12-4-2011

The Role of Boundary Spanning in Outsourced IS Development Projects

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ABSTRACT

Outsourced information systems development projects are especially complex, as they cross both external (client-vendor) and internal boundaries (among stakeholder groups within the client organization). We propose a boundary spanning theoretical lens to assess the quality of external and internal communication among involved groups and suggest that the quality and extent of boundary spanning have an impact on the success of an outsourcing relationship and the project's outcomes. This paper reports on the development and testing of constructs which are part of a survey instrument assessing the extent and quality of boundary spanning in a client organization. Construct validation is based on responses from 197 project managers. The constructs will be used to test a model of internal and external boundary spanning activity in outsourced IS development. Uncovering the implications of client boundary spanning practices for outsourcing relationship management will be of significant value for researchers and for practicing project managers.

Keywords

IT Outsourcing, boundary spanning, boundary objects, project management, survey, factor analysis

INTRODUCTION

Information System development (ISD) projects entail collaborative working arrangements among people with different backgrounds and different job responsibilities. Company management, users and the IT department evaluate project results using differing objectives and criteria, which pose a significant challenge to these projects (Lacity, Khan and Willcocks, 2009). The ability to coordinate diverse expertise and input is an important predictor of IS project effectiveness, more so than traditional factors such as administrative coordination or development methodologies (Faraj and Sproull, 2000). A key to successful collaboration would therefore involve recognizing communication and collaboration boundaries among project participants and stakeholders, and learning to work across them while still preserving the tacit knowledge and identity of each group.

When an ISD project is outsourced to an external contractor or vendor, a new boundary must be spanned by the project team and its management. In addition to coordination of diverse expertise in the client organization, there is a need to build and manage contractual relationships with outsourcing vendors who have their own work patterns and goals. Previous studies discussed and empirically tested the importance of good client-vendor relationships for outsourcing success (e.g. Kern, 1997; Lee and Kim, 1999; Lee, 2001). Complex, knowledge intensive projects involve re-definition of requirements, information exchange, negotiations, and often collaborative brainstorming and joint decision making. For this type of project, the effectiveness of ongoing communication and knowledge management becomes critically important (e.g., Gopal and Gosain, 2010; Lacity and Willcocks, 2004). Aspects of good communication such as vendor-client teamwork, balanced flexible control and process agility have been found to lead to better project outcomes in interorganizational settings (e.g., Goles, 2001; Gopal and Gosain, 2010; Kim, 2005). A complex outsourced ISD project, therefore, involves working across both intra-organizational (internal stakeholder groups) and inter-organizational (client-vendor) boundaries.

We focus on projects that involve development or implementation of complex information systems by an external vendor, and which require significant information exchange. We argue that successful communication among stakeholder groups within a client organization and the effective communication between a client organization and its outsourcing vendor have a conceptual commonality. Both settings deal with communication across boundaries: organizational and expertise boundaries between the organization and its outsourcing vendor, or internal boundaries among different participating groups inside the client organization. We further argue that an organization that has

well-developed boundary spanning practices to support internal communication over the course of its everyday business will report better internal and external communication during outsourcing projects which, in turn, leads to more successful outsourcing relationships and ultimately, more likely project success.

We present the foundational steps of an ongoing exploratory research project, for which the eventual goal is to provide a deeper insight into possible factors of outsourced ISD projects success that lay in an organization's structure and culture, often beyond the project's lifetime. We believe that the focus on quality of communication and juxtaposing internal and external communication will make an important contribution to research on project management and interorganizational collaborations in general, not just client-vendor type arrangements. The study is also of great value for practicing project managers as its findings will aid in the assessment of projects' risks and clients' maturity. It will help practitioners make better sourcing decisions and more consciously leverage their internal communication experience, leading to better relationships with outsourcing vendors. Finally, most work on boundary spanning practices in knowledge intensive projects employs qualitative analysis methods. Our quantitative approach adds well-documented empirical support to the boundary spanning theoretical perspective.

This paper begins with a brief overview of the research model that forms the basis of the long-term project, and then focuses on the development and testing of a set of constructs that will enable assessment of boundary spanning during an outsourced ISD project. Thus, *the purpose of the paper is to introduce and validate a new set of measures for internal and external boundary spanning* that can be adopted for use in future studies of these interorganizational relationships. The paper is structured as follows. The next section discusses the applicability of the boundary spanning theoretical approach in the context of managing knowledge intensive outsourced ISD projects. The following section describes the general research design. After that we explain our methodology, then present and discuss the results of our instrument validation. Future research plans and suggestions conclude the paper.

