that you and your vendor adopted in <The Project>
<u>Click twice</u> on tools and aids that were tried or proposed during <The Project>, but have not been adopted for any reason (the buttons will turn purple).
Select at least one tool.



Q12a

List any other tools that you and your vendor adopted for communication during <The Project>.

1. _____
2. _____
3. _____

By now you have completed about 35% of the survey.
We appreciate your time and commitment.

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Q13

Does your outsourcing contract require the use of any of the following? (Select all that apply)

- ❑ Documents and procedures (standards, specs, use cases or source code) {IF SELECTED IN Q12}
- ❑ Visual aids (charts, diagrams) {IF SELECTED IN Q12}
- ❑ Project management tools {IF SELECTED IN Q12}
- ❑ Issue tracking systems {IF SELECTED IN Q12}
- ❑ Prototypes and beta versions {IF SELECTED IN Q12}
- ❑ Web 2.0 technologies (shared documents, blogs, forums, virtual social networks) {IF SEL. IN Q12}
- ❑ <Additional Tool 1> {IF INDICATED IN Q12a}
- ❑ <Additional Tool 2> {IF INDICATED IN Q12a}
- ❑ <Additional Tool 3> {IF INDICATED IN Q12a}
- ❑ No communication aids are defined in the contract
- ❑ I don't know

In the next questions we ask how useful the tools are that you selected earlier for achieving different objectives of <The Project>.

Q14

How useful are these tools for communicating your company's strategic goals and directions to the vendor?

	Very useful	Useful	Some what useful	Not useful at all	Counter pro ductive
Documents and procedures (standards, specs, use cases etc) {IF SELECTED IN Q12}	❍	❍	❍	❍	❍
Visual aids (charts, diagrams) {IF SEL. IN Q12}	❍	❍	❍	❍	❍
Project management tools {IF SEL. IN Q12}	❍	❍	❍	❍	❍
Issue tracking systems {IF SELECTED IN Q12}	❍	❍	❍	❍	❍
Prototypes and beta versions {IF SEL. IN Q12}	❍	❍	❍	❍	❍
Web 2.0 technologies (shared documents, blogs, virtual communities) {IF SEL. IN Q12}	❍	❍	❍	❍	❍
<Additional Tool 1> {IF INDICATED IN Q12a}	❍	❍	❍	❍	❍
<Additional Tool 2> {IF INDICATED IN Q12a}	❍	❍	❍	❍	❍
<Additional Tool 3> {IF INDICATED IN Q12a}	❍	❍	❍	❍	❍

Q15

How useful are these tools for introducing and re-negotiating changes in requirements and procedures?

	Very useful	Useful	Some what useful	Not useful at all	Counter pro ductive
Documents and procedures (standards, specs, use cases etc) {IF SELECTED IN Q12}	❍	❍	❍	❍	❍
Visual aids (charts, diagrams) {IF SEL. IN Q12}	❍	❍	❍	❍	❍
Project management tools {IF SEL. IN Q12}	❍	❍	❍	❍	❍
Issue tracking systems {IF SELECTED IN Q12}	❍	❍	❍	❍	❍
Prototypes and beta versions {IF SEL. IN Q12}	❍	❍	❍	❍	❍
Web 2.0 technologies (shared documents, blogs, virtual communities) {IF SEL. IN Q12}	❍	❍	❍	❍	❍
<Additional Tool 1> {IF INDICATED IN Q12a}	❍	❍	❍	❍	❍
<Additional Tool 2> {IF INDICATED IN Q12a}	❍	❍	❍	❍	❍
<Additional Tool 3> {IF INDICATED IN Q12a}	❍	❍	❍	❍	❍

Q16

How useful are these tools for resolving conflict situations and misunderstandings between your company and the vendor?

	Very useful	Useful	Some what useful	Not useful at all	Counter pro ductive
Documents and procedures (standards, specs, use cases etc) {IF SELECTED IN Q12}	❍	❍	❍	❍	❍
Visual aids (charts, diagrams) {IF SEL. IN Q12}	❍	❍	❍	❍	❍
Project management tools {IF SEL. IN Q12}	❍	❍	❍	❍	❍
Issue tracking systems {IF SELECTED IN Q12}	❍	❍	❍	❍	❍
Prototypes and beta versions {IF SEL. IN Q12}	❍	❍	❍	❍	❍
Web 2.0 technologies (shared documents, blogs, virtual communities) {IF SEL. IN Q12}	❍	❍	❍	❍	❍
<Additional Tool 1> {IF INDICATED IN Q12a}	❍	❍	❍	❍	❍
<Additional Tool 2> {IF INDICATED IN Q12a}	❍	❍	❍	❍	❍
<Additional Tool 3> {IF INDICATED IN Q12a}	❍	❍	❍	❍	❍

Q17

How useful are these tools for monitoring project progress?

	Very useful	Useful	Some what useful	Not useful at all	Counter pro ductive
Documents and procedures (standards, specs, use cases etc) {IF SELECTED IN Q12}	❍	❍	❍	❍	❍
Visual aids (charts, diagrams) {IF SEL. IN Q12}	❍	❍	❍	❍	❍
Project management tools {IF SEL. IN Q12}	❍	❍	❍	❍	❍
Issue tracking systems {IF SELECTED IN Q12}	❍	❍	❍	❍	❍
Prototypes and beta versions {IF SEL. IN Q12}	❍	❍	❍	❍	❍
Web 2.0 technologies (shared documents, blogs, virtual communities) {IF SEL. IN Q12}	❍	❍	❍	❍	❍
<Additional Tool 1> {IF INDICATED IN Q12a}	❍	❍	❍	❍	❍
<Additional Tool 2> {IF INDICATED IN Q12a}	❍	❍	❍	❍	❍
<Additional Tool 3> {IF INDICATED IN Q12a}	❍	❍	❍	❍	❍

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page break

This is the last set of statements about practices and tools that you adopted for communication with the vendor during <The Project>.

Q18
How much do you agree or disagree with each statement?

	Strongly Disagree	Dis-agree	Some what Disagree	Neither Agree nor Disagree	Some what Agree	Agree	Strongly Agree
The tools and aids that we use facilitate knowledge exchange between us and the vendor	❍	❍	❍	❍	❍	❍	❍
Using the tools in the project helps us explain our point of view and understand the vendor's point of view	❍	❍	❍	❍	❍	❍	❍
Not all involved people are comfortable with technical documentation and computer applications; this impedes communication between our organization and the vendor.	❍	❍	❍	❍	❍	❍	❍
Most communication practices used in <The Project>were proposed or required by the vendor	❍	❍	❍	❍	❍	❍	❍
We have the freedom to decide on the best ways to manage communication with the vendor	❍	❍	❍	❍	❍	❍	❍
During <The Project>, we and our vendor reflected on our communication practices and changed them as needed	❍	❍	❍	❍	❍	❍	❍

By now you completed at least 70% of the survey. We appreciate your time and commitment.

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page break

Now we ask you to focus on communication within the client organization in relation to <The Project>. This communication may involve project managers, users, and other stakeholders of <The Project>. We will refer to this as "internal" communication.

Q19
Does the client organization have… (check all that apply)

- ❑ an internal project team which includes representatives of users and other stakeholders
- ❑ a person formally in charge of internal communication related to <The Project>
- ❑ informal leader(s) of internal communication related to <The Project>
- ❑ none of the above
- ❑ I don't know much about the communication within the client organization
  Note: if the respondent selects "I don't know much about…" questions 20-24 are skipped

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page break

Q20
How important are the following aspects of collaborative work for <u>the project related communication within your (client) organization?</u>

	Not at all important	Of low Importance	Some what important	Important	Very important
Making project related information available to all people involved	❍	❍	❍	❍	❍
Effective coordination of efforts of all people involved	❍	❍	❍	❍	❍
Understanding requirements of different people from the new system	❍	❍	❍	❍	❍
Encouraging people with different backgrounds to help and support each other	❍	❍	❍	❍	❍
Creating opportunities for people with different perspectives to work together on complex problems	❍	❍	❍	❍	❍

Q21

The next questions focus on tools and practices that you use for <u>project related communication within your (client) organization.</u>

<u>Click once</u> on communication mechanisms that you adopted for internal project related communication during <The Project>.
<u>Click twice</u> on communication mechanisms that were tried or proposed for internal project related communication during <The Project>, but have not been adopted for any reason (the buttons will turn purple).
Make at least one selection.

Q22

How much do you agree or disagree with the following statements about <u>project related communication within your organization?</u>

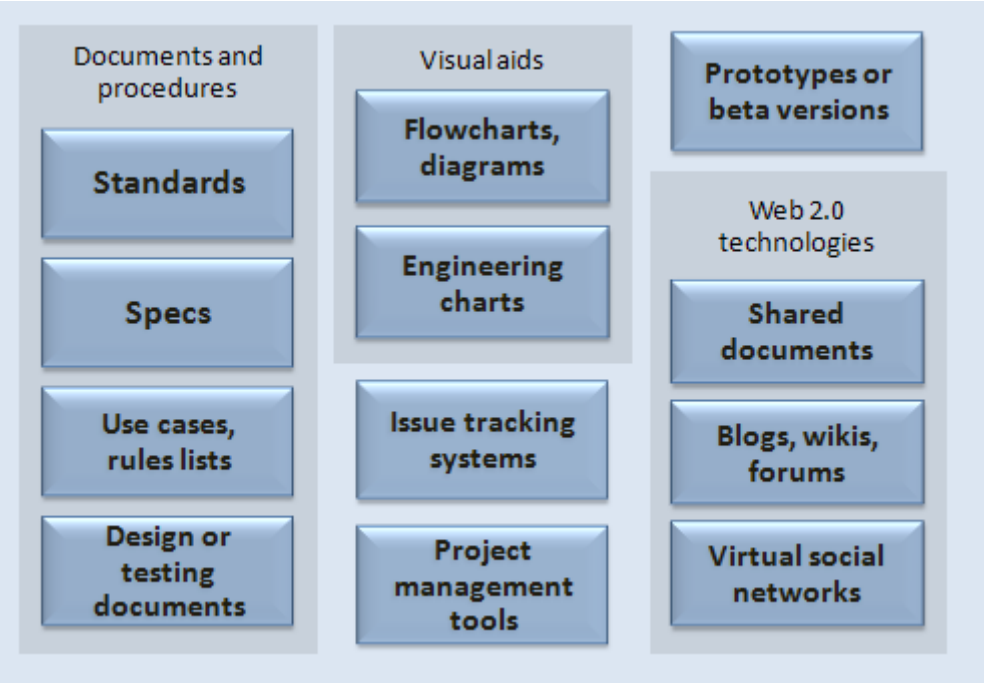
	Strongly Disagree	Dis-agree	Some what Disagree	Neither Agree nor Disagree	Some what Agree	Agree	Strongly Agree
People who lead the internal team for <The Project>are well known and respected in our company	❍	❍	❍	❍	❍	❍	❍
Top management encourages collaboration of all people involved in the project	❍	❍	❍	❍	❍	❍	❍
Vendor's representative(s) are involved in most of our project related communication	❍	❍	❍	❍	❍	❍	❍
Overall, our internal project related communication is effective	❍	❍	❍	❍	❍	❍	❍
Overall, we could have better internal project related communication considering the effort we put into it	❍	❍	❍	❍	❍	❍	❍

page break

Q23

Please think about tools and aids that you used or are still using to document, explain and manage various technical and managerial issues related to <The Project> <u>within your organization</u>

<u>Click once</u> on tools and aids that you adopted for internal project related communication during <The Project>.
<u>Click twice</u> on tools and aids that were tried or proposed for internal project related communication during <The Project>, but have not been adopted for any reason (the buttons will turn purple).
Select at least one tool.



Q23a

List any other tools that you adopted for internal project related communication during <The Project>.

1. _____
2. _____
3. _____

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page break

Q24

How much do you agree or disagree with the following statements about the use of tools and aids in <u>internal project related communication</u> during <The Project>.

	Strongly Disagree	Dis-agree	Some what Disagree	Neither Agree nor Disagree	Some what Agree	Agree	Strongly Agree
The tools facilitate knowledge sharing among project stakeholders with different backgrounds	❍	❍	❍	❍	❍	❍	❍
The tools help project stakeholders with different backgrounds explain themselves and understand others' point of view	❍	❍	❍	❍	❍	❍	❍
Not all involved people are comfortable with technical documentation and computer applications; this impedes our internal project related communication	❍	❍	❍	❍	❍	❍	❍
We have the freedom to decide on the best ways to manage internal project related communication and on the best tools to use	❍	❍	❍	❍	❍	❍	❍
During <The Project>, we reflected on our internal communication practices and changed them as needed	❍	❍	❍	❍	❍	❍	❍

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Q25

Did the stakeholders of <The Project>in your organization communicate before it started?

- ❍ Yes, this is a routine part of our everyday business
- ❍ Yes, there was some occasional communication.
- ❍ Most people involved in <The Project>never worked together before
- ❍ Other. Please, explain: _____
- ❍ I don't know much about communication in the client company apart from <The Project>

Note: of the respondent selects "I don't know much about…" questions 26-27 are skipped

Q26

The statements below (these are last two sets in the survey) refer to everyday communication in the client organization, apart from <The Project>.

