Governance of Strategic IT Projects: A Nomological Network of the Antecedents of Performance

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Abstract

Increasingly, as firms undertake large, mission-critical, and strategic IT projects, the governance and management of these projects is an important challenge. Though prior research has examined the control and coordination of IS projects, not much attention has been devoted toward understanding what factors influence the governance of IS projects, particularly in terms of the distribution of project decision-making rights. Numerous decisions are made on IS projects, such as the integration of business requirements and information technologies and the management of costs and schedules. Despite a prevailing norm encouraging co-leadership of IS projects by business and IS units, it is not clear how and why successful IS projects might actually be governed. Drawing from the governance and project management literatures, we conceptualize IS project governance on the basis of decision-making rights for three key activities: requirements analysis, technical analysis, and budget/schedule management. Further, we identify a variety of factors that could determine how decision-making for these key project activities are organized and develop hypotheses about their impacts on project performance. The hypotheses are tested using matched survey responses from lead business unit and IT executives associated with 58 projects. Our results reveal that the strategic importance of the IS project and the business units’ knowledge about IT are critical antecedents of the degree to which business and IT units are actively engaged in the governance of IS projects. We find that business unit participation in project governance is driven by executives’ perceptions of the strategic importance of the project. The IT unit’s role in governance is negatively influenced by perceptions of strategic importance, but it is positively influenced by both the business unit’s knowledge of IT and the IT unit’s knowledge of business processes. Understanding the drivers of each unit’s role in governance is essential since our results indicate that a greater level of governance for both groups is positively related to project performance.

Keywords: project governance, knowledge, project management, control, systems development
INTRODUCTION

As contemporary firms regard information technology (IT) to be the platform for enhancing business processes, innovation, competitiveness, and performance (Sambamurthy Bharadwaj and Grover 2003), information systems (IS) projects are the forums where integration between the capabilities of information technologies and business processes, data, and information requirements occurs. Estimates from the Project Management Institute suggest that US firms annually spend about $2.3 trillion on information systems projects and that the global project spending might be nearly $10 trillion (PMI 2001). The effective management of information systems projects continues to be a significant organizational challenge and imperative (Benko and McFarlan 2003). Yet, most organizations continue to find that the management of these projects is difficult, with common concerns being the failure to deliver on time or within budget, or the failure to have the projects meet their intended business goals (Guinan Cooprider and Faraj 1998; Kirsch Sambamurthy Ko and Purvis 2002).

Why are IS projects challenging? Earlier research has argued that IS projects require the integration of thin slices of business and technical knowledge through the collaboration and involvement of numerous stakeholders, including business and IS professionals (Faraj and Sproull 2000; Nelson and Cooprider 1996). Such integration is not easy and IS project management requires significant attention to the control, coordination, and leadership of complex work processes in organizations (Kirsch 1996). With the growing scale, complexity, and criticality of IS projects, these issues assume greater organizational significance (Collins and Kirsch 1999). As a consequence, prior research has examined many aspects of the effective management of IS projects: design of effective control portfolios (Kirsch 1997), exercise of leadership (Faraj and Sambamurthy 2006), and the coordination of expertise sharing (Faraj and Sproull 2000). Yet, one aspect that has received less attention is the governance of IS projects.

Governance is defined as the distribution of decision-rights for significant decisions related to the management and use of IT (Sambamurthy and Zmud 1999; Weill and Ross 2004). Prior IS research has examined IT governance at the enterprise and business unit levels (Brown and Magill 1994; Sambamurthy and Zmud 1999; Weill and Ross 2004). However, not much research has examined how
and why the nature of IS project governance might be organized within firms. As projects grow larger and more complex it becomes necessary to understand the decision-making structures that occur within them separately from the broader organizational IT governance structures.

In any project, numerous decisions must be made. These include decisions that directly affect the resources assigned to the project, such as setting the project budget and schedule. It also includes decisions that shape a project’s objectives, such as approving project requirements, and decisions about the technologies that will be used in the development of the system. Project level governance must reflect who is making these decisions about requirements, technologies, and resources. Thus, we conceptualize IS project governance as the degree to which business and IS executives are vested with authority for project decisions related to requirements, technical specifications and resources management.

Normative prescriptions about the governance of IS projects usually advocate a sharing of decision authority between the IS and business executives, so that IS professionals can provide technical insights, whereas business executives can provide insights about the business requirements and can champion the funding for the project (Rockart 1988; Sambamurthy and Zmud 1999). Yet, IS projects are knowledge intensive activities and require an understanding of both the business processes that are being digitized and the underlying technologies that are being used to develop the system. Knowledge from both the business and technical domains has a direct impact on the effective development of these projects (Patnayakuni, Rai and Tiwana 2007). Studies suggest that when business executives do not possess the requisite IT knowledge or when IS executives do not possess the requisite business knowledge, they might not be able to exercise the appropriate decision authority (Nelson and Cooprider 1996; Sambamurthy and Zmud 1999). Kirsch (1996) found that, without knowledge of the systems development process, business executives are not able to structure effective control and oversight of IS projects, even if they are provided with authority. Thus, the level of business and IT knowledge possessed by the IS and business executives should be a significant antecedent of the nature of IS project governance.
The goal of this research is to integrate relevant literature from information systems, project management, and knowledge management to examine the following questions:

1. What factors influence the nature of IS project governance?
2. How does project governance impact project performance?

Taken together, we develop a nomological network of the antecedents and outcomes of the governance of IS projects.

The remainder of this paper is organized as follows. The next section presents the theoretical and conceptual foundations. This is followed by the development of the research model and hypotheses, which examine the relationships between business unit knowledge of IT, IT unit knowledge of business processes, strategic importance, IT project governance, and project performance. Empirical results from a matched-pair field survey of lead IT and business unit executives for IS projects are then presented. These results are used to validate the measures, including the conceptualization of project governance, and test the hypotheses. The paper concludes with discussion of the results, implications, and limitations of this study.

**CONCEPTUAL FOUNDATIONS**

**IT Governance**

IT governance refers to the location of decision-making authority and responsibility for IT activities within firms (Sambamurthy and Zmud 1999). Much of the early research on IT governance focused on the dichotomous distinction between centralized and decentralized decision-making structures (King 1983). Though this view provides valuable insights and a foundation for understanding IT decision-making structures in organizations, recent research has begun to investigate the more complex arrangements actually seen in organizations (Agarwal and Sambamurthy 2002; Weill 2004).