BOUNDARY SPANNING IN PRACTICE IN THE OUTSOURCING CONTEXT

Internal communication in organizations, ISD project management and outsourcing relationships are each well-studied research areas, each accounting for dozens of publications in both the scholarly and popular press. While many theoretical approaches have been applied to studying both internal and external communication in organizations, most theories are tailored to specific contexts, such as internal organizational dynamics or asymmetrical contractual relationships. The boundary spanning theoretical approach allows for comparing or juxtaposing internal and external communication patterns despite contextual differences. Previous studies applied this theoretical perspective to boundaries between organizations (Ancona and Caldwell, 1988; Levina, 2005), organizational subunits (Carlile, 2002; Schwab, Ungson and Brown, 1985), subunits of different organizations (Levina and Vaast, 2005), and a mix of them (Pawlowski and Robey, 2004). This flexibility makes the boundary spanning approach a natural selection for a study considering different types of boundaries simultaneously.

The boundary spanning perspective focuses on communication activities occurring at the boundaries among participating stakeholder groups. Early studies focused on individual and team level communication in order to analyze how boundary spanning group members interact with others within or outside the group (e.g., Ancona and Caldwell, 1988; Dollinger, 1984; Sawyer, Guinan and Cooprider, 2008; Tushman and Scanlan, 1981; Friedman and Podolny, 1992; Marrone, 2010) and how their behavior affects a team's or organization's performance (e.g., Zaheer et al., 1998). Later theoretical and empirical work expands the boundary spanning perspective to the organizational level of analysis, and discusses boundary spanning practices in general (Orlikowski, 2002), boundary complexity (Carlile, 2004) and characteristics of boundary spanners and boundary objects (Levina and Vaast, 2005). These works view *boundary spanning* as exchange and transformation of knowledge, and since "knowledge may reside in people, or it may be embedded in processes or artifacts" (Carlile and Rebentisch, 2003, p. 1189), the analysis includes boundary spanning individuals ("boundary spanners"), boundary spanning tools ("boundary objects") and their interactions. *Boundary objects* are artifacts used on both sides of a spanned boundary to facilitate communication and knowledge transfer (e.g., Bechky, 2003; Carlile, 2002; Star, 1989). Furthermore, we focus on boundary spanning *in practice* following existing accounts of well intended boundary spanning efforts that had been undermined by resistance to *nominated* boundary objects or lack of motivation of *nominated* boundary spanners (e.g., Levina and Vaast, 2005; Volkoff, Strong and Elmes, 2002).

The usefulness of an object as a boundary object is not inherent in its properties but depends on the way it is enacted. Potential users may ignore a proposed boundary object, 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 users' knowledge at the boundary, and become boundary objects in practice (Levina, 2005).

In a somewhat similar manner, boundary spanning by certain individuals in organizations is partially tied to their personal characteristics, but mostly to the environment and situation (e.g., Ancona and Cadwell, 1988; Johlke et al, 2002; Edmondson, 1999). A successful boundary spanner should be known and respected in all communities on the boundary (Tushman and Scanlan, 1981; Levina and Vaast, 2005); moreover, the members of communities should see him as a "legitimate but peripheral participant" (Ibid., p.353) and a legitimate negotiator. Boundary spanner is an uncomfortable position, made more palatable by the introduction of incentives (Volkoff et al., 2002; Johlke et al., 2002). Boundary spanners reflect on existing practices and propose artifacts for the role of boundary objects. A boundary spanner would use his power to promote his artifact as a boundary object; in turn, when an object is adopted, it empowers the boundary spanner who nominated it (Levina and Vaast, 2005).

Since the purpose of our study is analyzing the contribution and impact of different boundary spanning contexts within the same organization and related to the same project, we adopt the *organizational level of analysis* as espoused by Levina and others (Levina, 2005). *We study the role of boundary spanners and the use of boundary objects in practice in support of communication among participants in the organization's ISD outsourcing project.*

RESEARCH DESIGN

For the purpose of this study, we define *external boundary* as a boundary between two organizational parties who sign an outsourcing contract (i.e., the *client* and the *vendor*). *Internal boundaries* are those among different stakeholder groups in the client organization that are relevant to the outsourced ISD project, such as potential users, the client's IT department, or project managers. Organizations usually create an ISD project team for an outsourcing project comprising representatives of the vendor, the client's IT group and assorted user groups (Volkoff et al., 2002; Lacity and Willcocks, 2004) thus requiring the team members to communicate across both external and internal boundaries.

The client organization's team members who are experienced in working with other internal stakeholder groups as a matter of routine may find their *routine boundary spanning* (RBS) practices to be beneficial for boundary spanning during an outsourced project. However, routine business communication within the client organization is likely to not be as complex as communication during an outsourced ISD project[7]. For this reason, boundary spanning during an outsourced ISD project will be challenging even for a client organization with well developed routine boundary spanning practices.