How important are the following aspects of collaborative work for <u>everyday communication</u> in your organization?

	Strongly Disagree	Dis-agree	Some what Disagree	Neither Agree nor Disagree	Some what Agree	Agree	Strongly Agree
Communicating company news, decisions, new procedures and requirements clearly and in a timely manner	❍	❍	❍	❍	❍	❍	❍
Effective coordination among people working for different departments	❍	❍	❍	❍	❍	❍	❍
Encouraging people with different backgrounds to help and support each other	❍	❍	❍	❍	❍	❍	❍
Creating opportunities for people with different perspectives to work together on complex problems	❍	❍	❍	❍	❍	❍	❍

Q27

How much do you agree or disagree with the following statements about tools and practices you use in <u>everyday communication?</u>

	Strongly Disagree	Dis-agree	Some what Disagree	Neither Agree nor Disagree	Some what Agree	Agree	Strongly Agree
Tools and practices used for routine communication help people with different backgrounds understand each other	❍	❍	❍	❍	❍	❍	❍
Some tools are not adopted because not all involved people are proficient and comfortable with using them	❍	❍	❍	❍	❍	❍	❍
There are people in the client organization who facilitate diffusion of ideas	❍	❍	❍	❍	❍	❍	❍
Company management encourages communication among employees from different departments	❍	❍	❍	❍	❍	❍	❍

Tools and practices of our everyday business communication were helpful for <The Project>	❍	❍	❍	❍	❍	❍	❍
We have the freedom to decide on how to manage our communication and what tools to use	❍	❍	❍	❍	❍	❍	❍
Overall, everyday business communication in the client organization is effective	❍	❍	❍	❍	❍	❍	❍
Overall, we could have better everyday communication considering the effort we put into it	❍	❍	❍	❍	❍	❍	❍

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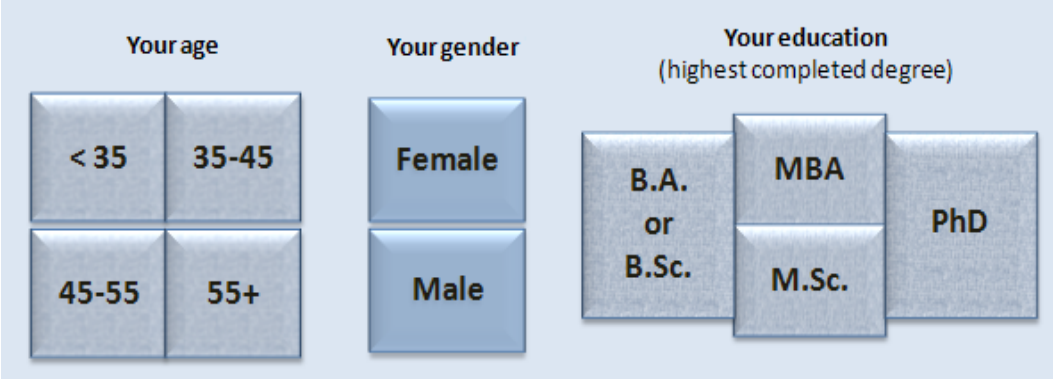
The survey concludes with several demographic questions.

The industry of your (client) company:

Communications and media	High tech and bio tech	Transportation and energy
Finance, insurance, real estate	Manufacturing and construction	Tourism and entertainment
Education	Professional services	Wholesale and retail trade
Health care	Public administration	OTHER

Your formal job title:

_____



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THANK YOU!!!!

Click the "Next Page" button to record your answers in the database.

Comments, suggestions: Sonia Gantman (Vilvovsky) svilvovsky@bentley.edu

APPENDIX E
List of datasets

SET ID	Data set		Date Distributed	# of Responses (Full + Partial)	Clients	Ven dors	Consul tants	Details, incentives
1	Personal network		05/01 –09/01, 2011	6 + 1	4	2	1	Participants of the pilot study were not invited to take the final survey.
2	Bentley Alumni		6/29/2011	36+2	26	5	7	An email sent to ~700 Alumni who's job title is related to IT. Not all of them are actual IT Project Managers. Incentive: Exe Summary to be sent if email is provided (21 of 36)
3	PMI Communit ies of practice:	Organi-zational	7/31/2011	11 + 1	7	3	2	~6500 members got a survey link in CoP email Newsletter. No incentives
4		Healthcare	8/10/2011	1	1	0	0	Sent as a link in CoP email Newsletter. No incentives.
5		IS	7/6/2011	366+3	223	78	68	~14,000 members got an e-mail invitation; the participants got a "professional development unit" required for renewal of PMP certification
6	National Contract Management Association (NCMA)		6/27/2011	5	5	0	0	Emails were sent to 223 heads of local chapters. Eleven people responded mostly saying that they forward my email to somebody else ("distribution officer") or will "bring it to the group's attention at the next meeting". No follow ups were undertaken. Incentive was offered in a form of donation to a charity of the participant's choice, and also as an Exe Summary if the respondent provides an email. 3 were interested in making a donation; 2 provided emails.

APPENDIX F
List of measurement items

EBS variables	IBS variables	RBS variables	Survey questions	Scale
Intensity of boundary spanning				
ePall	*iPall*		Total different communication practices tried during the project, either adopted or not	Index: 1-6
ePused	**iPused**		Total different communication practices adopted during the project	
eTall	*iTall*		Total different tools tried for communication during the project, either adopted or not	Index: 1-12
eTused	**iTused**		Total different tools adopted for communication during the project	
Boundary complexity level				
	iLVL0	*rLVL0*	Making information available to all people involved	5-point Likert scale (EBS & IBS) 7-point Likert scale (RBS)
eLVL1	*iLVL1*	**rLVL1**	Effective coordination of efforts	
eLVL2	**iLVL2**		Understanding of each other's tasks and responsibilities Understanding requirements of different people	
eLVL3	**iLVL3**	**rLVL3**	Helping and supporting each other	
eLVL4	**iLVL4**	**rLVL4**	Creating opportunities for people with different perspectives to work together on complex problems	
Quality of boundary spanning				
eSPN	*iSPN*	*rSPN*	People assuming boundary spanning roles are well known and respected	7-point Likert scale
eMGT	*iMGT*	**rMGT**	Top management encourages communication	
eBO1	**iBO1**		The use of BOs facilitates knowledge exchange	
eBO2	**iBO2**	**rBO2**	BOs help people explain their point of view and understand the others' point of view	
eBO3R	*iBO3R*	*rBO3R*	Not all participants are comfortable with the BOs, this impedes communication (only for complex BOs)	
eREF1	**iREF1**	*rREF1*	Freedom to decide on the best ways to manage communication	
eREF2	*iREF2*	**rREF2**	Reflection on communication practices and changing them as needed	

Vendor's influence				
eV			Vendor's influence in selecting BOs	7-point Likert scale
	iV		Vendor's participation in IBS	
Overall satisfaction with communication (control variables)				
eCOMM 1	iCOMM 1	rCOMM 1	"Overall, the communication is effective"	7-point Likert scale
eCOMM 2r	iCOMM 2r	rCOMM 2r	"Overall, we could have better communication considering the effort we put into it"	
Quality of outsourcing relationship				
Collaboration		**CLB1**	We make decisions that are beneficial for each other	7-point Likert scale
		CLB2	We willingly provide assistance to each other	
		CLB3	We understand each other's business processes	
		CLB4	We have a "common language"	
		CLB5	We have compatible org cultures and policies	
Partnership		**PRTN1**	Both sides do their best to maintain the relationship	
		PRTN2	Both sides are reliable partners	
		PRTN3	We have a global underst. of each other's bus. objectives	
		PRTN4	The client and the vendor treat each other with respect (hopefully loads here)	
Conflict resolution		**CNFL1**	Disagreements between the client and the vendor are successfully resolved	
		CNFL2	There is an effective process in place for resolving conflicts and disagreements between the client and the vendor	
		CFL3_R	Overall, the level of disagreement in the relationship is high	
Project outcomes				
		PBudget	The project is within budget	7-point Likert scale
		PSched	The project is within the planned schedule	
		PQual	The expectations for product quality have been met to date	
		PFunc	The expectations for product functionality have been met to date	
		POverall	Overall satisfaction with the project	

Variables retained in the final CFA models are marked in bold
Variables dropped during either EFA or CFA are marked in italic

APPENDIX G
Descriptive statistics of variables

	N	Min	Max	Mean	Std. Dev.	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
eTall	266	1	12	7.03	2.396	.084	.149	-.379	.298
eTused	266	1	11	6.28	2.063	.020	.149	-.581	.298
ePall	266	1	6	4.44	1.297	-.660	.149	-.205	.298
ePused	266	1	6	4.16	1.306	-.548	.149	-.207	.298
eLVL1	266	1	5	4.50	.744	-1.597	.149	2.700	.298
eLVL2	266	1	5	4.42	.765	-1.657	.149	3.846	.298
eLVL3	266	1	5	4.14	.839	-1.086	.149	1.556	.298
eLVL4	266	1	5	3.42	1.110	-.498	.149	-.416	.298
eSPN	266	1	7	5.40	1.207	-1.216	.149	1.471	.298
eMGT	266	1	7	5.43	1.246	-.877	.149	.705	.298
eBO1	266	1	7	5.52	1.166	-1.376	.149	2.579	.298
eBO2	266	1	7	5.33	1.144	-.980	.149	1.254	.298
eBO3_R	266	1	7	3.88	1.778	.001	.149	-1.121	.298
eV1	266	1	7	3.39	1.463	.297	.149	-.592	.298
eREF1	266	1	7	4.81	1.505	-.746	.149	-.128	.298
eREF2	266	1	7	5.41	1.315	-1.043	.149	.559	.298
iTall	262	1	12	6.98	2.60	.090	.150	-.600	.300
iTused	262	1	12	6.37	2.26	-.094	.150	-.743	.300
iPall	263	1	6	4.54	1.29	-.675	.150	-.276	.299
iPused	263	1	6	4.29	1.28	-.474	.150	-.422	.299
iLVL0	263	1	5	4.31	.830	-1.526	.150	3.067	.299
iLVL1	263	1	5	4.45	.770	-1.688	.150	3.750	.299
iLVL2	263	1	5	4.30	.868	-1.400	.150	2.186	.299
iLVL3	263	1	5	3.75	1.028	-.636	.150	-.054	.299
iLVL4	263	1	5	3.59	1.080	-.527	.150	-.283	.299
iSPN	263	1	7	5.61	1.150	-1.299	.150	1.973	.299
iMGT	263	1	7	5.38	1.425	-1.083	.150	.920	.299
iV	263	1	7	4.80	1.495	-.707	.150	-.318	.299
iBO1	259	1	7	5.37	1.175	-.956	.151	1.128	.302
iBO2	259	1	7	5.18	1.240	-.866	.151	.528	.302
iBO3_R	259	1	7	4.24	1.711	-.181	.151	-1.029	.302
iREF1	259	1	7	4.96	1.532	-.854	.151	-.020	.302
iREF2	259	1	7	5.31	1.406	-1.119	.151	.787	.302
rLVL1	255	1	5	4.13	.928	-1.065	.153	.682	.304
rLVL2	255	1	5	4.11	.909	-.957	.153	.530	.304

rLVL3	255	1	6	3.88	.989	-.598	.153	-.227	.304
rLVL4	255	1	6	3.76	1.040	-.471	.153	-.264	.304
rBO2	254	2	7	5.23	1.061	-.728	.153	.298	.304
rBO3_R	254	1	7	4.80	1.464	-.706	.153	-.233	.304
rSPN	254	1	7	4.89	1.244	-.799	.153	.645	.304
rMGT	254	1	7	5.18	1.374	-.984	.153	.511	.304
rREF1	254	1	7	5.15	1.368	-1.124	.153	.955	.304
rREF2	254	1	7	5.34	1.161	-1.055	.153	1.185	.304
PRTN1	266	1	7	5.63	1.028	-1.273	.149	2.376	.298
PRTN2	266	1	7	4.91	1.478	-.782	.149	-.093	.298
PRTN3	266	1	7	4.83	1.360	-.763	.149	.028	.298
PRTN4	266	1	7	5.67	1.111	-1.420	.149	2.768	.298
CLB1	266	1	7	4.83	1.295	-.791	.149	.249	.298
CLB2	266	1	7	5.35	1.172	-.970	.149	.872	.298
CLB3	266	1	7	4.50	1.449	-.618	.149	-.463	.298
CLB4	266	1	7	4.69	1.405	-.756	.149	-.066	.298
CLB5	266	1	7	4.03	1.538	-.132	.149	-.887	.298
CNFL1	266	1	7	5.21	1.244	-1.188	.149	1.301	.298
CNFL2	266	1	7	4.86	1.393	-.712	.149	-.240	.298
CFL3_R	266	1	7	3.21	1.511	.604	.149	-.674	.298
PBudget	266	1	7	3.64	1.224	-.086	.149	.211	.298
PSchedule	266	1	7	3.22	1.339	.374	.149	.279	.298
PQual	266	1	7	3.71	1.262	.155	.149	.221	.298
PFunc	266	1	7	3.70	1.256	.178	.149	.139	.298
POverall	266	1	7	3.77	1.350	.118	.149	-.141	.298
eCOMM1	266	1	7	5.16	1.268	-.945	.149	.457	.298
eCOMM2r	266	1	7	4.55	1.578	-.414	.149	-.780	.298
iCOMM1	263	1	7	5.17	1.320	-1.014	.150	.669	.299
iCOMM2r	263	1	7	4.68	1.595	-.388	.150	-.732	.299
rCOMM1	254	1	7	4.87	1.300	-.849	.153	.406	.304
rCOMM2r	254	2	7	5.09	1.373	-.626	.153	-.354	.304