Three primary IT governance structures have been identified in the IT literature (Brown and Magill 1998; Sambamurthy and Zmud 1999): centralized, decentralized, and federal or hybrid forms. Centralized IT governance modes place the organization’s IT decision-making entirely with a central IT unit or corporate IT function (Sambamurthy and Zmud 1999). Decentralized IT governance forms place
decision-making with individual business units. The third form, federal or hybrid, splits IT decisions between centralized and decentralized decision-makers (Sambamurthy and Zmud 1999). At the two extremes, there is a tradeoff between the combination of cost savings and standardization with flexibility and responsiveness to the needs of individual units within the organization. Centralized IT governance arrangements are associated with smaller firms, defender strategies, centralized corporate control, and mechanistic decision-making (Sambamurthy and Zmud 1999). Decentralized IT governance arrangements are associated with larger firms, prospector strategies, decentralized corporate control, and organic decision-making (Sambamurthy and Zmud 1999). Hybrid arrangements represent a middle ground where decision-making is split between organizational units, often based on the type of decision. (Grover Henry and Thatcher forthcoming; Sambamurthy and Zmud 1999; Weill 2004)

Much of the existing research focuses on governance arrangements as enterprise level context variables. Brown and Magill (1998) point out that such a focus is predicated on two assumptions: 1) an organization has the same arrangements across all business units, and 2) antecedent variables can be captured at the organizational level. Yet, in a study of a single organization with four separate units, Brown (1997) demonstrated the existence of a differentiated governance structure, where certain business units had a centralized IT governance structure, whereas others had greater authority in key IT decisions. These results suggest that differences between business units can affect the choice of governance for that specific business unit (Brown and Magill 1998). Thus, IT governance research can be viewed as moving toward finer grained levels of analysis. Though IT governance was once viewed simply in terms of centralization/decentralization for an entire organization, the concept has evolved to include the possibility of many arrangements existing within the same organization, based on the specific contexts in which decisions are made.

Our research continues this trend by moving beyond the business unit to the project level of analysis. Projects are the primary mechanism through which organizations manage their systems development efforts. As many critical and strategically important projects become larger and more closely integrated with business processes (Collins and Kirsch 1999), understanding project level governance becomes a
logical progression. At the project level, the outcomes of effective governance may be more readily apparent, viz., in terms of project success.

**IT Project Governance**

There are several defining characteristics of IS projects (Mahring 2002) that point to the need to conceptualize governance at the project level. IS projects are bounded in time. They are comprised of a set of tasks and activities that must be completed. These tasks are specific to the technologies and business processes associated with the information system being developed and implemented. These characteristics point to the need for a conceptualization for project governance that is different from organizational or business unit IT governance, which focuses on general decision rights for broad categories of decisions. For example, decisions at the organizational or business unit level typically represent broad policy decisions, such as budget prioritization or standard setting, whereas project level decisions are more specific, dealing with project management, requirements, or technical specifications. Projects should be governed based on their particular needs (Gibson 2003), which may not necessarily reflect the overall IT governance of the organization.

A definition for project governance must capture the types of decisions made during IS projects. Conceptualizing differences in governance based on different types of decisions is not new. IT governance literature routinely differentiates between decision categories such as IT infrastructure, IT use, and project management (Sambamurthy and Zmud 1999); or IT principles, IT investment, and IT architecture (Weill 2004). For project level governance, it is important to consider categories of decisions that are central to the execution of IS projects. Project-level categories roughly reflect decisions that fall at critical junctures of the development process, underscore key problems and issues that often arise during IS projects, and reflect different aspects of the comprehensive set of decisions that must be made. The researcher and practitioner literatures provide a window into these key issues and junctures that require decisions from business and IS personnel as IS projects unfold. We identify three significant types of project-related decisions.
One category of IS project decisions concerns requirements determination. Prior research has demonstrated the difficulty of successfully determining requirements, and the practitioner literature is replete with examples of failed efforts. Many of the challenges arise because of communication difficulties between IS and business stakeholders, the “thin” spread of knowledge between stakeholders, process uncertainty, and individual skills for eliciting requirements (Agarwal and Tanniru 1990; Browne and Rogich 2001; Curtis Krasner and Iscoe 1988; Davidson 2002; Urquhart 2001). Decisions about determining requirements – how it should be done, who should be involved, etc. – are critical to the success of a project, and thus a definition of project governance should include requirements decisions.

A second category of decisions centers on the technical aspects of building systems. In any project there are a large number of technical design decisions that must be made, ranging from the choice of development environment to the system’s internal structure. Most large scale projects require the integration of multiple technologies (applications, databases, networks), often across multiple platforms (Curtis et al. 1988). While these issues are often seen as “backend,” system design decisions directly impact capabilities and the ability to meet requirements (Weill and Vitale 2002). Decisions about design and technical specifications – what technologies to use, how to integrate components, etc. – are essential, and they must be captured in a definition of project governance.

A third category of decisions reflects project management, in particular, concerns about effectively managing budgets and schedules. IS projects routinely face budgetary and time pressures and are often criticized for their tendency to overshoot cost and schedule promises (Keil 1995). Being “on schedule” and “under budget” are two of the most commonly used measures of project success and are central to project management practice (PMI 2004). Budget and schedule decisions directly affect the assignment of resources to a project. Uninformed or unrealistic budgets and schedules can doom a project to failure before it even starts (Abdel-Hammid Sengupta and Swett 1999), or lead to a cycle of escalating commitment (Keil Truex and Mixon 1995). While initial cost and duration estimates are important, these decisions occur throughout the life of a project. They should be based on an understanding of both the
needs and ability of the organization. Thus, the location of project management decisions should be an important part of a definition of project governance.