In the case of internal boundary spanning, client organization members deal with some familiar boundaries within the organization; however, some internal project related activities, such as analysis of user needs or requirements definition (e.g., Kinnula, 2006), will be unusual for at least some of the participants. This novelty makes internal boundary spanning more challenging than routine boundary spanning for most organizations, but less challenging then external boundary spanning, which involves working across organizational boundaries and dealing with representatives of the vendor who have not only different professional background but also different organizational goals. Given the increase in complexity, if a client is successful in project-related internal boundary spanning, it is positioned to have a higher chance of succeeding in external boundary spanning as well. On the other hand, communication practices adopted from the vendor may positively affect internal boundary spanning (Gal et al., 2008).

The inquiry into boundary spanning practices in outsourced ISD projects is motivated by expectations that they have a positive effect on projects' outcomes, either directly or mediated by the quality of the client-vendor relationship. The positive role of the client-vendor relationship in the project's success has been confirmed in several prior empirical studies (e.g. Grover, Cheon and Teng, 1996; Kern, 1997; Lee and Kim, 1999; Lee, 2001). It is natural to expect that EBS can positively affect the quality of outsourcing relationships. IBS also may have a direct effect on the quality of relationships and the project's outcome by providing the client with a better understanding of its own needs, and helping articulate the requirements better and make the expectations more realistic. The relationship

[7] Gantman (2010) contains a detailed discussion of boundary spanning challenges experienced by client organizations during outsourced projects, based on Carlile's (2002, 2004) knowledge management framework.

among IBS, the outsourcing relationship and the project's outcomes may or may not be mediated by the extent of EBS.

These relationships are captured in our general research model, as depicted in Figure 1 below. A detailed discussion of the relationships in Figure 1 and the testable propositions reflected by the model are beyond the scope of this paper.

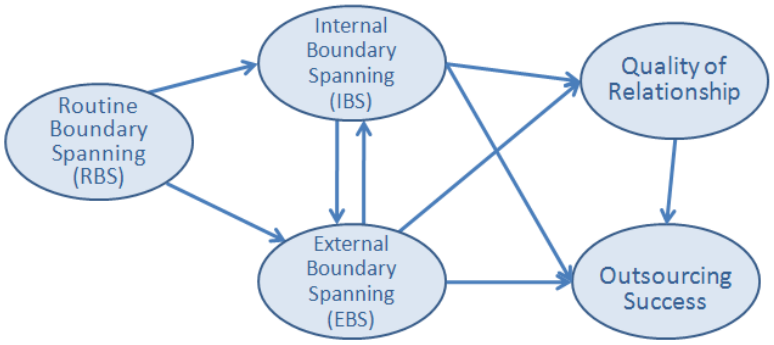

Figure 1. Research model

METHOD

The scholarship on boundary spanning at the organizational level has relied almost entirely on qualitative research methods. Case studies of different types provide interesting and deep insights into the nature of boundary spanning phenomena. However, caution should be applied when generalizing the findings as observed boundary spanning activities have been observed to vary across settings.

For this study, post-hoc perceptual data were collected with an online cross sectional survey. Survey instruments allow for systematical collection of rich data needed for measurement and evaluation of a complex statistical model. Our survey is targeted at project managers of recently completed or close to completion outsourced ISD projects. Since the unit of analysis is a single project, each completed questionnaire refers to one project.

Operationalisation of constructs

Several prior researchers offer frameworks for operationalizing and assessing the quality of outsourcing relationships and the overall success of outsourcing arrangements. These frameworks are both theoretically supported and empirically tested (e.g., Goles, 2001; Kim and Chung, 2003; Kinnula, 2006; Lee and Kim, 1999). Therefore, the items for measuring project success and the quality of client-vendor relationship were adopted from previous literature. On the other hand, when it comes to operationalisation of boundary spanning in practice at the organizational level of analysis, there is limited prior research to rely on (Marrone, 2010; Gopal and Gosain, 2009). Consequently, we developed new items for the boundary spanning constructs, using findings and recommendations from others' in-depth qualitative studies. In this paper, we focus on instrument development and validation for internal and external boundary spanning.

We assess boundary spanning in terms of its *intensity, quality and boundary complexity.* These dimensions are independent; each contributes to successful boundary spanning; therefore we model the three boundary spanning situations as formative latent constructs (Petter et al., 2007). Please refer to Appendix A for a detailed summary of items for each construct.

Intensity of boundary spanning reflects the use of potential boundary objects and the presence of boundary spanners, either formally nominated or informally emerged (e.g., Volkoff et al., 2002; Levina and Vaast, 2005). Survey

respondents chose from a list of six communication activities and twelve commonly used in ISD projects tools that may serve as boundary objects (see Appendix A for references).