APPENDIX H
Factor scores

External boundary spanning:

	eTAll	ePAll	eBO1	eBO2	eREF1	eREF2	eLVL1	eLVL2	eLVL3
Boundary Spanning Intensity	0.714	0.137							
Boundary Spanning Quality			0.264	0.237	0.127	0.134			
Boundary Complexity Level							0.269	0.292	0.148

Internal boundary spanning:

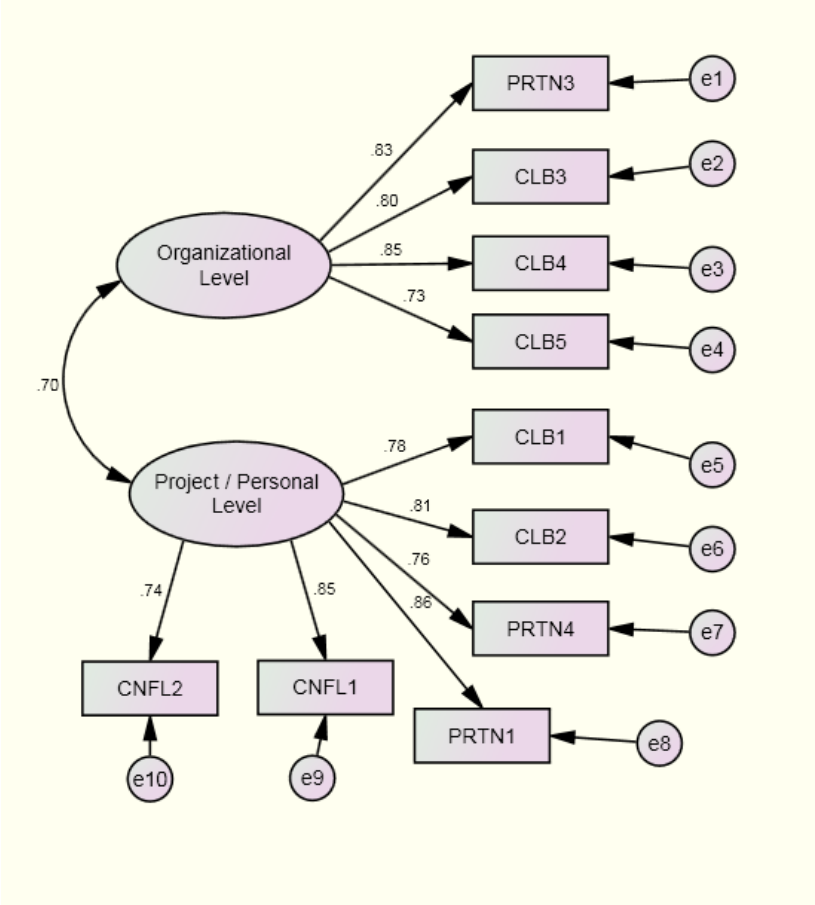
	iTUsed	iPUsed	iBO1	iBO2	iREF1	iLVL2	iLVL3	iLVL4
Boundary Spanning Intensity	0.236	0.124						
Boundary Spanning Quality			0.403	0.361	0.099			
Boundary Complexity Level						0.116	0.301	0.083

Routine boundary spanning:

	rBO2	rREF2	rMGT	rLVL1	rLVL3	rLVL4
Boundary Spanning Quality	0.392	0.216	0.162			
Boundary Complexity Level				0.098	0.322	0.18

APPENDIX I

Confirmatory analysis for Quality of Outsourcing Relationship construct



Goodness of Fit Measures	Recommended levels	Value for this model
Degrees of freedom		34
No of parameters		21
P	Insignificant	.003
Chi-square		60.490
Normed Chi^2 (Chi^2/df)	< 3.00	1.779
RMR		.128
GFI	> .90	.927
Adjusted GFI	> .85	.883
Incremental Fit Index	> .90	.865
Tucker Lewis index	> .92	.811
Comparative fit index	> .92	.857
RMSEA	< .07	.054

CHAPTER THREE. COMMUNICATION AND CONTROL IN OUTSOURCED IS DEVELOPMENT PROJECTS

ABSTRACT

This study brings together approaches from auditing and IS literatures in order to obtain deeper understanding of control mechanisms in complex outsourced IT projects. It is proposed that client-vendor communication tools used during outsourced IS Development (ISD) projects also fulfill internal control functions, such as risk assessment and performance monitoring. To test this proposition, field data have been collected from managers of complex outsourced IT projects through an online survey instrument.

The data analysis suggests that different types of communication tools are best suited to support different control objectives. Other observed patterns are that the type of project complexity dictates which tool to use and that contractually specified tools are more useful for control purposes than those that emerge during the project.

1. INTRODUCTION

Contemporary business practices are increasingly complex and dependent on the need to coordinate efforts of people representing a range of groups or organizations. Effective internal control is especially pertinent in this complex environment. A company's system of internal control encompasses all organizational functions, including information systems and information technology (IT). Moreover, control over IT is especially important and challenging since IT is involved with virtually all processes in an organization, supporting the work of all other departments and enabling cooperation and coordination among them.

The issue of internal control in general, and IT related control in particular, became even more pressing after the big corporate corruption scandals of the early 2000s and the subsequent passage of the Sarbanes-Oxley Act (SOX) in 2002. SOX makes executive management directly responsible for adequate control and sets new and increased requirements for internal control and reporting. Compliance with SOX introduced significant changes to an organization's systems of internal control and, in the long-term, to the whole business culture (Butler & Richardson, 2005). Due to the unique role of IT departments and their involvement in all other business processes, effective internal control of IT is especially critical. However, industry surveys show that, despite the availability of detailed guidance documents, most IT executives are not fully aware of their IT control assessment responsibilities (Hall & Liedtka, 2007).

In today's business environment, many different IT functions can be outsourced to external vendors. IT outsourcing (ITO) does not eliminate the need to comply with SOX reporting requirements. On the contrary, the importance of effective control is much higher for outsourced functions than for the same functions performed in-house. Relying on vendor's internal controls is a dangerous strategy. Vendors are not always cooperative in providing information on their control mechanisms (Hall & Liedtka, 2007); worse is that this information may be incorrect or even fraudulent (e.g., Wilson, 2009). Still, many IT managers do not have adequate knowledge of

the impact of ITO on SOX compliance. The effect of SOX on corporate IT in either outsourced or in-house form has not attracted much attention from researchers (Cleven & Winter, 2009).

In parallel, other aspects of ITO, including the issue of control, have attracted attention from IS scholars. The IS outsourcing literature of the 1990s prescribes that control mechanisms should be defined in great detail in a contract and followed throughout the entire project lifecycle. Later evidence suggests, however, that a system of control in complex outsourced projects is more effective when it is flexible and can evolve over time, which means that relying only on contractually specified control mechanisms is not sufficient (Gopal & Gosain, 2010; Choudhury & Sabherwal, 2003).

The purpose of this study is to investigate how the tools selected by project participants for communication purposes support different objectives of internal control. One type of complex IT projects is selected for the study: outsourced IS development (ISD) projects. The study argues that the flexibility of well-suited communication tools and their involvement in every step of the project makes them useful for implementing some control functions, such as risk assessment and performance monitoring, which are particularly important in an outsourcing relationship. Therefore, internal control is likely to be embedded, at least partially, in the client-vendor communication in ISD outsourcing arrangements.

The paper is structured as follows. The next section provides an overview of the challenging interplay between control and flexibility in complex outsourced projects, and presents the research questions. The selection of IT audit framework COBIT for study design is explained after that, followed by methodology and data collection sections. The paper concludes with a discussion of findings and suggestions for future research.

2. BACKGROUND

Information technology plays an important and unique role in today's organization. It supports the work of most organizational units and facilitates communication and coordination among them. An integrated organization-wide information system demands a large investment and costly maintenance. However, an organization can only benefit from such a system when it is well aligned with the company's processes, governed in accordance with its overall organizational strategy (e.g., Pinsonneault & Rivard, 1998), and addresses the requirements of its various individual users. Implementing and managing IS, therefore, is a complex and ambiguous process. Intensive ongoing communication among all system's stakeholders is widely recognized as one of the critical factors for success of the IS development project (e.g., Faraj & Sproull, 2000). Another critical success factor is establishing effective control mechanisms (e.g., Kern & Willcocks, 2000). The ubiquitous role of technology in an organization and the close involvement of an integrated information system with entire business processes make both system related communication and control of the system as complex and as critical as is the IT organization itself.

Control of product quality and the development process becomes even more challenging when the project is contracted to an external vendor. A vendor's objectives, management practices, organizational (and often national) culture are very different from those of the client. The client organization should also keep in mind that the vendor may be prone to opportunistic behavior (e.g., Barthélemy & Quélin, 2006). Outsourced projects therefore require increased client oversight of project management, constant communication with the vendor and associated modes of control (Levina, 2005).

Challenges related to control in outsourced projects are discussed in the IT outsourcing literature (e.g., Tiwana & Keil, 2009; Gopal & Gosain, 2010), which often emphasizes the contractual nature of an outsourcing agreement and views control as a part of a formal principal-agent

relationship (e.g., Bahli & Rivard, 2003). Outsourcing contracts should include an agreement about control mechanisms (e.g., Ngwenyama & Sullivan, 2007). Moreover, the type of outsourcing contract underscores the client's approach to control: "Fixed price" contracts are focused on the outcomes; "time and material" contracts usually include procedures for behavior based control (Choudhury & Sabherwal, 2003).

Although "time and material" contracts are recognized as more flexible and leading to better outcomes, "fixed price" contracts still dominate the industry due to client companies' fear of losing control over the project. However, embedding controls in the contract at the beginning of the project does not solve the problem of possible loss of control, especially for long and complex projects. IT outsourcing scholars increasingly note the importance of relational governance as a complement to formal contracts, especially complex ones (Sabherwal, 1999; Poppo & Zenger, 2002). Contractual and relational governance are commonly viewed as two of the three main drivers of outsourcing success, along with sourcing decisions (Lacity, Khan & Willcocks, 2009). Development of a new information system may take several years to complete; at the same time, such projects are also highly volatile. Expectations and requirements often change during a project and need to be re-negotiated (Gopal & Gosain, 2010). No contract can predict and capture all possible circumstances. On one hand, tasks in complex development projects are usually highly interdependent and their effective coordination requires structure and discipline; on the other hand, flexibility is essential to support the spirit of innovation and motivate people to do high quality work (Clegg et al., 2004). Overly tight and formalized control mechanisms encourage the vendor to offer simple tangible solutions instead of a state-of-the art innovative system (Levina & Ross, 2003). Successful outsourcing relationships therefore are those that balance a well written contract with the flexibility of partnership relations (Sabherwal, 1999). Many outsourced projects start with a few simple controls, but later on new controls evolve, and the overall control environment becomes more complex (Choudhury & Sabherwal, 2003; Kirsch, 1997).

The information systems and management literatures provide significant insight into the interplay among control, trust and communication in interorganizational relationships (e.g., Anderson & Narus 1990; Das & Teng, 2001; Heiskanen, Newman & Eklin, 2008). In the case of complex innovative projects, effective communication and well-designed mechanisms of information exchange and mutual learning play critical roles in the ability of the client and vendor to build and manage successful relationships (e.g., Tiwana, 2010). One way to conceptualize information exchange and communication among people who have different objectives and varied professional backgrounds is to view communication as a process for spanning a boundary. A number of studies that adopted this approach discuss the selection and enactment of "boundary objects" - tools and artifacts which help people with different backgrounds work together on knowledge intensive projects and contexts. A successful boundary object is "plastic enough to adapt to local needs and constraints" (Star, 1989, p.46), provides concrete means for everybody to learn about differences and dependencies across the boundary, and facilitates the process of knowledge transfer (Carlile, 2002). Such diverse artifacts as sales presentations (Levina, 2005), design review sessions (Gopal & Gosain, 2010) or system prototypes (Carlile, 2002) may serve as boundary objects in different situations. The usefulness of a certain communication tool as a boundary object depends on the way it is enacted by participants of a particular project rather than on the inherent properties of the artifact itself. Some tools are adopted and become "boundary objects in practice" while others are rejected (Levina & Vaast, 2005). This can be paralleled with the notions of *attempted* and *realized* control mechanisms, introduced by Tiwana and Keil (2009). They compared outsourced and "in house" projects and found that although more formal control mechanisms are attempted in outsourced projects, the effectiveness of these controls and their contribution to the project performance is much lower.