In addition to specifying the types of project decisions about requirements, technologies, and budget/schedule, our conceptualization of IS project governance identifies IT and business unit executives as the stakeholders who are accorded decision rights. In particular, we conceptualize governance in terms of the degree of authority, responsibility, and participation of each stakeholder for the individual categories of IS project decisions. Authority represents the location of decision rights and has been the dominant conceptualization in traditional views of governance (Brown 1997; Brown and Magill 1994; Brown and Magill 1998; Ein-Dor and Segev 1982; Sambamurthy and Zmud 1999; Tavakolian 1989). Responsibility reflects the obligation to perform a task and take accountability for the outcome. These two components are the most widely used measures of governance roles. Weill (2004) recognizes both authority and accountability as aspects of governance, although the two are not addressed separately. While it is possible to have responsibility without authority (Sunsil, 1990), structures that align the two are most valuable (Grover et al. forthcoming). We include participation as a third element of governance; it is similar to input rights (Weill, 2004) and reflects stakeholders’ input into decisions.

Therefore, our definition of project governance encompasses requirements governance, technical governance, and budget/schedule governance. Each governance dimension is enacted through IT and business executive authority, responsibility, and participation. Requirements governance includes the authority, responsibility, and participation of business and IT executives in decisions made to define the scope and boundaries of the project. Technical governance flows from the authority, responsibility, and participation to business and IT executives in making decisions about the technical aspects of the system and its development. Finally, budget/schedule governance concerns authority, responsibility, and participation of business and IT executives in choices that impact the resources that are given to the project and the effective execution of the project. While prevailing conceptualizations about governance emphasize centralization or decentralization, our definition recognizes that project
governance occurs in a richer manner, where authority for specific decisions might be balanced with patterns of responsibility and participation. For example, IT executives might have the authority for technical decisions, but business executives might have varying levels of participation in those decisions.

**Antecedents of IT Project Governance**

What factors influence how business and IT executives are accorded with the requisite authority, responsibility, and participation in the requirements, technical, and budget decisions for IT projects? In this regard, a rich vein of existing research on the control of IT projects provides insights about potential antecedents (Henderson and Lee 1992; Kirsch 1996; Kirsch 1997). Governance of IT projects refers to how key decisions about IT projects are made by business and IT executives, whereas control refers to the process through which business and IT executives exercise oversight of the progress of the project toward valued outcomes. Though the two constructs are distinct, prior literature on the factors influencing the choice of control mechanisms provides clues about the antecedents of IT project governance.

Control research largely takes an agency perspective (Eisenhardt 1985), whereby controllers (either business units or project leaders) exercise control over controllees (either project leaders or project team members, respectively) (Kirsch et al. 2002). Controllers use various forms of control (Kirsch 1997). This research has focused on the antecedents of various forms of control, particularly looking at the observability of outcomes and behaviors as predictors of the choice of control mechanism. One of the salient findings of the research is that controllers’ knowledge about the systems development processes is an important factor in the exercise of control (Kirsch 1996; Kirsch et al. 2002). Controllers who do not understand the behaviors that are necessary to complete a task cannot use behavioral controls to monitor those tasks. Similarly, controllers who define arbitrary outcomes due to misunderstanding about what it takes to produce the appropriate results will be ineffectual. The lack of knowledge about systems development directly affects, and actually limits, the role that a controller from the business unit can take in a project (Tiwana and Keil 2007). One of the implications for the present research is that the requisite knowledge of business and IT executives might be important antecedents of IT project governance.
Relatedly, Jensen and Meckling (1992) argue that decision-makers must have access to the necessary knowledge for making those decisions. The location of decision-making rights should be influenced by who has the requisite knowledge to make those decisions. In the context of IT projects, knowledge of the business processes being supported and knowledge of the technologies that will be used are both essential to the success the project (Kirsch 1996). These two domains of knowledge, IT and business process knowledge, though important, are not necessarily evenly distributed or collocated (Curtis et al. 1988). The extent to which business executives have knowledge of IT and IT executives have knowledge of the business processes being supported directly impact how effective each one of the stakeholders would be in making project related decisions and ultimately the success of the project (Basselier and Benbasat 2004; Bassellier Benbasat and Reich 2003).

In a complementary vein, the theory of strategic intra-organizational contingencies provides insights about another important antecedent of IT project governance (Hickson, Hinings, Lee, Schneck and Pennings 1971). This theory argues that managers invest more of their time and attention in activities that are strategic to their business and, therefore, the source of significant uncertainties. By paying attention to the strategic activities and initiatives and investing their personal time and organizational resources toward managing these activities, managers seek to enhance their organizational performance. IS researchers have applied this theory to propose that business managers’ interest in and willingness to engage with information technology related activities will be related to the perceived importance of IT in their organizations (Lucas 1984; Saunders and Scammell 1986). Therefore, this theoretical perspective would suggest that business executives might take on a heightened governance role on IT projects that are deemed to be strategically important.

The next section of the paper integrates these conceptual foundations in developing our research model and hypotheses.

MODEL DEVELOPMENT AND HYPOTHESES
The conceptual research model for this study is shown in Figure 1. The constructs and relationships in this model are discussed in the following sections.

Business Unit Knowledge of IT

Business unit knowledge of IT has increasingly been seen as an important factor in IT management (Keen 1991; Sambamurthy and Zmud 1992; Sambamurthy and Zmud 1994). Knowledge of IT by business managers has been related to alignment (Reich and Benbasat 2000), IS group performance (Nelson and Cooprider 1996), championing IT (Bassellier et al. 2003) and the use of control mechanisms (Kirsch 1996). The specific components of business unit knowledge of IT deal with the ability to both evaluate and implement technologies, and include both explicit and tacit IT knowledge (Bassellier, Reich, and Benbasat 2001). Explicit IT knowledge deals with knowledge about the existence and potential application of technologies, general understanding of development methodologies, and knowledge of the strategic implications of IT. Tacit IT knowledge deals with experience in developing applications. Understanding the IT environment as it relates to business-specific processes and the IT environment of the organization is another component.

Though making project decisions requires a general knowledge of technologies and methodologies, it is also necessary to have an understanding of how IT works specific to the organization and project. Although technologies may be relatively standard across organizations, the implementation details and relationships between systems will vary between organizations and projects. Therefore, we define business unit knowledge of IT to include: 1) knowledge of the strategic impacts of IT, 2) knowledge of the underlying technologies, 3) knowledge of systems development methodologies, and 4) knowledge of the IT environment within the organization.