The quality construct is based on criteria developed by Levina and Vaast (2005) for boundary objects and boundary spanners (in practice as opposed to nominated ones). A boundary object in practice is locally useful and has a common identity across the fields it bridges. A nominated boundary spanner needs an initial capital (economic, cultural, social, or symbolic), legitimacy as negotiator and inclination to perform the boundary spanning role in order to become a boundary spanner in practice. Boundary spanners reflect on existing objects and practices, look out for artifacts that may serve as boundary objects, and introduce them as new boundary objects in their organization. They use their capital to promote the new boundary object; in turn, an artifact adopted as a boundary object in practice, empowers the boundary spanner who nominated it (Levina and Vaast, 2005).

We included items in the survey instrument reflecting the enactment of boundary objects, the status of nominated boundary spanners in the organization and the propensity of project participants to reflect on their communication practice (see Appendix A). In addition, study participants were asked to identify communication activities and tools that they tried to use but abandoned to gain a better understanding of which nominated objects succeed (or fail) in practice.

Finally, we subscribe to Carlile's (2004) theoretical framework for knowledge management across boundaries and adopt his definition of knowledge complexity to provide a measure of the complexity of communication objectives and challenges for the different boundaries being spanned. Organization's conceptual approach to sharing knowledge across boundaries dictates the boundary spanning behavior and selection of boundary objects with certain characteristics (Ibid.). While the client organization may have a well developed routine boundary spanning at *syntactic* ("information transfer") level, defining the requirements for an integrated system and communication with an outsourcing vendor require a shift toward more complex *semantic* ("knowledge translation") and *pragmatic* ("knowledge transformation") levels, which means a need in re-conceptualization of the boundaries and adopting other communication tools and practices (Carlile, 2004; Gantman, 2010). In addition to items for assessing the level of *boundary complexity*, we plan to evaluate the types of communication tools and practices in a related manner. Some of them (e.g., joint brain stormings, "groupware") are indicative of higher level approach to boundary complexity.

Instrument Development

To establish face and content validity of the measures, opinions of several academic and industry experts were obtained through personal and phone interviews. The first draft of the survey was pre-tested on two experienced project managers using the cognitive interviewing technique (Willis, 2005). After that the survey was pilot tested on a group of twenty six project managers with relevant experience. The pilot results were tested rigorously to weed out poorly worded, redundant or unneeded questions. In particular, we decided to drop several items reflecting the approach to boundary complexity following the interviews with practitioners and the pilot survey. A number of questions regarding project-related communication were also revised. Boundary spanning constructs and related items used in the final survey instrument are listed in Appendix A.

The survey was implemented using Qualtrics software. It populates each question with the project name provided by the participant, which personalizes many questions. It also makes extensive use of skip logic, avoiding questions deemed not relevant by prior questions. We made a significant effort to minimize the amount of time needed to complete the survey, and to make it visually attractive to keep the attention of the respondent. On average, the survey takes 15 minutes to complete. We estimate that the average respondent fills in two text fields and makes one hundred responses (mouse clicks) to complete the survey.

Data Collection

The survey was circulated to 13,972 members of the IS Community of Practice of the Project Management Institute (PMI) on July 6, 2011. PMI is the leading project management association, and has more than half a million members worldwide. Survey participation was voluntary, and the respondents were rewarded with "professional development units" required for maintaining PMI certification. Representatives of client organizations, outsourcing vendors and third party consultants were invited to participate. For the construct validation analysis we used 197

valid responses from client organization representatives that had been submitted by a cutoff date of July 25, 2011. Self reported demographic data on the participants and their projects can be found in Appendix B.

ANALYSIS AND DISCUSSION

This paper reports on the validation of the survey instrument. We commenced with an exploratory factor analysis to assess the existence and structure of various factors reflecting the boundary spanning processes in outsourcing relationships, and to compare them to our theory-based expectations. These factors form the basis of subsequent confirmatory factor analysis (CFA) using the Structural Equation Modeling (SEM) technique, which provides for testing the model fit to the data and refining the model to achieve the best possible fit. The ability to refine the models matches the exploratory nature of our study.

The results of confirmatory factor analysis for External Boundary Spanning and Internal Boundary Spanning variables are shown on Figures 2 and 3 respectively. All path loadings in both models represent an acceptable level of convergent validity (Bagozzi and Yi, 1988). The measures of goodness of fit (Hair, Black, Babin and Anderson, 2009) are summarized in Table 1.