Research suggests that both communication and control in complex outsourced projects should involve formal and informal mechanisms and be adaptable to changing situations. Gopal and Gosain (2010) argue that successful communication on the client-vendor organizational boundary

("boundary spanning") improves the effectiveness of the vendor's controls, and that most communication tools ("boundary objects") also serve as behavioral controls. It can be also expected that controls are more efficient and cost-effective when they are an integral part of existing processes - "built in versus bolted on", in the words of Gelinas and Dull (2007, p.218). This reasoning suggests that tools used for communication and knowledge management may play an important role in control applied by a client organization due to their flexibility and acceptance by project participants.

The first research goal of this study, therefore, is to understand if the tools used for communication purposes in outsourced IS development projects are perceived as useful for control purposes by the project's participants:

RQ1. Do the tools that are used for communication during an outsourced ISD project also support project control?

The notion of system or project complexity is given increased attention in the project management and IS literatures. While there is no single commonly accepted definition of ISD project complexity (Bosch-Rekveldt et al., 2009), many definitions mention the involvement of a large number of self-organizing agents, dynamic non-linear interactions among the self-organizing agents, and path dependency (e.g., Cilliers, 1998). All authors note that complexity is closely connected to the uncertainty faced by the project. ISD projects therefore are inherently complex because they deal not only with technical issues but also with organizational factors that are largely beyond the control of the project team (Xia & Lee, 2004)

Project complexity is a multidimensional concept; existing classifications and frameworks suggest various dimensions of complexity, although two dimensions - technical and organizational – are always included. For example, Jacucci et al. (2006) discuss technical, organizational and societal complexity, while Bosch-Rekveldt et al. (2009) distinguish between technical, organizational and environmental complexity. Vidal and Marle (2008) offer a two-level

classification, with technological and organizational dimensions at the first level, each broken down into aspects related to project size, project variety, interdependencies within the project and context interdependencies. Xia and Lee (2004) distinguish between structural and dynamic aspects of technical and organizational types of complexity, offering taxonomy of four complexity components. They also show how various types of complexity affect different aspects of project success in different ways.

Complexity contributes to a project's unpredictability and increases associated risks. The role of a project manager is not to reduce the complexity but to address it with proper management and adequate control mechanisms (Vidal & Marle, 2008). Since the number of different control mechanisms in outsourcing partnerships is positively associated with the level of uncertainty (Rustagi et al., 2008), complex projects are more likely to employ a greater variety of control mechanisms compared to projects with low complexity.

Project complexity also appears as a critically important factor shaping the interplay between formal and informal relationships. It is even argued that too much knowledge exchange and communication can be counterproductive for simple routine projects (Tiwana, 2004). Therefore project complexity may play an important role in using various tools for both communication and control purposes.

RQ2. How does the project's complexity affect the simultaneous use of communication tools as control mechanisms?

Existing research suggests that detailed contractual agreements are not sufficient for creating successful outsourcing relationships. However, including control mechanisms in the contract is still important, and specifying as much as possible in the contract appears to be a common and useful practice (e.g., Klepper, 1995; Ngwenyama & Sullivan, 2007; Willcocks & Currie, 1997).

The next question therefore is whether including the tools in the outsourcing contract affects their usefulness for control purposes.

RQ3. Does specification of tools in the project contract affect the usefulness for control purposes compared to the tools chosen by other means?

Finally, the ultimate goal of studying outsourced projects where communication tools are used as control mechanisms is to understand if this practice is related to better project outcomes.

RQ4. Does the use of communication tools for control purposes in an ISD project affect the project outcomes?

3. ISD PROJECTS AND COMPLIANCE

Although the IS literature pays significant attention to control related issues in outsourced projects, these issues are almost never viewed in terms of the internal control environment, reporting and compliance. Historically, there was little regulation on IT organizations; this situation changed dramatically after the passage of Sarbanes Oxley Act (SOX) in 2002. SOX introduced revolutionary changes in auditing and reporting, affecting virtually all business processes and all of organizational functions. Since IT departments are involved with most business processes and have a notable impact on both financial and managerial accounting, they also face new requirements for reporting and control (Butler & Richardson, 2005). Enforcing SOX compliance in an outsourced project can become particularly challenging. Although many vendors claim that they have the resources and expertise to handle SOX demands, this is often not the case. Auditing and monitoring a remote vendor involves higher costs, increased risk of vendor's unwillingness or lack of capability to create and maintain the required control mechanisms, and additional effort to obtain the required information from the vendor (Hall &

Liedtka, 2007). Compliance is widely perceived by IT professionals as a burden, and many IT executives are not aware of their control assessment responsibilities. Although hundreds of IS studies have been published which discuss a variety of issues related to outsourced projects, a systematic search for studies on regulatory compliance in IS research produced rather modest results (Cleven & Winter, 2009).

At the same time, the challenges of control over IT organizations have long been recognized by auditors. The auditing literature offers a comprehensive and well-structured IT governance framework *Control OBjectives for Information and related Technology* (COBIT) (ITGI, 2007). COBIT is designed as a "supporting toolset that allows managers to bridge the gap between control requirements, technical issues and business risks" (ISACA, 2012). It was developed using best control practices and provides an internally consistent conceptual model for assessment of IT related control (Tuttle & Vandervelde, 2007). The framework is constantly updated to fit user needs. An international team is working on COBIT 5.0 edition, scheduled to release during 2012. COBIT is frequently referenced in IS audit guidelines published by the Information Systems Audit and Control Association (ISACA), and widely used by the community of IT audit practitioners.

COBIT's definition of internal control is adapted from that of a widely used Enterprise Risk Management integrated framework published by the Committee of Sponsoring Organizations of the Treadway Commission (COSO): "*the policies, procedures, practices, and organizational structures designed to provide reasonable assurance that business objectives will be achieved and that undesired events will be prevented or detected and corrected.*"(ITGI, 2007, p.13) In IS research control is viewed as "*a process of regulation and monitoring for the achievement of organizational goals*" (Das & Teng, 2001, p.258). This approach is conceptually close to definitions by COSO and COBIT; however, it is less specific and allows for broad, often abstract, interpretation.

The two disciplines, therefore, have a similar understanding of the nature of control in complex IT projects, but address it from different perspectives. The IS scholarship is focused on contractual and relational governance in outsourced projects. IS literature uses a rather general notion of control: specific control mechanisms are rarely discussed, regulatory compliance is barely mentioned. The accounting literature, on the contrary, provides comprehensive and detailed frameworks aimed to help IT organizations comply with regulatory requirements. This literature, however, almost completely overlooks the role of control in IT outsourcing and the ways to achieve compliance in complex projects and in interorganizational contexts (Gopal & Gosain, 2010). A rare example of a study bridging together these two perspectives was recently published by Bernroider and Ivanov (2011) who show the value of COBIT as a framework for IT project management.

This study brings together the IS and Accounting approaches in order to show how internal control is being incorporated into existing practices of managing outsourced ISD projects. I draw on the outsourcing literature in my theoretical reasoning and use the structure of the COBIT framework to operationalize the use of communication tools for specific control purposes. The research methodology is discussed in the next section.

4. RESEARCH METHODOLOGY

Post-hoc perceptual field data were collected from project managers of recently completed or close to completion outsourced ISD projects through an online cross sectional survey. 266 full valid responses are used for analysis. Data for two parts of this dissertation were collected through the same online questionnaire. The detailed description of instrument development steps, the protocol of recruiting participants, the full questionnaire and the demographic data of the study participants can be found in the Appendices of Chapter II, “Internal and External Boundary Spanning in Outsourced IS Development Projects.”

All of the variables used in this study, as well as the indices created for data analysis, are listed in Appendix A of this chapter. The rest of this section describes the instrument design related to this study.

4.1. Instrument design

Data collected for this study cover use of tools in client-vendor communication, the usefulness of these tools for control purposes, contractual specification of the tools, metrics for project complexity, and satisfaction with the project outcomes.

4.1.1. Documenting the use of tools for communication

After a thorough examination of the literature, informal conversations with practitioners and conducting a pilot survey on a small convenience sample of IT project managers, a short list has been developed of tools commonly used for client-vendor communication in IS development projects[4]. The list included twelve tools divided into six categories. They are summarized in Table 3.1.

Category	**Subcategories, where applicable**
Documents and procedures	Standards Specifications Use cases & business rules Design and testing documents
Visualizations	Flowcharts and diagrams (for example, UML) Engineering charts
Issue tracking systems	
Project management tools	
Prototypes and beta versions	
Web 2.0 and groupware	Shared documents Wikis, forums, blogs Virtual social networks

Table 3.1. Six categories of communication tools used in this study

[4] A detailed discussion on developing the set of communication tools for this study and references to previous literature can be found in Chapter II of this dissertation.

4.1.2. Measuring the use of communication tools for control purposes in terms of COBIT control objectives

Control Objectives for Information and related Technology (COBIT) is a domain and process framework. It provides good practices representing the consensus of experts and presents activities in a manageable and logical structure. COBIT defines thirty-four IT processes and maps them into four broad interrelated domains: Plan and Organize (PO), Acquire and Implement (AI), Deliver and Support (DS) and Monitor and Evaluate (ME). COBIT further specifies control objectives for each process. Organizations, however, have different process structures; they may not need to apply all COBIT processes. In addition, the processes can be altered or combined to fit each enterprise.

Figure 3.1 illustrates COBIT's classification of IT related processes and control objectives into four interrelated domains. The full list of control objectives in each of the control domains is presented in Appendix B. For detailed descriptions of each control objective the readers are referred to publications of the Institute of IT Governance (ITGI, 2007).

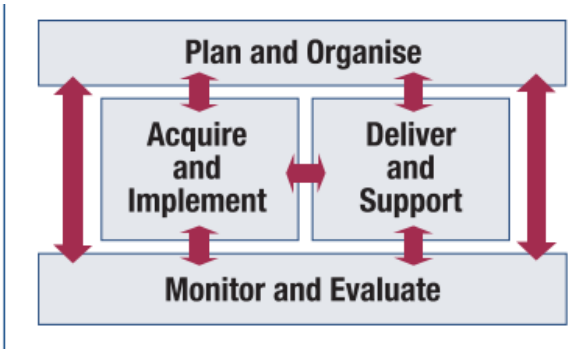


Figure 3.1. Four broad IT control domains (ITGI, 2007)

This study does not aim to test the applicability of the entire COBIT framework, but rather uses it as a tool to determine if communication tools in outsourcing projects are employed for control purposes. Due to the internal conceptual consistency of the COBIT framework (Tuttle and Vandervelde, 2007), representation of all four domains provides a sufficiently balanced assessment of the quality of control. The four domains also match the lifecycle phases of a

strategic outsourcing arrangement (e.g., Kinnula et al., 2007). Therefore, control objectives for four IT processes were selected to represent the four control domains. The processes that were chosen are recognized as important in the outsourcing and project management literature and included in the lists of activities for each of the four outsourcing phases matching four COBIT domains (Ibid.). Table 3.2 summarized the four domains and corresponding IT processes used in this study.

COBIT domain	Process Code	Process Description
Plan and Organize (PO)	PO6	Communicate management aims and direction
Acquire and Implement (AI)	AI6	Manage changes
Deliver and Support (DS)	DS10	Manage problems
Monitor and Evaluate (ME)	ME1	Monitor and evaluate IT performance

Table 3.2. Four COBIT domains and IT processes used in this study

The study participants were offered a list of twelve tools (Table 3.1), and indicated which tools they used for client-vendor communication in their projects. The respondents could also enter up to three additional tools into text fields. These entries were manually mapped to the existing six categories during data cleaning and preparation for analysis.

For each category where at least one tool was selected, the respondents assessed the usefulness of the tool type during the project for achieving each of the four control objectives from Table 3.2. These twenty-four variables (six types of tools across four control domains) were measured on a shifted 5-point Likert scale, with 3 meaning “very useful”, 2 – “useful”, 1 – “somewhat useful”, 0 – “not useful at all”, and -1 – “counterproductive”. The respondents also indicated which of the tools were required by the outsourcing contract.

4.1.3. Measuring satisfaction with the project’s outcomes

The project management literature clearly distinguishes between project objectives that are focused on the quality of the final product and those concerned with the development process, and the “structure” and “process” approaches to control respectively (e.g., Gopal & Gosain,

2009). The “process approach” emphasizes control over activities (behavior control), while the “structure approach” suggests using outcome-based control. A balanced combination of these two types of controls preserves an innovative spirit while allowing for effective coordination of efforts and meeting deadlines (Nidumolu & Subramani, 2004)

Prior literature offers several theoretically supported and empirically tested frameworks for measuring the success of outsourcing arrangements (e.g., Kim & Chung, 2003). The operationalization of Gopal and Gosain (2010) was adopted as the basis for this study, since their work was focused on issues of control. Project success is measured with five items: two process based items (meeting time and budget constraints), two outcome based items (satisfaction with the quality and functionality of the final product), and a general item on overall satisfaction with the project results. These items are measured on a 7-point Likert scale, with 4 meaning that the project matches the expectations, and 1 and 7 indicating much worse and much better than expected respectively.