Though business unit knowledge of IT has been often discussed in the literature (Bassellier et al. 2003; Bassellier Reich and Benbasat 2001), the impact of this knowledge on the allocation of IT decision-
making rights has not been widely studied. Sambamurthy and Zmud (1999) argue that the lack of line managers’ IT knowledge and experience will inhibit business managers’ ability to make IT decisions, and therefore, lead to greater centralization of IT decision authority. The more knowledgeable that members of the business unit are about IT, the more they can accept IT decision-making responsibility (Bassellier et al. 2003). Business managers are more likely to take a leadership role for IT when they have IT training and competence (Bassellier et al. 2003; Rockart Earl and Ross 1996).

IS projects require an understanding of information technologies (Ewers and Vessey 1981). Although non-IS units are often directly affected by technology choices, these units may have little understanding of what is involved in developing information systems or managing IS projects (Lucas 1984). Lack of IT knowledge within the business unit makes it difficult for the business unit to accept responsibility or authority for the project (Kirsch 1997; Kirsch et al. 2002) or to take a project leadership role (Armstrong and Sambamurthy 1999; Bassellier et al. 2003; Rockart et al. 1996). Lack of knowledge also limits the extent to which the business unit can participate in project decisions (Nelson and Cooprider 1996). Conversely, higher levels of knowledge will allow and encourage the business unit leaders to take a greater role in project governance. When decision makers within business units are more knowledgeable about IT, they will be able to take on a greater level of authority, responsibility, and participation in IS project decisions. Therefore, we propose that:

\[ \text{Hypothesis 1: Higher levels of business unit knowledge of IT will be associated with higher levels of business unit governance of the project.} \]

**IT Unit Knowledge of Business Processes**

Since IT must support business processes, knowledge of those underlying processes is important. Though business managers’ IT knowledge has been emphasized, significantly less attention has been paid to IT professionals’ knowledge of the business processes (Avital and Vandenbosch 2002; Keen 1991; Sambamurthy and Zmud 1992; Sambamurthy and Zmud 1994). We define IT units’ knowledge of business processes to include: 1) knowledge of operations within the business unit 2) knowledge of the
processes performed within the business unit and 3) knowledge of the relationship between the business processes and the business unit’s external environment. Not only is such knowledge often deficient among IT professionals (Todd, McKeen and Gallupe 1995), but also it is difficult to have detailed knowledge of the specific business processes, when IT units often support multiple units within an organization (Henderson 1990; Nelson and Cooprider 1996). Greater business competency, however, has been shown to impact intentions on the part of IT managers to partner with business units instead of going it alone (Basselier and Benbasat 2004) and plays a role in fostering effective communication (Nelson and Cooprider 1996). When an IT unit has sufficient knowledge of business processes, it can make project decisions that match the needs of that business unit without requiring the business unit to be fully involved.

In the context of IS projects, much of the need for end-user involvement and control relationships stems from a lack of knowledge about business processes on the part of IT professionals (Kirsch 1997). They often lack understanding of the business needs necessary in shaping IS projects that enable business processes. When IT decision-makers are knowledgeable about the business processes, they can “take the ball and run with it;” therefore, such knowledgeable IT unit executives can play a more active role in IS project governance. We propose that:

*Hypothesis 2: Higher levels of IT knowledge of business processes will be associated with higher levels of IT unit governance of the project.*

**Strategic Importance of Projects**

In determining the levels of governance, it is also necessary to take into account factors that impact not only the ability to make decisions, but also a unit’s willingness to increase their role in governance. An understanding of the roles in governance must also consider strategic issues (Martin 2003). Strategic projects are more salient to business units and encourage greater involvement (Hunton and Beeler 1997). The strategic importance of a project, especially from the perspective of the business unit, can therefore be expected to impact the amount of decision-making associated with business and IT units. While information technology is increasingly integral to achieving organizational objectives, this is not always
the case, and IT is almost certainly not always perceived to be a strategic necessity by those outside of IT. Although the increased participation of end users and business units has been found to play a role in the success of projects, these groups are not required to assume active roles. Participation from business groups is based on their desire to participate (Hunton and Beeler 1997), which happens when they see a project as strategically important. Prior research has also found a positive relationship between the importance of project goals and the use of controls (Kirsch 1996). Business units that care about a project and the projects goals will invest time and energy in managing the project. Therefore, when projects are considered strategic or important, business units are more willing take active roles, while they may leave the governance of less strategically important projects to the IT unit.

Hypothesis 3: Higher levels of strategic importance to the business unit will be associated with higher levels of business unit project governance of the IS project.

Project Performance

IT project performance has consistently been a troubling issue for organizations trying to manage IT projects (Xia and Lee 2004). Researchers have looked at both the measurement of and factors influencing project performance (Aladwani 2002). It is widely accepted that the management of IT projects is a difficult task and that the ability of an organization to meet the IT needs of its stakeholders is vital (Kirsch et al. 2002). This is especially difficult considering the complexities of dealing with IT projects. One of the primary objectives in developing appropriate governance arrangements is to increase the benefits produced by the organization’s investments in IT (Weill and Ross 2004).

Recent studies find that in high performing companies, ownership of IS projects is shared between IT and business units (Avital and Vandenbosch 2002). This suggests that both IT and business units should play substantial roles in IS project governance. With high levels of business unit governance, the project is likely to benefit from insight about the business process, championship of the project, and support for funding. At the same time, high levels of IT governance will benefit the project with the technical insight needed for steering the project in a timely and economical manner. Therefore, we propose that:

Hypothesis 4a: Higher levels of business unit governance of the IS will be associated with higher levels of project performance.
Hypothesis 4b: Higher levels of IT unit governance of the IS project will be associated with higher levels of project performance.

METHODOLOGY

This research utilizes matched survey responses from lead business unit and IT managers associated with IS projects. The sampling frame was built around large Fortune 500 firms. Senior IT executives in these firms were contacted and the goals of the project were described to them through a one-page prospectus specifically developed for the study. The prospectus described the goals of the study, its importance, the nature of data gathering, cooperation requested from the firm, and the type of findings and deliverables that would be shared from the study. Once a willingness to participate was obtained, the executives were asked to identify business application projects that required internal development efforts or package implementations with substantial internal customization. Of particular importance was the emphasis on identifying projects that were viewed as enabling strategic applications and not maintenance or upgrades. Once appropriate projects were identified, the lead business unit and IT executives associated with those projects were sent matched-pair surveys. In some instances, the business unit and IT respondents were contacted by the research team, while, in other cases, the distribution of surveys was handled within the organization.