Our theoretical model suggested that boundary spanning can be described and measured in three dimensions, not necessarily correlated. One of them is the use of communication tools ("boundary objects") and presence of people who act as boundary spanners. The second dimension covers boundary spanning activities, manifested as reflection on the boundary objects and the enactment of these objects by the spanners and by other people. Finally, the third dimension reflects the boundary complexity level as it is perceived by the client organization (Carlile, 2002; 2004).

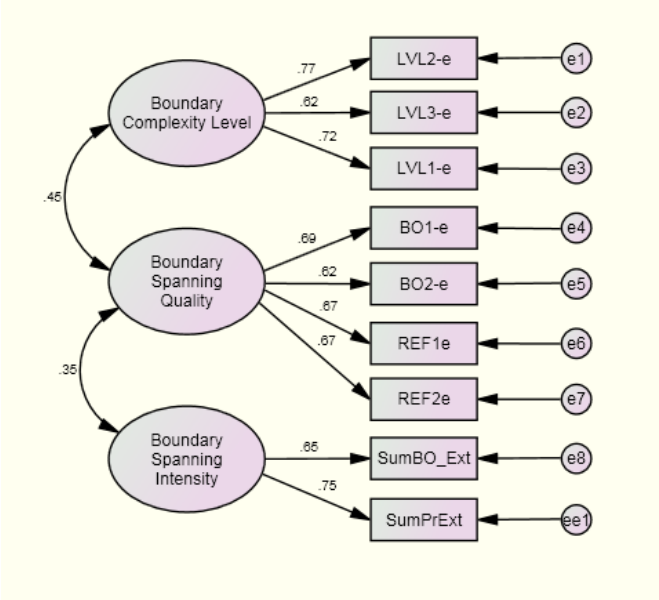

Figure 2. Confirmatory factor analysis for External Boundary Spanning (EBS) variables

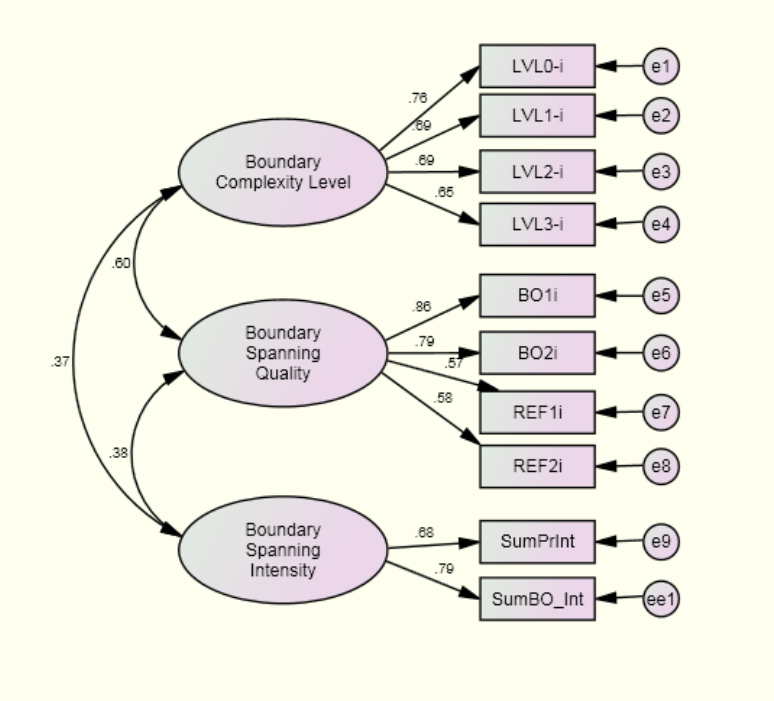

Figure 3. Confirmatory factor analysis for Internal Boundary Spanning (IBS) variables

Fit Measures	Recommended levels	External	Internal	Combined model
Degrees of freedom		25	32	148
Num of parameters		20	23	62
P	< 0.05	.000	.000	.000
Chi-square		53.79	75.14	296.86
Chi-square/df	2.00 – very good, 2.00-5.00 acceptable	2.152	2.348	2.006
RMR	< 0.10	.125	.123	.110
GFI	> 0.90	.945	.931	.872
Adjusted GFI	> 0.85	.901	.882	.818
Incremental Fit Index	> 0.90	.935	.934	.903
Tucker Lewis index	> 0.90	.904	.905	.872
Comparative fit index	> 0.90	.934	.932	.900
RMSEA	< 0.08	.077	.083	.072

Table 1. Goodness of fit in three CFA models

Three observations can be made from the models presented in Figure 2 and Figure 3. First of all, the sets of External and Internal Boundary Spanning variables formed three latent factors each, which appear very similar based upon their respective variable loadings. These three latent constructs reflect our three theoretical dimensions of boundary spanning in both analyses. A second observation is related to the latent construct representing the boundary complexity level. In both cases, only variables addressing *syntactic and semantic* levels of boundary complexity loaded to a latent construct. Variables reflecting the most complex *pragmatic* level (see Appendix A for a list of variables) have been eliminated due to low loadings. Finally, two variables related to the presence of potential boundary spanners were also eliminated due to low loadings in both analyses.