4.1.4. Complexity and demographic information

Taxonomies of project complexity from previous research (Bosch-Rekveldt et al., 2009; Xia & Lee, 2004; Vidal & Marle, 2008) identify organizational and technical complexity as two main dimensions of complexity of ISD projects. Additionally, the literature on outsourcing suggests the need in increased control in situations when a project is outsourced offshore or distributed among several vendors (e.g., Hartmann et al., 2011). Therefore, three types of project complexity were assessed in this study: technical (integration of different platforms, users from different business units), organizational (major changes in the client organization related to the implementation of the new system) and interorganizational (multiple vendors, significant off shore). I also collected additional information about the client organization (industry, outsourcing experience in general and with the specific vendor in particular), the project (length, contract type) and the survey participants (gender, age, education, working experience).

4.2. Statistical methods used for data analysis

Most data analyses in this study are based on comparing means of independent (for example, projects with and without complexity) or related (for example, usefulness of a tool for different control objectives in the same project) samples.

Running a high number of pairwise comparisons within one set of variables increases the probability of Type I error (declaring a result significant when it is not). To avoid this problem, MANOVA procedure was applied instead of series of pairwise t-tests of independent samples. When MANOVA was not applicable, Bonferroni adjustment was applied to series of pairwise comparisons within same groups of variables. This adjustment involves dividing the desired level of statistical significance by the number of tests in the series. Therefore, in series of six tests (Paired Samples T-tests of variables representing four control domains) values of significance below .0083 (.05 divided by 6) represent significance level of .05; in series of fifteen tests (Paired Samples T-tests of variables representing six types of communication tools) significance level of .05 requires the values of significance lower than .0033 (.05 divided by 15).

5. DATA ANALYSIS

5.1. Use of tools for communication and control purposes

The data suggest that project managers use a variety of different tools for communication with outsourcing vendors. The average number of different types of tools used for client-vendor communication in one project is 4.22. Table 3.3 shows that virtually all IS development projects communicate through some type of documentation; three of every four projects rely on project management and issue tracking tools.

	N	%
Documents	263	98.9%
Visualizations	193	72.6%
Project management tools	206	77.4%
Issue tracking tools	208	78.2%
Beta versions and prototypes	112	42.1%
Web based tools	158	59.4%

Table 3.3. Use of different types of tools for communication in outsourced projects (Total N = 266)

Mean values for usefulness of each tool type for each control domain are listed in Table 3.4. Tables 3.5a and 3.5b summarize the significances of pairwise comparisons across control domains and across tool types. The full tables can be found in Appendix C.

It can be observed from Table 3.4 that different types of tools are useful for achieving different control objectives; the usefulness varies across control domains and tool types. Notably, Web-based tools are consistently the least useful in comparison with any other tool for achieving any of the control objectives. Pairwise analyses (Tables 3.5a and 3.5b) strengthen this observation.

How useful are the following tools for… (mean values)	Docu ments	Visuali-zations	Issue Tracking tools	PM tools	Proto-types & Betas	Web based tools	Avg for control domain
… communicating strategic goals (PO)	1.94	1.93	1.41	1.61	1.62	1.15	1.62
….managing changes (AI)	2.23	2.02	2.17	1.95	2.09	1.27	1.97
… conflict resolution (DS)	2.14	1.86	2.09	1.86	1.88	1.18	1.84
….monitoring performance (ME)	1.72	1.79	2.35	2.51	1.62	1.23	1.91
Usefulness index (mean of 4 domains)	2.01	1.90	2.01	1.98	1.81	1.20	1.835
Friedman Chi^2	56.62	10.684	135.03	114.27	21.76	2.066	
Asymptotic Sig.	.000	.014	.000	.000	.000	.559	

Table 3.4. Mean values for usefulness of each tool type for each of the control objectives
The usefulness is measured with a skewed 5-point Likert scale (see Appendix A).

		AI	DS	ME
Documents	PO	*	*	*
	AI			*
	DS			*
Visual aids	PO			
	AI			*
	DS			
PM tools	PO	*	*	*
	AI			*
	DS			*
Issue Tracking tools	PO	*	*	*
	AI			*
	DS			*
Prototypes and Betas	PO	*		
	AI			*
	DS			
Web based tools	PO			
	AI			
	DS			

		Docs	Vis	PM	Trk	Beta
PO	Visual Aids					
	PM tools	*	*			
	Issue Tracking	*	*			
	Prot. & Betas	*				
	Web based	*	*	*	*	*
AI	Visual Aids	*				
	PM tools	*				
	Issue Tracking			*		
	Prot. & Betas					
	Web based	*	*	*	*	*
DS	Visual Aids	*				
	PM tools	*				
	Issue Tracking			*		
	Prot. & Betas	*				
	Web based	*	*	*	*	*
ME	Visual Aids					
	PM tools	*	*			
	Issue Tracking	*	*			
	Prot. & Betas			*	*	
	Web based	*	*	*	*	*

Tables 3.5a and 3.5b. Significances of pairwise comparisons across tools and domains (Excerpt from Appendix C)

Table 3.5a suggests similarity between AI and DS domains (although all tools were reported less useful for DS domain compared to AI domain, these differences are not significant). Documents, PM and Issue Tracking tools are notably less useful for planning (PO) compared to other domains. Documents are also much less useful for monitoring performance (ME) compared to other domains, while PM and Issue Tracking tools, on the opposite, provide stronger support to ME control domain compared to other domains. Visual aids are almost uniformly useful across all domains; Web-based tools, as noted earlier, are of uniform low usefulness.

Comparisons of usefulness of different tools for same control domain (Table 5b) do not show any clear pattern beyond the already mentioned low usefulness of Web-based tools. For each control objective, a variety of tools are useful to different extents.

The findings provide a positive answer to the first research question of this study, ***"****Do the tools that are used for communication during an outsourced ISD project also support project control?"* Most mean values of usefulness are close to 2 (measured on a skewed 5-point Likert

scale, with 3 meaning “very useful”, 2 – “useful”, 1 – “somewhat useful”, 0 - “not useful at all” and -1 - “counterproductive”). At the same time, statistical analyses point at differences in communication tools’ usefulness for control purposes among the tools and across control domains. This suggests that an effective system of internal control should rely on a portfolio of tools in order to cover a variety of control objectives.

5.2. The role of project complexity

As explained earlier, three types of project complexity were assessed in this study: organizational, interorganizational and technical, in order to analyze how the project’s complexity affects the usefulness of communication tools as control mechanisms. An additional computed variable for complexity level shows how many different types of complexity the project involves. Frequencies for complexity types and complexity levels are summarized in Tables 3.6a and 3.6b.

Complexity types	**N**	**%**
Organizational Complexity	178	66.9%
Inter Organizational Complexity	107	40.2%
Technical Complexity	233	87.6%

Table 3.6a. Frequencies of complexity types

Complexity levels	**N**	**%**
0	7	2.6%
1	74	27.8%
2	111	41.7%
3	74	27.8%

Table 3.6b. Frequencies of complexity levels

As indicated in Table 3.1, survey participants were offered a list of twelve tools and asked to select those used in their projects. The tools were further classified into six types, with four tools classified as “Documents”, three as “Web-based tools”, and two as “Visualizations”. Table 3.7 summarizes the average numbers of tool types used for client-vendor communication in projects with different types and levels of complexity, as well as the variety of Documents, Visual aids and Web-based tools. MANOVA analysis reveals different patterns for each of the three types of complexity. More different types of tools are used in organizationally complex projects; they also employ visual aids more often than projects with no organizational complexity. The higher

numbers of different tools used by technically and interorganizationally complex projects are due to involvement of different types of documents.

		Not complex		Complex		MANOVA
		N	Mean	N	Mean	F Sig.
Org	Tool types (0-6)	88	4.28	178	4.79	.000**
	Docs (0-4)		2.61		2.87	.059
	Vis (0-2)		.67		.93	.001**
	Web (0-3)		1.02		1.00	.683
InterOrg	Tool types (0-6)	159	4.59	107	4.66	.590
	Docs (0-4)		2.64		3.01	.004**
	Vis (0-2)		.83		.86	.697
	Web (0-3)		.99		1.03	.520
Technical	Tool types (0-6)	33	4.33	233	4.66	.101
	Docs (0-4)		2.33		2.85	.008**
	Vis (0-2)		0.7		.86	.142
	Web (0-3)		.94		1.02	.327

Table 3.7. Average number of tool types, different types of documents, visual aids and Web-based tools for projects with different complexity types

Partial results from comparing frequencies of use in projects of different complexities for each tool type are presented in table 3.8. The full tables can be found in Appendix D.

		No complexity		Complexity		Total			
		N	%	N	%	N	%	Pearson Chi-Sq	Sig. (2-sided)
Visual Aids	Tech Complexity	19	57.60%	174	74.70%	193	72.60%	4.246	.039*
	Org Complexity	51	58.00%	142	79.80%			14.081	.000**
	InterOrg Complexity	115	72.30%	78	72.90%			0.1	.919
Issue Track tools	Tech Complexity	23	69.70%	183	78.50%	206	77.40%	1.294	.255
	Org Complexity	59	67.00%	147	82.60%			8.14	.004**
	InterOrg Complexity	118	74.20%	88	82.20%			2.36	.124
Web based tools	Tech Complexity	13	39.40%	145	62.20%	158	59.40%	6.251	.012*
	Org Complexity	52	59.10%	106	59.60%			0.005	.943
	InterOrg Complexity	85	53.50%	73	68.20%			5.782	.016*

Table 3.8. Use of Visualizations, Issue Tracking and Web based tools for communication in projects of different complexity types (excerpt from Appendix D)

Visualizations – flowcharts, diagrams and engineering drawings – appear to be used significantly more often in projects that involve integration, multiple stakeholders or business transformations (technical and organizational complexity). However, visualizations are not perceived as

communication enhancers in projects with multiple or overseas vendors (interorganizational complexity). In cases of multiple vendors, as well as in cases of multiple project stakeholders in the client organization (technical complexity), outsourcing partners tend to increasingly employ Web based communication tools, such as sharing documents online, running Wiki pages, forums or virtual social networks. Somewhat surprisingly, the use of Issue Tracking tools turns out to be very helpful in organizationally complex projects, but insensitive to other two types of complexity.

Complexity type	Tool and Control Domain	Mean usefulness (not complex)	Mean usefulness (complex)	F	Sig.
Tech	Prototypes and Betas for AI	2.30	1.98	5.556	.020*
Org	Documents for AI	2.06	2.31	5.370	.021*
InterOrg	Prototypes and Betas for ME	1.77	1.35	4.209	.043*

Table 3.9. Selected MANOVA F values comparing usefulness of different tools for different control domains in projects with and without various complexity types (excerpt from Appendix E)

Increased use of certain tools for communication purposes does not automatically mean more intensive use for purposes of control. Table 3.9 shows the only three statistically significant t-tests comparing usefulness of specific tools for specific control domains in projects with and without various complexity types (the full table can be found in Appendix E). They suggest that while for some tools their usefulness for particular control objective increases with the increase in complexity (the usefulness of documentation during the development stage of the project is more appreciated in organizationally complex projects), in other cases complexity may cause a significant drop in a tool's usefulness (for example, Prototypes and Betas are less useful for monitoring performance when the project is geographically distributed).

Although most of the complexity related differences in tool use for control purposes are not statistically significant (see Appendix E), "mapping" them may assist in a general assessment of the role of complexity in the use of communication tools for various control purposes. These maps are depicted in Figure 3.2. The "equal" signs indicate tool types that are about equally

useful for particular control objective in projects with and without the specified complexity. Pluses indicate tools that are more useful for control purposes in complex projects and minuses tools that lose their usefulness for particular control objective in complex projects. Larger pluses and minuses indicate more notable (more than 10%) mean differences. Statistically significant differences are circled.

Technical complexity map

	DOCS	VIS	PM	TRK	BETA	WEB
Comm	+	(+)	=	+	=	(+)
PO	+	-	=	=	-	=
AI	=	--	--	--	(--)	=
DS	=	=	-	=	+	=
ME	--	=	=	=	-	=

Organizational complexity map

	DOCS	VIS	PM	TRK	BETA	WEB
Comm	+	(+)	+	(+)	+	=
PO	+	=	--	=	-	=
AI	(+)	-	=	=	+	+
DS	=	-	=	=	=	=
ME	=	-	=	=	=	-

Interorganizational complexity map

	DOCS	VIS	PM	TRK	BETA	WEB
Comm	+	=	+	+	--	(+)
PO	=	+	--	--	--	+
AI	+	+	--	=	--	+
DS	=	+	--	=	+	+
ME	--	+	+	+	(--)	+

Figure 3.2. Comparisons of mean usefulness of different tools for different control domains in projects with and without various complexity types

Several observations can be made based on these maps regarding the effect of complexity on the usefulness of communication tools for control purposes. First, more frequent use of a specific tool for communication purposes in projects of a certain type of complexity does not necessarily mean that the tool is more useful for control purposes. Although companies use visual aids and advanced communication practices, such as issue tracking and Web based tools, in technically complex projects more often than in projects with low technical complexity, usefulness of these tools does not change or even drops with increased technical complexity. Visualizations in

interorganizationally complex projects exhibit the opposite tendency: drawings and charts are not used more often in complex projects, but their usefulness for all control purposes improves.