The use of matched-pair responses allows the governance issues to be examined from both the IT and business unit perspective, and it addresses concerns associated with common method bias and the use of single respondents. IT respondents were asked to indicate how the members of the IT unit participated in the governance of the IS project; whereas business unit respondents provided responses about business unit governance on the same projects. Together these two perspectives are used to assess the governance arrangements for the project. The measures of knowledge were based on assessments from the opposite group (i.e. business knowledge of IT was assessed by IT respondents). This approach was taken to avoid self-respondent bias in measures of knowledge.

Sample
In order for projects to be included in the analysis it was necessary to receive completed surveys from both the business unit and the IT unit respondents. Of the 189 companies directly contacted, 77 indicated interest, and 92 potential projects from these firms were identified. A total of 58 projects from 31 organizations were included in the final analysis (63% response rate from identified projects). Including both groups this represents a total of 116 survey responses. The organizations in this sample represent a broad range of industries including manufacturing, service, healthcare, financial/insurance, media, and governmental agencies. Although our sampling approach was based on convenience sampling, the firms included are representative and consistent with similar studies. The sample size is also consistent with other matched-pair studies at the project level (Kirsch 1996; Kirsch et al. 2002; Nelson and Cooprider 1996; Nidumolu 1995). Power analysis indicates that an N of 58 is adequate to detect an effect size of .3, a medium effect size according to Cohen (1988), at a power of .8. It also conforms to suggestions for regression analyses that the number of observations should exceed the number of constructs by at least 50 (Harris 1985).

Projects varied in terms of duration, size, and cost. Descriptive statistics of the project characteristics are shown in Table 1. The most commonly reported languages used to develop the systems were Java, C++, and COBOL, although there was a wide variety of development environments reported. Ten projects included in the sample were ongoing when the data was provided; of these, 4 gave expected completion dates (included in the duration statistics) and 6 gave no expected completion (not included in duration statistics). The ongoing projects, although not completed, had all delivered at least one major deliverable, in accordance with the rules used to select projects for the survey. Delivering at least one major deliverable gives enough information about knowledge and governance arrangements for the purposes of this research. It also provides a basis for assessing project performance.

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Insert Project Descriptive Statistics (Table 1) about here
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Analysis

Analysis of the data was conducted using partial least squares (PLS), a structural modeling technique well suited to explaining the relationships within a structural model (Fornell 1987). Unlike other SEM approaches that evaluate model fit, PLS identifies variance explained in the data and causal links between latent constructs and the structural model (Fornell and Larker 1981). PLS is particularly appropriate for assessing predictive relationships or for analysis designed to build theory (Wold 1986). PLS analysis involves two stages: 1) validating the measurement model and 2) assessing the explanatory and predictive power of the structural model. Visual-PLS version 1.04b was used for this analysis. Visual-PLS is a graphical user interface program that provides an easy to use interface for LVPLS 1.8. The significance of paths in both the structural and measurement models was determined using a bootstrap resampling method. To insure that the maximum number of observations could be included in the analysis, missing data for duration and team size were computed using maximum likelihood imputation in SPSS 11. This technique has been shown to be accurate and not bias results even with large amounts of missing data (Allison 2002).

Measurement Model

Wherever possible the items used to measure the constructs were based on existing scales. All items, including the cues provided on the questionnaires and the scales, are shown in Appendix 1.

Business Unit and IT Unit Knowledge

This research looks at two aspects of knowledge, business unit knowledge of IT and the IT unit knowledge of business processes. Business unit knowledge of IT measures the level of knowledge that key business unit executives have about information technology. Similarly, IT unit knowledge of business processes measures the extent of knowledge that executives or managers in the IT unit associated with a project have about the business processes being supported within a business unit. Both scales were composed of eleven items. The items were adapted from previous work on business manager IT competence (Bassellier et al. 2001; Reich and Benbasat 2000) and IT competence (Avital and Vandenbosch 2002), along with original items based on concepts identified in the literature. Responses
for IT unit knowledge of business processes were provided by the business unit respondents and responses for business unit knowledge of IT were given by the IT unit respondent.

Both knowledge scales demonstrated adequate validity and reliability. Items for both knowledge scales loaded on the hypothesized construct with loadings above the .70 threshold for PLS measurement (Chin and Newsted 1995). No items loaded on any other construct above .5, thereby demonstrating discriminant validity. Reliabilities for both scales were above the recommended threshold of .70 (Nunnally 1978). Items, factor loadings, and reliabilities for knowledge constructs are shown in Table 2.

Insert Knowledge Measures (Table 2) about here

IS Project Governance

IS Project governance for each of the three decisions was measured separately for the business unit and the IT unit. Business unit respondents indicated the business unit’s role in project governance in terms of participation, responsibility, and authority for various project decisions. Similarly, the IT unit’s role in project governance was measured using IT responses. Both the IT unit governance and business unit governance constructs were comprised of three dimensions – requirements governance, technical governance, and budget/schedule governance. The items for each dimension loaded together for both the business and IT unit respondents above .70 and demonstrated reliabilities above recommended levels. No items loaded above .5 on any other construct. The three dimensions for each group were then modeled as second order constructs following the procedure described in Chin and Gopal (1995) for a molecular model to create a single measure of each unit’s role in project governance. The combined scales also demonstrated high reliability.

Insert Project Governance Measures (Table 3) about here

Strategic Importance of IS Projects
Strategic importance reflects the degree to which the project fits with the overall strategy for the business unit and is important to the success of the business unit. As seen in Appendix 1, the measure for this construct consists of a two item scale, which exhibits high reliability (composite reliability = .96). This construct was assessed by business unit respondents.