Since external and internal boundary spanning during outsourced projects are closely connected, we hypothesized that analyzing them together may provide additional insight into the nature of different aspects of boundary

spanning. We ran another exploratory factor analysis followed by SEM CFA, this time including all variables related to both internal and external boundary spanning in outsourced projects. Figure 4 shows the full model with seven resulting latent variables and all covariances among them (shown in grey). The model is arranged to emphasize the symmetry of loadings. All variables representing EBS are aligned on the left, the matching variables representing IBS are on the right. Some goodness of fit indices for this model fall slightly short of acceptable levels; they can be improved by adding additional covariances between error terms within the same construct. However, at this exploratory stage we feel that presenting the full model is preferable over subtle improvements to the goodness of fit indices. The goodness of fit measures for this model can be found in Table 1.

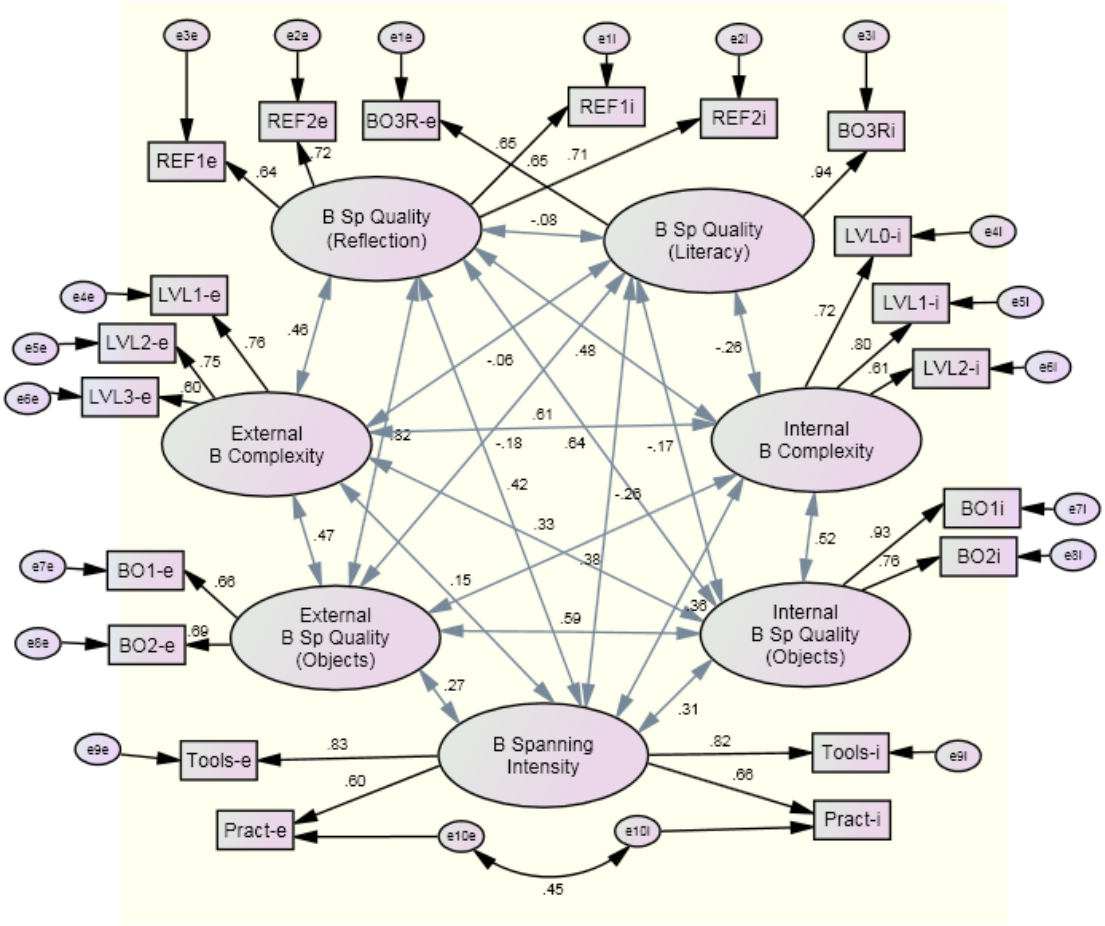

Figure 4. Combined CFA model for Internal and External Boundary Spanning

The combined CFA model suggests that some of the latent constructs capture boundary spanning characteristics of one of the two types of communication in an outsourced project: the boundary complexity levels and enactment of boundary objects should be measured separately for a client's internal project related communication and the client's communication with the vendor. At the same time, the tendency to use a variety of tools and practices, the ability to reflect on communication tools and problems related to lack of technical literacy are characteristics of the project as a whole rather than of one of the two communication types. It is worth noting that variables reflecting routine boundary spanning in the client organization were included in the initial exploratory factor analysis for this model, but did not load high enough on any of the factors.