Second, introduction of complexity changes the relative relevance of various tools for control purposes. For example, in a project with multiple or overseas vendors (interorganizational complexity), visual aids and Web based tools are more important, while PM tools and prototypes are less important for control purposes compared to projects with single local vendors.

It is also observable that different types of complexity change the usefulness of same tools differently. One salient example is Visual Aids, which are slightly more useful for technically or organizationally complex projects compared to projects with no complexity, yet become notably more helpful in complex interorganizational settings.

Finally, some control domains are particularly "sensitive" to certain types of complexity. It can be observed in the maps in Figure 3.2 that most controls embedded in communication tools are much less useful for "Acquire and Implement" domain for technically complex projects compared to those with no technical complexity; the usefulness of most tools for "Monitor and Evaluate" control domain is, on the opposite, higher for interorganizationally complex projects compared to those with no interorganizational complexity.

The level and type of complexity in an outsourced project, therefore, may significantly change the selection of tools for client-vendor communication and the appropriateness of these tools for achieving various control objectives. Technically complex projects tend to rely on higher number and higher variety of communication tools; managing change (the AI domain control objective) becomes especially challenging as the project's technical complexity grows. Projects accompanied by organizational changes call for increased used of all tool types (except for Web-based tools) to accommodate the increased information flows; for these projects, the most challenging control objective is communicating strategic goals (PO domain). Finally, complexity introduced by using multiple and/or overseas vendors (interorganizational complexity) leads to an increasing use of documentation, issue tracking and Web-based tools. In these projects, control

embedded into communication is most useful for monitoring and evaluating a vendor's performance. The projects also seem to benefit the most from using visual aids and Web-based tools for both control and communication.

5.3. Contractually specified communication tools versus emerging tools

Extant literature suggests that including control mechanisms in an outsourcing contract significantly improves the quality of internal control and positively affects the project's outcomes (e.g., Ngwenyama & Sullivan, 2007). At the same time, it is argued that well-managed complex projects allow for adjustments to communication practices during the project (Levina & Vaast, 2005), as well as for introduction of new controls (Choudhury & Sabherwal, 2003).

Overall usefulness across all four control domains are reported in Table 3.10. T-tests comparing contractually specified tools and tools selected by other means, show that those specified in the outsourcing contract are significantly more useful for control purposes. This is true for all tool types with the exception of Project Management tools.

	Not in contract		In contract		% in contract	t	Sig.
	N	Mean	N	Mean			
Documents	91	7.53	169	8.29	65.0	-2.125	.035*
Visualizations	122	7.19	69	8.32	36.1	-2.804	.006**
Issue Tracking tools	87	7.54	117	8.42	57.4	-2.308	.022*
PM tools	84	7.51	121	8.17	59.0	-1.711	.089
Prototypes and betas	59	6.54	52	8.00	46.8	-2.592	.011*
Web based tools	116	4.41	31	6.48	21.1	-3.183	.002**

* Significant at 0.05 level; ** - significant at 0.01 level

Table 3.10. Usefulness of communication tools depending on contract inclusion

A detailed breakdown of usefulness of each contractually specified tool type for each control domain is presented in Appendix F. This analysis allows for making a general conclusion that contractual specification of communication and control tools is beneficial for achieving control objectives of the project. However, it should be noted that contract definitions affect the

usefulness of some tool types for certain control objectives, while in other situations the tools are equally useful whether or not they are specified in the contract.

5.4. Project outcomes and communication tools

Survey respondents assessed their projects' performance by comparing project outcomes to initial expectations. The answers are summarized in Table 3.11. Differences between various metrics of project success are not statistically significant except for the Project Schedule (Friedman test for related samples).

One notable observation is that all average satisfaction metrics are lower than 4 ("as expected"). This is consistent with results of other studies (e.g., Kappelman et al., 2006). Another interesting tendency is that the overall satisfaction of project managers with their projects is higher than satisfaction with any of the specific aspects.

	Project Budget		**Project Schedule**		**System Quality**		**System Functionality**		**Overall**	
	N	%	N	%	N	%	N	%	N	%
Worse	101	38.0	153	57.5	108	40.6	110	41.4	113	42.5
As Expected	121	45.5	85	32.0	105	39.5	105	39.5	88	33.1
Better	44	16.5	28	10.5	53	19.9	51	19.2	65	24.4
Mean	3.64		3.22		3.71		3.70		3.77	

Table 3.11. Process based (budget, schedule) and outcome based (quality, functionality) metrics of project success

Correlations between project outcome metrics and average usefulness of communication tools for achieving the control objectives from the four COBIT domains are summarized in Table 3.12. The overall assessment of the projects' results and outcome based metrics are positively correlated to the use of communication tools for conflict resolution (DS) and monitoring performance (ME). Although managing changes (AI domain) benefitted the most from using communication tools for control purposes (Table 3.4), this is not associated with better project outcomes.

	Budget	Sig.	Sche-dule	Sig.	Qua lity	Sig.	Functi onality	Sig.	Over all	Sig.
PO (… communicating strategic goals)	.008	.899	.013	.829	.052	.403	.083	.176	.065	.294
AI (… managing changes)	-.038	.534	.005	.936	.055	.375	.066	.285	.009	.885
DS (… resolving conflicts)	.055	.371	.080	.192	.176**	.004	.182**	.003	.190**	.002
ME (… monitoring performance)	.030	.623	.121*	.048	.181**	.003	.139*	.024	.136*	.027

Table 3.12. Correlations between project's outcome metrics and average usefulness scores of COBIT control domains

Correlations between project outcome metrics and average usefulness of each of the communication tool types (Table 3.13) show that process based metrics of project success are not related to the use of communication tools for control purposes. At the same time, satisfaction with the final product functionality and especially quality, is higher in projects with more extensive use for control purposes of documents, visual aids and PM tools.

	Budget	Sig.	Sche-dule	Sig.	Quality	Sig.	Functio nality	Sig.	Overall	Sig.
Documents	.080	.197	.114	.067	0.186**	.003	.151*	.014	0.174**	.005
Visual Aids	-.018	.808	.080	.270	0.169**	.019	.139	.056	.126	.081
Issue Tracking tools	.003	.965	.043	.536	.123	.079	.123	.079	.100	.154
PM tools	.051	.468	.109	.119	0.139*	.046	0.159*	.023	0.157*	.024
Prototypes and Betas	-.027	.775	-.158	.095	.005	.961	-.032	.734	.010	.914
Web-based tools	-.159	.052	-.071	.389	-.058	.478	-.027	.741	-.120	.144

Table 3.13. Correlations between project's outcome metrics and average usefulness indices of tool types

Pairwise correlations of project outcome metrics with variables indicating usefulness of each tool for each control domain objective (Appendix G, summarized in Table 3.14) suggest that using communication tools for control purposes during the "Delivery and Support" stage of the project has a direct effect on the quality and functionality of the product, as well as on the overall satisfaction with the project results. Unexpectedly, using Web-based tools for various control purposes is negatively correlated with the project budget and overall results. One possible explanation is that Web-based tools are powerful and complex, but their efficient use for communication and control purposes requires a more developed mutual agreement of the

communicating parties. There is also a lot of anecdotal evidence that exposing workers to the Web as a part of their job responsibilities negatively affects their productivity.

		Budget	Sched	Qual	Func	Overall			Budget	Sched	Qual	Func	Overall
PO	Doc						**DS**	Doc			**	**	**
	Vis							Vis			**	*	*
	PM							PM			*	*	*
	Trk							Trk			*	*	*
	B							B					
	Web					(*)		Web	(*)				
AI	Doc						**ME**	Doc			**		*
	Vis							Vis			*		
	PM							PM					
	Trk							Trk					
	B							B					
	Web	(**)				(*)		Web					

Table 3.14. Significant correlations between project's outcome metrics and usefulness of tool types (summary of Appendix H)

No associations were found between the projects' outcomes and the number of tools in use, project complexity or contract characteristics.

6. DISCUSSION

Analysis of 266 surveys on communication in outsourced IS development projects completed by client side project managers provides strong support to the initial proposition of this study that the tools that are used for communication during an outsourced ISD project also fulfill control functions and support compliance with requirements of the IT audit control framework COBIT. The ability of communication tools to support COBIT control objectives, however, differs across types of communication tools and COBIT control domains. Some tools are more universal, and can be instrumental for achieving control objectives from several control domains (such as Documents and Issue Tracking systems), others are more specific (such as project management tools which are reported to be most useful for monitoring performance).

Each control objective is best supported with different types of tools. Documents are the best for AI and DS domains, closely followed by Issue Tracking tools. Issue Tracking tools are also very useful for monitoring performance (ME domain), along with Project Management tools. The control domain that benefits the least from the use of communication tools to fulfill control functions is PO. Tools used the least for control purposes are Web-based tools. Their average usefulness is the lowest across all control domains.

Two research questions of this study aimed at obtaining a deeper understanding of the role of two project characteristics: the project complexity and contractual specification of the communication tools.

The level and type of project complexity have a strong impact on the usefulness of communication tools.

Generally, more complex projects rely on higher number of tools, but same tools are not uniformly useful for projects of different complexity types. Only projects accompanied by organizational changes rely on higher variety of tool types; this is not the case for technically and interorganizationally complex projects, which employ more different types of documents but not higher variety of tools in general.

Increased use of a tool for communication purposes in projects with higher complexity does not automatically mean more intensive use of this tool for purposes of control. Moreover, project complexity may “shift” the relative relevance of a tool for achieving different control objectives. For example, technical complexity of the project makes Prototypes and Beta versions significantly less useful for managing changes (AI domain) but more useful for managing conflicts (DS domain), compared to projects with no technical complexity. Identifying and prioritizing of control objectives, therefore, should accompany the analysis of project’s complexity when control mechanisms for an outsourced ISD project are considered.

Contractual specification of control mechanisms is a popular and recommended practice. The tools considered in this study are used primarily for communication, though they can be also

specified in the outsourcing contract, but most likely as communication mechanisms. It turns out that communication tools specified in the outsourcing contract are still more useful for control purposes than communication tools selected by other means. All tool types with the exception of Project Management tools contribute more to achieving control objectives when the tools are specified in the contract. Acquire and Implement (AI) and Monitor and Evaluate (ME) control domains benefit the most from contractual specification of communication tools; Delivery and Support (DS) domain benefits the least (Table 3.15).

	PO	AI	DS	ME
Documents	*			
Visual Aids		*	**	
PM tools				
Issue Track		*		**
Beta		*		**
Web based	**	**		*

Table 3.15. Summary of statistically significant differences in usefulness between the contractually specified tools and tools chosen in other ways (an excerpt from Appendix F)

The most salient difference is observed for Web-based tools: although these tools are mentioned in the outsourcing contract least frequently, their contractual specification increases their mean control usefulness by 47% (Table 3.10), due to more active use at the planning and development stages of the project. This may happen because the use of Web-based tools not specified in the contract usually emerges at the advanced stages of the project, after planning and development are already over. While Web-based tools appear the least useful for control purposes in general, contractually specified Web-based tools are as useful at the planning stages as Prototypes, PM tools and Issue Tracking tools (Table 3.16).

	Not in Contract		In contract		Sig.
	N	Mean	N	Mean	
Documents	64	1.67	170	2.04	.030*
Visualizations	107	1.86	69	2.04	.237
PM tools	68	1.38	121	1.69	.080
Issue Tracking tools	68	1.24	118	1.52	.145
Prototypes and Beta versions	55	1.52	53	1.75	.206
Web tools	105	.98	31	1.74	.000**

Table 3.16. Usefulness of tools included and not included in contract for meeting control objectives of PO (an excerpt from Appendix F)

Finally, the study investigated the connection between the role of communication tools in achieving control objectives and the project's outcomes. The client's satisfaction with the project's outcomes has been assessed in terms of meeting schedule and budget constraints and meeting expectations for the final product quality and functionality. Average satisfaction metrics are slightly lower than "as expected", which is consistent with findings of other studies.

There is considerable association between satisfaction with the final product and using communication tools for conflict resolutions (DS domain) or, to a lesser extent, for monitoring performance (ME domain). It can be suggested that the use of communication tools for achieving control objectives from the DS and ME domains should be given priority when a system of internal control for an IS development project is designed and implemented.

Unexpectedly, the use of Web-based tools for managing change (AI domain) and conflict resolution (DS domain) is correlated with budget overflows**.** Throughout different data analyses, Web-based tools (shared documents, forums, Wikis and virtual social networks) consistently appear least useful for both communication and control. At the same time, they become much more useful when their use is planned and defined in the contract ahead of time. Web-based tools are complex and powerful; however, a lack of agreement on their use in the specific project may impede communication instead of facilitating it (Levina & Vaast, 2005; Tiwana & Keil, 2009). Preliminary planning and clear definition of the use of Web-based tools in outsourced projects

may increase their usefulness in achieving control objectives and ultimately their contribution to project success.