**Performance**

The performance items measure assessments of project outcomes for both the processes involved in the project and final deliverables. Items were taken from existing scales (Aladwani 2002; Nidumolu 1995). These items were included on both the business unit and the IT surveys. The scale consisted of 4 dimensions of performance – knowledge acquisition, control, user interaction, and system. Items for each of the hypothesized dimensions loaded as expected for both the business unit and IT respondents. Items and their loadings for the hypothesized dimensions are shown in Table 4. Business unit and IT respondents assessments of performance were highly correlated indicating that there was high inter-rater reliability regarding project performance (overall performance correlation = .629). The individual dimensions for both respondents were modeled as a second order factor representing the combined assessment of project performance using the procedure described by Chin and Gopal (1995). This was done to take both business and IT unit perspectives into consideration in the measure providing a more comprehensive view of the project’s overall performance. The combined scale demonstrated high reliability (composite reliability = .908).

---

Insert Project Performance Measures (Table 4) about here

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**Control Variables**

Three characteristics of IS projects are included in this research as control variables: project cost, project duration, and project team size. Project research often accounts for the size of projects and all three of these variables represent aspects of project size. Additionally, IT governance does not occur in isolation and is linked to the governance of other assets, in particular financial considerations (Weill 2004). Project costs were reported by IT unit respondents using a scale from 1 to 6 (1- under $500,000,
2- $500,000 to $1 million, 3- $1 million to $5 million, 4- $5 million to $10 million, 5- $10 million to $50 million, 6- more than $50 million). Duration was measured by calculating the total number of months elapsed between the project start and completion dates, which were reported by IT respondents. The number of project team members reflects the number of people on the project as reported by the IT respondents.

**RESULTS**

The correlations between constructs are shown in Table 5. The square root of the average variance extracted (AVE) is shown on the diagonal. When the square root of the AVE is higher than the correlations of the off diagonal elements this is a further demonstration of discriminant validity.

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Insert Correlations (Table 5)

---

**Tests of Hypotheses**

The results of the analysis of the structural model and tests of the hypotheses are shown in Figure 2. The test of the structural model includes estimating the path coefficients and the variation explained. Path coefficients and the t-statistics obtained through bootstrapping are shown for each path. The hypothesized constructs and control variables account for 48.6% of the variation in business unit governance and 29.6% of the variation in IT unit governance. Business unit and IT unit governance, along with the control variables, explain 30.6% of the variation in project performance.

Business unit knowledge of IT is not significantly related to business unit project governance ($\beta = .020, t = .210, p>.05$), failing to provide support for hypothesis 1. This suggests that the extent to which a business unit is knowledgeable about IT does not influence their level of participation, responsibility or authority in key project decisions. The results do show a significant relationship between strategic importance and business unit governance ($\beta = .607, t = 5.073, p<.05$), providing support for hypothesis 3.

A significant relationship exists between IT unit knowledge of business processes and IT unit governance ($\beta = .220, t = 1.971, p<.05$). This provides support for hypothesis 2. In addition business unit
knowledge of IT has a significant positive relationship with IT unit governance \( (\beta = .473, t = 2.953, p<.05) \), a relationship not hypothesized. This suggests that as business units become more knowledgeable about IT, IT units take a greater role in project governance. Interestingly, strategic importance of the IS project was also significantly related with IT unit project governance, but in the negative direction \( (\beta = -.407, t = -2.473, p<.05) \).

As hypothesized both business unit \( (\beta = .429, t = 2.604, p<.05) \) and IT unit \( (\beta = .380, t = 2.312, p<.05) \) roles in governance were related to project performance indicating the importance of each group’s role in impacting project outcomes. The impact of each group is further demonstrated by the results shown in Table 6. To construct this table a median split of business unit and IT unit project governance was used to classify each as either high or low. These were then used to classify the governance of each project in the sample. The table shows the overall project performance scores for each cell. The results in the table show that performance is the lowest when both groups take relatively low roles in governance. Increasing either group’s governance role improves performance. Project performance is highest, however, when both groups are highly involved in project governance.

DISCUSSION

The goal of this research is to examine factors that influence the governance of IS projects in organizations, and how business and IT unit governance impacts project performance. IS projects represent the convergence of business needs and information technologies. Effective implementation of IS projects requires the integration of thin slices of business and technical knowledge as well as making decisions about delivering the projects within budgeted costs and agreed schedules. With the growing scale, complexity, and importance of IS projects to business strategies and firm performance, there is continued interest in insights related to the effective governance, control, and management of IS projects.
Though the control and coordination of IS projects has received significant attention, the governance of IS projects has received relatively less consideration.

The focus of this research is particularly on how three factors influence the governance of IS projects: (i) the level of IT knowledge possessed by business unit executives, (ii) business process knowledge possessed by IT unit executives, and (iii) the strategic importance of the project. Both types of knowledge have been discussed in the literature and are consistently found to be important aspects of successful information systems development and implementation (Basselier and Benbasat 2004; Bassellier et al. 2003; Nelson and Cooprider 1996), although the IT competence of business managers has received significantly more attention (Bassellier et al. 2003). IS project governance was conceptualized in terms of three important types of project decisions: requirements, technical specifications, and budget/schedule. Each of these categories of decisions was used to create a broad measure of governance reflecting the degree of authority, responsibility, and participation for the business and IT units. This study also examines the impact of project governance on project outcomes.

Our analysis of the matched-pair survey responses from business and IT executives involved in 58 projects reveals significant insights: (i) Though our hypothesis that IT knowledge of the business executives will result in their greater levels of authority, responsibility, and participation for this group in IS project decisions was not supported, we found that such knowledge facilitates greater levels of IS project governance by the IT units. (ii) IT units’ business knowledge also had a significant impact on the governance role of IT units. (iii) When the IS projects were regarded as strategically important, business units assumed a greater role in IS project governance. While this finding was consistent with the hypothesis (H3), it was also striking that strategic importance was significantly negatively related with the governance role of the IT unit. For strategically important projects, not only did business units take on a salient role in IS project governance, but also the role of the IT unit was significantly diminished. (iv) Both IT unit and business unit roles in project governance were associated with increased project performance.
Before discussing the implications of this research, it is important to assess its limitations. First, the sample size is limited, even though it is consistent with other research using dual respondents in studying phenomena at the level of IS projects (Aladwani 2003; Kirsch 1996; Kirsch et al. 2002). Second, the study used a convenience sampling approach rather than random sampling. With a matched-pair survey design and a focus on IS projects, it is not clear that a random sampling approach would be particularly effective. The demands for data gathering (e.g., identifying an appropriate mission critical project, motivating responses from both the IT and business unit leads on the project) were higher than would be the case in a typical field survey, and we believed that our data gathering would be more successful if we approached large firms where we had established relationships. Finally, the criteria used to select projects also represent another potential limitation. This study looked only at the governance for internal systems development projects. Additionally, governance was only considered from the perspective of one business unit and one IT unit. As the IT environment changes, organizations may see IT more as a commodity and internal systems development may represent a decreasing percentage of overall systems implementations, especially considering the recent rise in outsourcing. As systems become more tightly integrated throughout the organization, multiple business and IT units, both inside and outside the organization, may be involved in governance. More complex governance arrangements involving a variety of stakeholders may not be affected in the same manner as the projects included in this sample.