In summary, the analyses depicted in Figures 2 and 3 validate the three second order reflective constructs that we proposed based on the theory and the extant literature. The combined CFA model (Figure 4) supports the contention that internal and external boundary spanning are interconnected in some aspects (technical literacy, reflexivity and

propensity to use various tools and practices) while distinct in others (the quality of boundary spanning and boundary complexity level).

The results of this exploratory analysis provide good guidelines for transforming the general research design (Figure 1) into a testable model. In this model we will use separate latent constructs for quality and complexity level of each type of boundary spanning and test their impact on the project's outcomes. Three other constructs - technical literacy, reflexivity and propensity to use a variety of tools and practices - appear to be related to the project in general rather than to one type of boundary spanning. The role of these constructs in the testable model will be examined based on the theory underlying the model and on the covariances produced by the analysis.

IMPLICATIONS FOR RESEARCH AND PRACTICE

There is consensus in the outsourcing research on the importance of quality communication between outsourcing clients and vendors, especially for knowledge-intensive projects. The importance of communication with system users and understanding their needs when managing an ISD project has been also well noted in the literature. However, the connection between these two types of communication has never been conceptualized. Our study contributes to academic research in expanding the analysis of successful ISD outsourcing collaborations by highlighting a previously overlooked boundary spanning component of communication. A client organization's ability to manage an outsourced project successfully may be closely connected with its boundary spanning experience and ability to leverage it when facing novel and challenging types of boundaries.

The boundary spanning research paradigm has been around for more than thirty years. Its flexibility and 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 works which draw on the boundary spanning paradigm are based on case studies and use qualitative methods of data collection and analysis.

Thus an important contribution of this study is in providing quantitative support to theoretical developments of the boundary spanning approach. Developing an instrument for measuring complex qualitative concepts, such as extent of boundary spanning, the enactment of nominated boundary objects and perceived boundary complexity, and further operationalizing these concepts for quantitative modeling is an original methodological contribution.

Finally, practitioners can learn from this study how important internal communication in an organization is for building a successful relationship with vendor. This will help them make more informed decisions when choosing a vendor, forming an outsourcing team, investing in communication with various stakeholders and developing governance mechanisms for an outsourcing project.

Directions for future research

Although the validation of a set of theoretically justified constructs representing measurable boundary spanning variables is a worthwhile goal in and of itself, the use of these variables in a model where they can be related to process and product outcomes will provide the ultimate test of their value and generalizability. We completed our data collection in September 2011 with over 400 full responses from client, consultant and vendor representatives. This larger data set is being prepared to re-run the analysis and verify the applicability across types of respondents. We will then create a structural model to estimate the influence of different aspects of boundary spanning on a project's outcomes and on the quality of outsourcing relationship, in a test of the model in Figure 1. We also plan to run a variety of descriptive statistical tests, for example, comparing projects of different complexity and respondents with various experience and background coming from different industries, to assess the representativeness of the sample and the generalizability of the results.

Client project managers have been often used as single informants in previous outsourcing studies, even when the client-vendor relationship was the main focus of their study (e.g., Kim and Chung, 2003; Lee, 2001; Lee and Kim, 1999). It is possible that the vendor and the third party consultant representatives may have slightly different insights. We plan to compare the answers of these groups of respondents in the next phase of the research project.

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, in particular, 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. The results of the study will provide a foundation to examine additional detailed questions about boundary spanning activity.

First, a more focused insight into successful cases may provide useful details on how an organization's boundary spanning culture informs the process of spanning a new boundary. What helps decision makers recognize the novelty of a new boundary? Will existing or emerging boundary spanners take on spanning the new boundary? What kinds of boundary objects can be most successfully reused for spanning new types of boundaries? Are there special concerns associated with leveraging an internal boundary object 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 which outsourcing activities do and do not benefit from 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 developing guidelines for making them successful and mutually beneficial.

ACKNOWLEDGMENTS

We thank the representatives of the Information Systems Community of Practice of the Project Management Institute for their assistance and support for our data collection.