6.1. Limitations

Communication is a complex process, and communication practices are highly situational. In order to collect data with a survey instrument, I developed scales for assessing the use of various tools, their usefulness, project complexities and outcomes. Such simplistic scales inevitably do not capture the full range of projects' contexts. However, survey based data collection and quantitative analysis are most suitable for the goal of my study, which is identifying and assessing general tendencies rather than an in-depth analysis of a phenomenon based on one or few cases. Survey design literature suggests keeping surveys as short as possible as an important condition for getting a sufficient number of responses. Following this guidance, I limited the number of tools and tool types to be included in the survey. The list of tools and their classification into six types were created after a thorough literature analysis, interviews with practitioners and pilot survey. Moreover, the respondents could add any additional tools they used in provided text fields. However, the need to fit all various communication practices into a limited grid remains a shortcoming of this study.

Another data collection limitation concerns the outsourcing contract. Numerous publications discuss the role of contracts in establishing and enforcing control mechanisms in outsourcing projects (e.g., Ngwenyama & Sullivan, 2007). Contracts are long and detailed documents that can serve as an excellent source of secondary data for virtually any research on outsourcing. However, I learned from preliminary consultation with practitioners that project managers are not privy to contract details and would not be a reliable source of information about the contract. This constraint naturally limits the scope of contract related questions that I could address in my study.

6.2. Contributions and outcomes

The subject of control in outsourced IT projects is covered by the literature of several research disciplines such as Information Systems, management or accounting. There is little interaction, however, between IS and management scholarship, on the one side, and accounting research, on the other. IS and management researchers are often unaware of accounting control frameworks. Similarly, the accounting literature does not draw on relevant findings from IS and management publications. An original contribution of this study is in bringing the IS and accounting fields together to advance our understanding of internal control in complex outsourced IT projects. This study opens a discussion on embedding control in communication, which is critically important for communication intensive creative environments that are sensitive to formality and flexibility of control mechanisms.

The internal control literature is dominated by normative and opinion papers; most empirical work is based on qualitative methods of analysis. This study is positivist and based on quantitative analysis of primary field data, which makes it a valuable addition to existing body of knowledge.

The findings of this study are of immediate value for practitioners. Early analysis of project's needs and priorities accompanied by conscious selection of communication practices can be recommended to practitioners in order to achieve projects' control objectives and comply with reporting requirements. In particular, it is recommended that communication mechanisms be specified in the outsourcing contract (this is especially pertinent for Web-based tools). Using communication tools for control purposes during the implementation ("Deliver and Support" COBIT domain) and post-implementation ("Monitor and Evaluate" domain) phases of the project directly affects the quality of the final product as well as client's overall satisfaction. Therefore, priority should be given to the use of communication tools for control purposes at these stages of the project.

Understanding of usefulness of different communication mechanisms for control purposes can also assist auditors in assessing internal control in ITO projects.

6.3. Directions for future research

This study provides an initial foundation for a further investigation of the role of different tool types in successful communication and establishing effective control mechanisms. By bringing together IS, Project Management and Accounting research fields, and including different types of tools, control objectives and projects, it opens up several directions for future inquiries.

First of all, the embeddedness of control in communication in cases of knowledge intensive collaborative projects definitely deserves additional attention. This is a rich and complex phenomenon; longitudinal studies and qualitative research methods appear to be most suitable for its' in-depth investigation.

This study touches only the tip of the iceberg of internal control and compliance in outsourced IT projects. I included only four control objectives that appear most often in the project management literature and, at the same time, represent all four COBIT domains. Future research can expand this setting and perform more comprehensive testing of the COBIT framework in the context of IS development projects.

More opportunities for applying the COBIT framework to research outsourced IT projects will emerge after COBIT 5 is issued. Project Management professionals already started to see COBIT as feasible and important for controlling practices, although the adoption rate of COBIT for Project Management control frameworks is still low (Bernroider & Ivanov, 2010). The comprehensive approach of COBIT 5, which consolidates several previous frameworks and addresses such important issues as risk and security management (ITGI, 2010) should increase the interest of practitioners.

An analysis of the role of IT outsourcing contracts in establishing an effective system of internal control could make another valuable contribution to our understanding of control in outsourced projects.

Finally, a more focused inquiry into the role of specific types of tools and different types of project complexity would allow for developing guidelines for practitioners to assist in tool selection across the lifespan of the project.

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APPENDIX A

Variables used in this study

Variable	Description	Scale
The use of communication tools in the project		
DSt	Standarts	Binary (1 - Yes, 0 - No)
DSpec	Specs	
DUCase	Use cases, rules lists	
DCode	Design or testing documents	
VUML	Flowcharts, diagrams	
VCAD	Engineering charts	
Track	Issue tracking systems	
PM	Project Management tools	
Beta	Prototypes and beta versions	
WGDocs	Shared documents	
Wblog	Blogs, Wikis, forums	
Wnet	Virtual social networks	
Computed indices for the use of communication tools in the project		
Docs	Any documents (standards, specs, use cases or design documents)	Binary (1 - Yes, 0 - No)
Vis	Any visual aids (flowcharts or engineering charts)	
Web	Any Web based tools (shared documents, blogs etc, social networks)	
Communication tools defined in the outsourcing contract		
TC_Docs	Documents defined in the contract	Binary (1 - Yes, 0 - No)
TC_Vis	Visual aids defined in the contract	
TC_PM	Project management tools defined in the contract	
TC_Trac	Issue tracking systems defined in the contract	
TC_Beta	Prototypes and beta versions defined in the contract	
TC_Web	Web 2.0 technologies defined in the contract	
TC_No	"No communication aids are defined in the contract"	
TC_DKn	"I don't know" < if any communication aids are in the contract>	
Usefulness of communication tools for four control objectives		
PO_D	"How useful are these tools for communicating your company's strategic goals and directions to the vendor?" - 6 variables, one per each type of tool	3 - very useful; 2 - useful; 1 - somewhat useful; 0 - not useful;
PO_V		
PO_TR		
PO_PM		
PO_B		
PO_W		
AI_D	"How useful are these tools for introducing and re-negotiating changes in requirements and procedures?" - 6 variables, one per each type of tool	
AI_V		
AI_TR		
AI_PM		
AI_B		
AI_W		

DS_D	"How useful are these tools for resolving conflict situations and misunderstandings between your company and the vendor?" - 6 variables, one per each type of tool	-1 - counter productive
DS_V		
DS_TR		
DS_PM		
DS_B		
DS_W		
ME_D	"How useful are these tools for monitoring project progress?" - 6 variables, one per each type of tool	
ME_V		
ME_TR		
ME_PM		
ME_B		
ME_W		
Computed indices for usefulness		
UI_Doc	Average usefulness of a tool across all four control objectives 6 variables, one for each type of tool	
UI_Vis		
UI_Trk		
UI_PM		
UI_B		
UI_W		
Sc_DS	Summated usefulness of all six tools for a given control objective 4 variables, one for each control objective	
Sc_PO		
Sc_AI		
Sc_ME		
AvgSc_DS	Average usefulness of all tools used in the project for a given control objective 4 variables, one for each control objective	
AvgSc_AI		
AvgSc_PO		
AvgSc_ME		
Project complexity measures and computed index		
Cx_Tech	Technical complexity (integration of multiple platforms, users from many business units)	Binary (1 - Yes, 0 - No)
Cx_Org	Organizational complexity (BPR, organizational changes)	
Cx_IntOrg	InterOrganizational complexity (multiple vendors, off-shoring)	
Cx_Types	Sum of Cx_Tech, Cx_Org and Cx_IntOrg	0-3
Project outcomes		
PBudg	The project is within budget	7-point Likert scale
PSch	The project is within the planned schedule	
PQual	The expectations for product quality have been met to date	
PFunc	The expectations for product functionality have been met to date	
POverall	Overall satisfaction with the project	

APPENDIX B

Control objectives for four domains of COBIT

Plan and Organize domain	
PO1	Define a Strategic IT Plan and direction
PO2	Define the Information Architecture
PO3	Determine Technological Direction
PO4	Define the IT Processes, Organization and Relationships
PO5	Manage the IT Investment
PO6	Communicate Management Aims and Directions
PO7	Manage IT Human Resources
PO8	Manage Quality
PO9	Assess and Manage IT Risks
PO10	Manage Projects
Acquire and Implement domain	
AI1	Identify Automated Solutions
AI2	Acquire and Maintain Application Software
AI3	Acquire and Maintain Technology Infrastructure
AI4	Enable Operation and Use
AI5	Procure IT Resources
AI6	Manage Changes
AI7	Install and Accredit Solutions and Changes
Deliver and Support domain	
DS1	Define and Manage Service Levels
DS2	Manage Third-party Services
DS3	Manage Performance and Capacity
DS4	Ensure Continuous Service
DS5	Ensure Systems Security
DS6	Identify and Allocate Costs
DS7	Educate and Train Users
DS8	Manage Service Desk and Incidents
DS9	Manage the Configuration
DS10	Manage Problems
DS11	Manage Data
DS12	Manage the Physical Environment
DS13	Manage Operations
Monitor and evaluate domain	
ME1	Monitor and Evaluate IT Processes
ME2	Monitor and Evaluate Internal Control
ME3	Ensure Regulatory Compliance
ME4	Provide IT Governance

APPENDIX C (a)

Paired Samples t-tests for Table 3.4 (means of usefulness)

		AI		DS		ME	
		t	Sig.	t	Sig.	t	Sig.
Documents	**PO**	-4.656	.000*	-3.039	.003*	2.944	.004*
	AI			1.857	.064	7.790	.000*
	DS					6.107	.000*
Visual aids	**PO**	-1.121	.264	.858	.392	1.892	.060
	AI			-2.311	.022	2.810	.005*
	DS					1.018	.310
PM tools	**PO**	-4.329	.000*	-3.482	.001*	-11.919	.000*
	AI			1.436	.153	-9.230	.000*
	DS					-10.736	.000*
Issue Tracking tools	**PO**	-8.886	.000*	-7.841	.000*	-11.019	.000*
	AI			1.050	.295	-3.099	.002*
	DS					-4.086	.000*
Prototypes and Betas	**PO**	-4.225	.000*	-2.581	.011	.041	.967
	AI			2.042	.044	3.921	.000*
	DS					2.028	.045
Web based tools	**PO**	-1.458	.147	-.306	.760	-.967	.335
	AI			1.284	.201	.509	.611
	DS					-.762	.447

* - significances at .05 level (after Bonferroni adjustment)

APPENDIX C (b)

Paired Samples t-tests for Table 3.4 (means of usefulness)

		Documents		Visual aids		PM tools		Issue Tr tools		Betas	
		t	Sig.	t	Sig.	t	Sig.	t	Sig.	t	Sig.
PO	Visual Aids	.877	.381								
	PM tools	5.325	.000*	4.050	.000*						
	Issue Tracking	6.505	.000*	4.684	.000*	1.220	.224				
	Prototypes & Betas	3.630	.000*	2.282	.025	.226	.822	-.722	.472		
	Web based tools	8.363	.000*	6.340	.000*	3.586	.000*	3.498	.001*	4.723	.000*
AI	Visual Aids	3.171	.002*								
	PM tools	4.865	.000*	1.027	.306						
	Issue Tracking	1.370	.172	-1.825	.070	-3.357	.001*				
	Prototypes & Betas	1.880	.063	-.497	.620	-.219	.827	.890	.376		
	Web based tools	10.43	.000*	6.437	.000*	6.708	.000*	9.652	.000*	5.784	.000*
DS	Visual Aids	5.330	.000*								
	PM tools	6.319	.000*	.643	.521						
	Issue Tracking	1.273	.205	-2.412	.017	-4.103	.000*				
	Prototypes & Betas	4.067	.000*	.186	.853	.090	.929	2.647	.010		
	Web based tools	9.384	.000*	5.829	.000*	5.149	.000*	10.23	.000*	6.387	.000*
ME	Visual Aids	-1.143	.255								
	PM tools	-10.86	.000*	-9.432	.000*						
	Issue Tracking	-8.626	.000*	-7.460	.000*	1.498	.136				
	Prototypes & Betas	.844	.400	.325	.746	6.631	.000*	7.477	.000*		
	Web based tools	4.991	.000*	4.947	.000*	13.16	.000*	13.31	.000*	3.720	.000*

* - significances at .05 level (after Bonferroni adjustment)

APPENDIX D

Complexities and tool types frequencies

Technical complexity								
	Not complex		Complex		Total			
	N using the tool	% of total 33	N using the tool	% of total 233	N using the tool	% of total 266	Pearson Chi-Sq	Sig. (2-sided)
Documents	32	97%	231	99.1%	263	98.9%	1.223	.269
Visual Aids	19	57.6%	174	74.7%	193	72.6%	4.246	.039*
PM tools	25	75.8%	183	78.5%	208	78.2%	.131	.717
Issue Track	23	69.7%	183	78.5%	206	77.4%	1.294	.255
Beta	14	42.4%	98	42.1%	112	42.1%	0.002	.968
Web based	13	39.4%	145	62.2%	158	59.4%	6.251	.012*