Notwithstanding these limitations, we believe that our research makes significant contributions to the emerging insights about the management of IS projects in organizations. The cumulative results, including the hypothesized and the non-hypothesized findings, reveal a rich set of dynamics about how and when business and IT units play active roles in IS project governance. Interestingly, we find that when business units have greater IT knowledge, they do not necessarily assume a greater role in IS project governance. Instead, higher levels of business unit knowledge of IT are associated with a heightened governance role for the IT unit. Initially, this finding appears to run counter to expectations raised by the IS literature (Armstrong and Sambamurthy 1999; Bassellier et al. 2003; Rockart 1988; Sambamurthy and Zmud 1994). This counterintuitive finding provides evidence calling for
reconceptualizing how IS project governance might occur. Such revised thinking can be understood by using an alternative thinking about roles in project governance, based on theory and results from organizational control (Kirsch 1996; Kirsch et al. 2002; Ouchi 1977; Ouchi 1978; Ouchi and Maguire 1975). Research on control finds that as controllers become more knowledgeable they are better able to monitor activities and utilize different, less-intensive forms of control. The different mechanisms allow business people to control the project while reducing the time and attention required in doing so.

Based on our findings, we propose that when business units have higher levels of IT knowledge, they are in a better position to observe and monitor the actions of the IT units in the IS project. Applying this insight to the current study suggests that business units may cede more decision-making over projects as their knowledge of IT increases in favor of less intensive monitoring. Though more business unit governance of IS projects has been normatively advocated (Brown and Sambamurthy 1999; Rockart 1988), a heightened governance role is costly and time consuming for the business executives. When they are knowledgeable about IT, they are in a better position to overcome any problems of moral hazard and trust the IT unit. Therefore, the benefit of heightened knowledge about IT is not that business units will take on an increased governance role on IS projects, but that they will take a role that better balances with the role of the IT unit. Findings from Bassellier et al (2003) show that increased business manager competence leads to increased intent to champion IT. But, willingness to champion and being actively involved in decisions may represent very different roles. Deeper understanding of IT may provide business managers the ability to determine when a greater role in governance is necessary, and when they can be ‘hands-off’. The decision may also be the result of improved communication that is made possible through increased knowledge on the part of the business unit (Nelson and Cooprider 1996).

However, when the IS projects are strategically important, business units become active in IS governance and, interestingly, the IT unit’s role is correspondingly diminished. As long as they do not see a project as strategically critical, business units are willing to let the IT unit govern the project. But, on strategically important projects, it is likely that the stakes of the project rise. Strategically important initiatives may be regarded as greater sources of uncertainty and dependency; therefore, managers
dedicate greater time and energy through direct involvement. Though business managers might be resistant to active governance of IS projects, their willingness toward such governance is enhanced on strategically important projects. And, correspondingly, IT unit executives witness a diminution in their governance role.

Our findings suggest a model of project governance arrangements as an interlinked choice process dominated by business units. Knowledgeable business unit executives, valuing their limited reserves of time and attention, typically choose to delegate IT governance decisions to IT units except if the project is strategically important. Thus, if IT units want business units to be more involved in governance, they should find ways to influence business involvement by showing the strategic importance of the project. Alternatively, IT people should expect less involvement from business people in non-strategic projects, allowing them to focus their demands for business involvement only on the most strategic projects.

The choice process for IT involvement appears to have a different mechanism, but is still one where business executives play an important role. IT professionals apparently accept governance responsibility for projects by default, but can see their decision-making increased when business executives are more knowledgeable about IT. Additionally, business units tend to take control away on strategic projects. Rather than increasing their role to match IT involvement, business units tend to increase their involvement and reduce IT involvement. Perhaps they believe that sole ownership of decisions is easier than joint ownership. On the other hand, perhaps IT managers deliberately shift more control of the project to the business, believing that it belongs there. Regardless of the cause of the shift from IT to business governance of strategically important projects, if IT managers want to maintain high involvement in decision-making, our findings suggest they should work to improve their knowledge of business processes and improve business executives knowledge of IT processes. The increased knowledge does not reduce business involvement in strategic projects, but does apparently give IT a seat at the governance table.

It should be noted, however, that there is an inherent (and possibly untrue) assumption in much of the IS literature -- namely, that the way to increase business unit participation in IS decision-making is to
make business managers more knowledgeable about IT. The fact that business managers choose governance arrangements that limit their roles even when they are knowledgeable, suggests that they only see the relevance on the projects they consider to be important. It may be most beneficial for IT managers to carefully consider what types of projects require greater business ownership, and what projects can live with IT unit governance. By carefully choosing their battles, IT managers can be more assured of getting appropriate business involvement when it is really necessary, while reducing workloads for business champions when involvement is not necessary. Of course this approach may come at a cost in terms of project performance. Our findings demonstrate that while the drivers of project governance are different for business and IT units, increases in both group’s roles has a positive impact on project performance. It may be, however, that increases in the roles of the two groups are not interchangeable. Future research needs to look at situations where increases in business or IT governance roles are most effective. This could be especially important when the cost of governance is high.

Our results support calls for increased collaboration and sharing of decisions across business and IT units. Organizations must find ways to increase involvement of both IT and business executives in ways that tap the knowledge of each. Not only do these findings highlight the need for collaboration, they provide insights into how to accomplish this objective. Understanding these relationships and the antecedents of each group’s role in project governance is vital specifically because of the apparent impact of each group on project performance during strategic projects.