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APPENDIX A
VARIABLES AND SURVEY QUESTIONS

EBS variables	IBS variables	Survey questions	Scale	Source
Intensity of boundary spanning				
Pract-e	Pract-i	**Indicate communication mechanisms that you and your vendor used during the project, and communication mechanisms that were tried or proposed during the project but have not been adopted for any reason.** 1. Informal communication in person, by phone, email or Skype 2. Chats, messaging, Twitter 3. Phone and video conferences 4. Status meetings 5. Document, product, code reviews 6. Brain storming sessions	Index: Number of practices used less Number of practices tried but not adopted	Numerous case studies showing how different tools may play a role of boundary objects. E.g., Gopal and Gosain, 2009; Levina and Vaast, 2005; Beimborn et al.,2009.
Tools-e	Tools-i	**Indicate tools and aids mechanisms that you and your vendor used during the project, and tools and aids that were tried or proposed during the project, but have not been adopted for any reason** 1-4: Documents and procedures: standards; specs; use cases; design or testing documents 5-6: Visual aids: flowcharts or diagrams; engineering charts 7. Issue tracking systems 8. Project management tools 9. Prototypes or beta versions 10-12. Web 2.0 technologies: shared documents; blogs, wikis or forums; virtual social networks	Index: Number of tools used less Number of tools tried but not adopted	
Level of boundary complexity				
		How important are the following aspects of working together for you and your vendor/you internal project related team?		
	LVL0-i	Making project related information available to all people involved	5-point Likert scale	Carlile, 2002, 2004; Goles et al., 2005
LVL1-e	LVL1-i	Effective coordination of efforts		
LVL2-e		Clear understanding of each other's tasks and responsibilities		
	LVL2-i	Understanding requirements of different people from the new system		
LVL3-e	*LVL3-i**	Helping and supporting each other in everything that is project related		
*LVL4-e**	*LVL4-i**	Creating opportunities for people with different perspectives to work together on complex problems		

Quality of boundary spanning				
		How much do you agree or disagree with the following statements		
*SPN-e**		The client representatives are well known and respected in the company	7-point Likert scale	Carlile, 2002; Levina and Vaast, 2005; Lyytinen and Robey, 1999; Star, 1989
	*SPN-i**	The leaders of the internal project team are well known and respected		
*MGT-e**		Top management encourages communication with the vendor		
	*MGT-i**	Top management encourages collaboration of all people involved in the project		
BO1-e	BO1-i	The tools and aids that we use facilitate knowledge exchange between us and the vendor/among the project's stakeholders		
BO2-e	BO2-i	Using the tools in the project helps us explain our point of view and understand the vendor's/other stakeholders point of view		
BO3R-e	BO3R-i	Not all involved people are comfortable with technical documentation and computer applications; this impedes communication with the vendor/internal project related communication		
*V-e**		Most communication practices used in the project were proposed or required by the vendor		Gal et al., 2009; Levina and Ross, 2003; Levina and Vaast, 2005
	*V-i**	Vendor's representative(s) are involved in most of our project related communication		
REF1-e	REF1-i	We have the freedom to decide on the best ways to manage communication with the vendor/internal project related communication		Choudhury and Sabherwal, 2003; Gantman, 2011
REF2-e	REF2-i	During the project, we reflected on our communication practices and changed them as needed		Levina and Vaast, 2005

APPENDIX B
DEMOGRAPHIC DATA OF SURVEY RESPONDENTS AND PROJECTS

Age	N	%
< 35	32	16.2
35-45	70	35.5
45-55	58	29.4
55 +	33	16.8
Total	197	100.0

Gender	N	%
Male	124	62.9
Female	68	34.5

Education	N	%
BA	94	47.7
MS	45	22.8
MBA	58	29.4
Total	197	

Work experience	as an IT professional		as a project manager	
	N	%	N	%
0	2	1.0	2	1.0
1-2 years	3	1.5	7	3.6
3-5 years	13	6.6	29	14.7
5-10 years	20	10.2	71	36.0
10+	156	79.2	87	44.2
Missing	3	1.5	1	.5
Total	197	100.0	197	100

Project complexity ("select all that apply")	Frequency	Percent
Users from multiple business units	147	74.6
Integration of multiple platforms	123	62.4
Business process re-engineering	112	56.9
Organizational changes in the client company	63	32
Significant off shoring	42	21.3
Multiple vendors	58	29.4

Client company industry ("select 2 at most")	Frequency	Percent
Education	5	2.5
Finance, insurance, real estate	46	23.4
Health care	18	9.1
Hi Tech/ Bio Tech	21	10.7
Tourism and Entertainment	1	.5
Manufacturing /Construction	29	14.7
Professional services	22	11.2
Public Administration	8	4.1
Transportation and Energy	19	9.6
Wholesale/Retail	12	6.1
Communications/media	12	6.1
Other	17	8.6
Total	210	