Organizational complexity								
	Not complex		Complex		Total			
	N using the tool	% of total 88	N using the tool	% of total 178	N using the tool	% of total 266	Pearson Chi-Sq	Sig. (2-sided)
Documents	86	97.7%	177	99.4%	263	98.9%	1.546	0.214
Visual Aids	51	58.0%	142	79.8%	193	72.6%	14.081	.000**
PM tools	66	75.0%	142	79.8%	208	78.2%	0.788	.375
Issue Track	59	67.0%	147	82.6%	206	77.4%	8.140	.004**
Beta	33	37.5%	79	44.4%	112	42.1%	1.144	.285
Web based	52	59.1%	106	59.6%	158	59.4%	0.005	.943

Interorganizational complexity								
	Not complex		Complex		Total			
	N using the tool	% of total 159	N using the tool	% of total 107	N using the tool	% of total 266	Pearson Chi-Sq	Sig. (2-sided)
Documents	155	97.5%	107	100.0%	263	98.9%	2.042	.15
Visual Aids	115	72.3%	78	72.9%	193	72.6%	0.10	.919
PM tools	121	76.1%	87	81.3%	208	78.2%	1.017	.313
Issue Track	118	74.2%	88	82.2%	206	77.4%	2.360	.124
Beta	72	45.3%	40	37.4%	112	42.1%	1.637	.201
Web based	85	53.5%	73	68.2%	158	59.4%	5.782	.016*

	Complexity	N with the tool	% of total	Total	Chi Sq (df=3)	Sig
Documents	0	7	100.0%	7	7.873	.049*
	1	71	95.9%	74		
	2	111	100.0%	111		
	3	74	100.0%	74		
	Total	263	98.9%	266		
Visual Aids	0	3	42.9%	7	9.997	.019*
	1	48	64.9%	74		
	2	80	72.1%	111		
	3	62	83.8%	74		
	Total	193	72.6%	266		
PM tools	0	6	85.7%	7	3.386	.336
	1	55	74.3%	74		
	2	84	75.7%	111		
	3	63	85.1%	74		
	Total	208	78.2%	266		
Issue Tracking Tools	0	4	57.1%	7	9.462	.024*
	1	50	67.6%	74		
	2	88	79.3%	111		
	3	64	86.5%	74		
	Total	206	77.4%	266		
Beta Versions and Prototypes	0	4	57.1%	7	2.132	.545
	1	28	37.8%	74		
	2	51	45.9%	111		
	3	29	39.2%	74		
	Total	112	42.1%	266		
Web based tools	0	2	28.6%	7	7.513	.057
	1	37	50.0%	74		
	2	70	63.1%	111		
	3	49	66.2%	74		
	Total	158	59.4%	266		

APPENDIX E

Complexities and tool types MANOVA F values

	Technical Complexity				Organizational complexity				Interorganizational complexity			
	Mean (not complex)	Mean (complex)	F	Sig.	Mean (not complex)	Mean (complex)	F	Sig.	Mean (not complex)	Mean (complex)	F	Sig.
aPO_D	1.90	1.96	1.186	.277	1.86	1.98	.709	.401	1.93	1.95	.60	.807
aAI_D	2.27	2.21	.016	.901	2.06	2.31	5.370	.021*	2.19	2.29	.698	.404
aDS_D	2.13	2.14	.115	.735	2.18	2.12	.267	.606	2.11	2.17	.222	.638
aME_D	1.83	1.65	.313	.576	1.75	1.70	.133	.715	1.78	1.64	1.230	.269
aPO_V	1.89	1.95	1.715	.192	1.98	1.91	.163	.687	1.87	2.03	1.209	.273
aAI_V	2.17	1.94	3.777	.053	2.14	1.97	1.124	.290	1.94	2.13	1.799	.181
aDS_V	1.88	1.86	.366	.546	1.94	1.84	.367	.545	1.76	2.01	2.770	.098
aME_V	1.82	1.77	1.644	.201	1.86	1.76	.436	.510	1.72	1.88	1.508	.221
aPO_PM	1.63	1.57	1.581	.210	1.70	1.56	.828	.364	1.69	1.45	2.092	.150
aAI_PM	2.02	1.89	.093	.760	2.00	1.92	.305	.581	2.01	1.86	1.229	.269
aDS_PM	1.90	1.83	.117	.733	1.92	1.83	.406	.525	1.96	1.72	3.009	.084
aME_PM	2.49	2.52	2.064	.152	2.52	2.50	.013	.909	2.44	2.60	2.558	.111
aPO_Trk	1.45	1.39	.145	.704	1.42	1.41	.000	.987	1.45	1.37	.222	.638
aAI_Trk	2.49	1.98	3.451	.065	2.16	2.17	.048	.826	2.17	2.16	.011	.916
aDS_Trk	2.16	2.05	.042	.838	2.03	2.12	.202	.654	2.10	2.08	.054	.816
aME_Trk	2.41	2.33	.001	.972	2.36	2.35	.002	.963	2.28	2.45	2.388	.124
aPO_B	1.73	1.56	.004	.952	1.73	1.58	.384	.537	1.69	1.50	.799	.373
aAI_B	2.30	1.98	5.556	.020*	2.03	2.12	.287	.593	2.15	2.00	.767	.383
aDS_B	1.70	1.99	3.762	.055	1.88	1.89	.001	.975	1.82	2.00	.852	.358
aME_B	1.73	1.56	.006	.937	1.64	1.62	.009	.925	1.77	1.35	4.209	.043*
aPO_W	1.14	1.16	1.355	.246	1.12	1.17	.084	.773	1.08	1.24	.936	.335
aAI_W	1.31	1.24	.251	.617	1.20	1.30	.220	.640	1.17	1.38	1.439	.232
aDS_W	1.16	1.19	.373	.542	1.20	1.17	.050	.824	1.09	1.28	1.386	.241
aME_W	1.19	1.25	1.978	.161	1.29	1.20	.152	.697	1.18	1.28	.419	.519

APPENDIX F

Usefulness of tools included and not included in contracts

		Not in Contract		In contract		MANOVA F	Sig.
		N	Mean	N	Mean		
Documents	PO	64	1.67	170	2.04	4.749	.030*
	AI	64	2.14	170	2.26	.469	.494
	DS	64	2.02	170	2.21	3.755	.054
	ME	64	1.61	169	1.78	1.808	.180
Visuali-zations	PO	107	1.86	69	2.04	1.405	.237
	AI	107	1.92	69	2.23	5.550	.020*
	DS	107	1.69	69	2.17	10.217	.002**
	ME	107	1.76	69	1.87	.886	.348
PM tools	PO	68	1.38	121	1.69	3.086	.080
	AI	68	1.85	121	2.04	3.077	.081
	DS	68	1.81	121	1.90	.575	.449
	ME	68	2.41	121	2.55	.882	.349
Issue Tracking tools	PO	68	1.24	118	1.52	2.139	.145
	AI	69	1.90	117	2.28	4.102	.044*
	DS	69	1.96	118	2.13	.478	.490
	ME	69	2.13	118	2.48	7.115	.008**
Prototypes and Beta versions	PO	55	1.52	53	1.75	1.621	.206
	AI	55	1.94	53	2.28	4.829	.030*
	DS	55	1.73	53	2.04	1.786	.184
	ME	55	1.35	52	1.90	7.302	.008**
Web tools	PO	105	.98	31	1.74	14.578	.000**
	AI	105	1.17	31	1.74	9.037	.003**
	DS	105	1.12	31	1.42	2.132	.146
	ME	103	1.17	31	1.58	4.339	.039*

APPENDIX G

Correlations between project outcomes and usefulness variables

		PBudget	PSchedule	PQual	PFunc	POverall
aPO_D	Correlation	.025	.035	.078	.098	.087
	Sig.	.687	.573	.209	.112	.160
aPO_V	Correlation	-.050	.000	.032	.066	.035
	Sig.	.494	1.000	.658	.362	.630
aPO_PM	Correlation	.060	.009	.073	.106	.108
	Sig.	.392	.903	.295	.129	.124
aPO_Trk	Correlation	-.005	.026	.067	.072	.064
	Sig.	.941	.714	.337	.303	.362
aPO_B	Correlation	.024	-.110	.000	-.049	-.016
	Sig.	.804	.249	.999	.610	.867
aPO_W	Correlation	-.086	-.072	-.111	-.096	-.181*
	Sig.	.295	.382	.177	.245	.027
aAI_D	Correlation	.054	.075	.090	.049	.047
	Sig.	.382	.229	.147	.426	.451
aAI_V	Correlation	-.087	-.038	.109	.101	.041
	Sig.	.229	.605	.132	.162	.572
aAI_PM	Correlation	.048	.131	.120	.091	.095
	Sig.	.495	.060	.087	.193	.174
aAI_Trk	Correlation	-.063	-.037	.030	.053	-.009
	Sig.	.367	.597	.667	.449	.893
aAI_B	Correlation	.046	-.074	-.010	-.033	.027
	Sig.	.630	.441	.917	.734	.778
aAI_W	Correlation	-.266**	-.114	-.117	-.086	-.182*
	Sig.	.001	.164	.154	.298	.026
aDS_D	Correlation	.117	.108	.209**	.190**	.234**
	Sig.	.059	.082	.001	.002	.000
aDS_V	Correlation	.059	.138	.187**	.160*	.179*
	Sig.	.421	.057	.010	.027	.013
aDS_PM	Correlation	.022	.099	.147*	.160*	.148*
	Sig.	.753	.157	.036	.022	.034
aDS_Trk	Correlation	.072	.076	.161*	.153*	.167*
	Sig.	.305	.280	.021	.028	.016
aDS_B	Correlation	-.046	-.108	.067	.073	.134
	Sig.	.628	.256	.484	.445	.160
aDS_W	Correlation	-.174*	-.109	-.049	-.030	-.101
	Sig.	.034	.185	.549	.718	.219
aME_D	Correlation	.045	.120	.172**	.106	.143*
	Sig.	.471	.053	.005	.086	.021
aME_V	Correlation	.022	.139	.179*	.084	.121
	Sig.	.760	.055	.013	.247	.095
aME_PM	Correlation	.014	.102	.074	.120	.121
	Sig.	.841	.144	.293	.087	.084
aME_Trk	Correlation	.001	.060	.095	.072	.058
	Sig.	.988	.394	.175	.301	.406
aME_B	Correlation	-.096	-.161	-.046	-.088	-.114
	Sig.	.314	.092	.629	.359	.232
aME_W	Correlation	-.034	.031	.046	.081	.024
	Sig.	.679	.704	.576	.327	.772

CLOSING REMARKS

The work presented in this manuscript aims to provide deeper interdisciplinary insights into the role of client's internal collaborative experience, both previous and current, in selecting proper communication practices during a complex outsourced project, building a quality client-vendor relationship and ultimately achieving success in the project. The growing popularity and complexity of collaborative interorganizational relationships opens a wide range of research opportunities. Each of the three studies in this dissertation identifies a gap in existing outsourcing research, proposes an interdisciplinary research agenda and makes big strides in the development of this agenda.

Analyses presented in the three dissertation chapters lead to several conclusions regarding the communication in complex outsourced projects. First, the selection of tools and practices for client-vendor communication and for project related communication within the client organization should be aligned with the requirements of the organization and of the project. Data analysis in Chapter 2 reveals that a larger number of communication tools in use is associated with more developed boundary spanning. Chapter 3 shows that projects with higher complexity tend to rely on a higher number of various tools for communication and control.

Second, the usefulness of different tools for communication and control purposes depends on a number of factors, some of which are structural (such as a project's complexity) while others are dynamic (control objectives related to the project's phases). The findings of Chapter 3 suggest that communication and control in complex outsourced projects should combine contractual specification of communication and control tools in the outsourcing contract with flexibility allowing for enactment of locally useful tools for particular stages and activities during the project. Additionally, observations from Chapter 2 point to differences in the use of communication tools in inter-organizational and intra-organizational contexts. While adopted and

abandoned tools both contribute to the quality of client-vendor boundary spanning, only adopted tools are important in the internal project related context.

Third, the findings in Chapter 2 support the argument of the extant boundary spanning literature that conscious enactment of selected communication tools is critically important for converting them to "boundary objects in practice" (Levina & Vaast, 2005) and subsequently for establishing effective communication practices. Chapter 3 shows that advance planning and inclusion of communication practices to be used during the project in the outsourcing contract significantly improves the ability of communication tools to support achieving control objectives.

Finally, this work supports the theoretical premise that pre-project communication practices matter for the project related communication and client-vendor relationship quality. The higher propensity to outsource and higher success rate in Public Safety Networks with effective governance and longstanding information exchange history, shown in Chapter 1, exemplify this statement. The analysis in Chapter 2 reveals that similar factors underlie routine boundary spanning practices in organizations and their boundary spanning, internal and external, during outsourced projects.

Each of the three essays in the dissertation makes an important contribution to theory, raises new questions and suggests directions for further research. The findings of this dissertation are also of immediate relevance for many practitioners involved in IT outsourcing, from public officers to IT auditors.

VITA

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