Our findings have significant implications for practice. Primarily, IT and business executives must pay close attention toward IS governance. In general, IT units are more likely to play an active role in governance of IS projects. However, in order to be effective, they must earn the trust of the business units by helping raise the business units’ knowledge about IT. Therefore, one of the important IT management goals must be to enhance the IT knowledge and competence of the business executives. Further, on strategically important projects, we provide evidence for why it is crucial that business units play an active governance role. If business units are resistant to active governance roles on every IS project, then it is critical to ensure that they are actively governing at least the strategically important ones.
CONCLUSION

This research offers several contributions to the current literature. First this research presents a theoretically grounded framework for investigating project level IT governance. While organizational-level IT governance has received significant attention, our results demonstrate the applicability at the project level of concepts previously studied at the organizational or business unit level. As organizational processes become larger and more closely linked with the success of IT projects, viewing the governance of projects separately from higher level views of governance will allow researchers to more specifically address the context in which many IT decisions are made. This study provides a view of project governance comprised of decisions related to requirements governance, technical governance, and budget and schedule governance that researchers can utilize in examining interactions at the project level.

This research also extends work done at the project level by expanding the view of the relationship between business and IT units. It provides a link between theories of governance and control and highlights synergies and conflicts between the two. It suggests that a controls-based view of governance dominates in some contexts, while a knowledge-based view dominates in others. Researchers should pay attention to the variety of relationships that are possible and not automatically assume the nature of the relationship. Researchers should also be aware that there may be many manifestations of governance. While IS researchers often focus on the necessity for user involvement, there may be circumstances where business units may not want to be actively involved, even when their involvement facilitates improved project performance. Researchers should take this into account when looking at the roles that various constituencies take in the development and management of IT.

Finally, our results suggest that project performance is highest when both business and IT executives take on greater governance roles for project decisions. The differences in the factors that lead to these greater roles, therefore, need to be taken into account to encourage appropriate participation from both sides.
REFERENCES


Table 1 Project Descriptive Statistics+

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+ reported by IT respondents
*(1- under $500,000, 2- $500,000 to $1 million, 3- $1 million to $5 million, 4- $5 million to $10 million, 5- $10 million to $50 million, 6- more than $50 million)

Table 2 Knowledge Measures

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Table 5
Correlations

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<td>1.00</td>
</tr>
<tr>
<td>9. Duration (Months)</td>
<td>.104</td>
<td>-.184</td>
<td>.101</td>
<td>-.110</td>
<td>.223</td>
<td>-.067</td>
<td>.489</td>
<td>.020</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Square root of AVE shown on diagonal

Table 6
Project Performance

<table>
<thead>
<tr>
<th>Business Unit Project Governance</th>
<th>IT Unit Project Governance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Low</td>
<td>3.779</td>
</tr>
<tr>
<td>High</td>
<td>N=16</td>
</tr>
<tr>
<td>High</td>
<td>3.475</td>
</tr>
<tr>
<td>Low</td>
<td>N=14</td>
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</tbody>
</table>
Figure 1 Research Model

- Business Unit Knowledge of IT
- IT Unit Knowledge of Business Processes
- Strategic Importance of Project
- Project Governance
- Control Variables: Project Cost, Project Duration, Team Size
- Project Performance
Figure 2 Structural Model Results

Significant paths shown in bold
Paths for control variables were not significant
Appendix

Items

**Business Unit Knowledge of IT**  
*(IT respondents)*

Please indicate the extent to which business unit decision-makers associated with this project understand each of the following: (1 – None at all, 7 – To a great extent)
- Information systems in general
- Information systems within this organization
- Strategic uses of IT
- Relevant emerging technologies
- *Competitors use of IT*
- Systems development processes
- Difficulties of developing information systems

- Costs associated with information systems
- How IT fits into this business unit’s overall strategy
- *Relationship between information systems in this business unit and information systems in other areas of the organization*
- Information systems support of business processes within this business unit
- Technologies used on this project
- Development methodologies used on this project

**IT Knowledge of Business Processes**  
*(Business unit respondents)*

Please indicate the extent to which IT unit decision-makers associated with this project understand each of the following: (1 – None at all, 7 – To a great extent)
- Industry business practices
- Your firm’s competitors
- Business processes within this business unit
- Strategies employed by this business unit
- Operations within this business unit
- This business unit’s present and future products
- Relationship between this business unit and other areas of the organization
- Important performance measures for this business unit
- Business processes supported by this project
- Important outcomes for this project
- Strategic impact of this project

**Project Governance**  
*(Business unit and IT respondents)*

For this project, to what extent did members of your [business unit / IT unit] ...
(1 – None at all, 7 – To a great extent)

- **Requirements**
  - participate in specifying system features
  - have responsibility for specifying system features
  - have authority over system features
  - participate in determining project requirements
  - *have responsibility for determining requirements*
  - have authority over system requirements

- **Technical**
  - participate in determining technical specifications
  - have responsibility for technical specifications
  - have responsibility for making sure technical specifications were met
  - have responsibility for making sure requirements were met
  - have authority over technical specifications

- **Budget/Schedule**
  - participate in setting project schedule
  - have responsibility for setting project schedule
  - *have responsibility for making sure schedule was met*
  - have authority over project schedule
  - participate in determining project budget
  - have responsibility for setting budget
  - *have responsibility for making sure budget was met*
  - have authority over project budget

**Strategic Importance**  
*(Business unit respondents)*

(1 – Strongly Disagree, 7 – Strongly Agree)

- This project fit with the overall strategy of this business unit
- This project is/was important to the success of this business unit
Project Performance (Business unit and IT respondents)
(1 – Very Poor, 5 – Very Good)
Relative to other comparable IS projects in your firm, how would you rate this project on each of the following:

- Knowledge acquired about the use of key technologies
- Knowledge acquired about the use of development methodologies
- Knowledge acquired about supporting users’ needs
- Overall knowledge acquired through the project
- Control over project costs
- Control over project schedule
- Adherence to auditability and control standards
- Overall control exercised over the project
- Adherence to schedules
- Adherence to budgets
- Completeness of training provided to users
- Quality of communication with users
- Users feeling of participation in the project
- Overall quality of interaction with users

Please indicate how you would rate the systems or set of completed deliverables on each of the following:
- Reliability
- Cost of operations
- Response time
- Overall operational efficiency
- Ease of use

* Denotes items that were dropped from final measures