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When users are IT experts too: the effects of joint IT competence and partnership on satisfaction with enterprise-level systems implementation

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Abstract

Enterprise-level information systems (IS) are fundamental to businesses. Unfortunately, implementing these large-scale systems is a complex and risky endeavor. As a result, these initiatives must tap the expertise and active involvement of both the IS department and the enterprise's functional areas. Past studies focusing on IS implementation teams consistently identify the IS department as the source of technical expertise and leadership, while functional department team members are typically relegated to the role of business experts. However, unlike the past, many business professionals are knowledgeable about information technology (IT) and are increasingly capable of contributing to IS implementations from a technical perspective as well as a business perspective. This study examines how IT competence held by both the IS department and the user department stakeholders contributes to user satisfaction with the enterprise-level system implementation. Specifically, this research introduces a theoretically grounded construct, *joint IT competence*, which emerges when the IS department and user department stakeholders integrate their individually held IT competences. The study's results empirically demonstrate that joint IT competence is a key driver of user satisfaction in enterprise-level IS implementations. Although not as significant as joint IT competence, results show that partner-based leadership between the IS department and user stakeholders also influences user satisfaction with IS implementations.

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Introduction

Enterprise-level systems, when successfully implemented, offer organizations the benefits of tightly integrated information systems (IS) with shared data and visibility across the enterprise. Unfortunately, implementation of these large-scale systems is a complex endeavor that can go awry and result in very unsatisfied users (Kumar & van Hillegersberg, 2000). The complexity of enterprise-level IS implementations primarily arises from the need to synthesize diverse perspectives and manage large amounts of information in a context often characterized by change, conflict, and multiple stakeholders (Arias *et al*., 2000).

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To mitigate risk, academics and practitioners consistently prescribe the active engagement of individuals from the user base in the implementation to better define functional requirements and meet the diverse cognitive demands involved with enterprise-level projects. In this context, the IS department traditionally assumes the overall project leadership role and the users are delegated to a contributing role in communicating business needs and information requirements. However, this caricature of respective roles is changing as a consequence of users' pervasive exposure to technology and continuous involvement in IS implementations. With growing information technology (IT) competence, many tech savvy workers are not content contributing in a supporting, business-definitional role. Instead, they also seek to contribute in technical capacities (Brown *et al.*, 2007). Furthermore, as enterprise-level IS become increasingly meshed with the operations and strategy of the business, decisions emerge in the implementation process that are more effectively addressed by IT-competent users (Ross & Weill, 2002; Peppard, 2007). In addition to seeking out increased technical responsibility, IT-competent business professionals are also interested in acquiring greater project leadership responsibilities, often pursuing partnerships with the IS department during large-scale implementation efforts (Kirsch, 1997; Bassellier *et al.*, 2003).

In this study, we extend the research on enterprise-level IS implementation and partnership by addressing the changing landscape of distributed IT competence across the organization. We introduce a theoretically grounded construct labelled *joint IT competence*, which captures the emergent IT competence of the implementation team resulting when user and IS department stakeholders integrate their individually held competences. Furthermore, guided by theory and past research, we hypothesize that higher levels of joint IT competence lead to increased user satisfaction with the system implementation, as well as more equally shared decision-making power between users and IS during the implementation. Overall, this study focuses on answering the following research questions:

RQ1: *What impact does the joint IT competence of the enterprise-level implementation team have on user satisfaction with the enterprise-level system implementation?*

RQ2: *What role does project-level partnership play in the relationship between joint IT competence and user satisfaction with the enterprise-level system implementation?*

Conceptual background

User satisfaction with enterprise system implementations

User satisfaction has been identified as a key measure of project success (Kwon & Zmud, 1987; DeLone & McLean, 1992). In the context of enterprise system implementations, user satisfaction encompasses multiple aspects of the implementation including satisfaction with the degree of *involvement* during the implementation of the system, satisfaction with the *operation and use* of the system, and satisfaction with the *support and services* provided for the system. Each of these aspects is a necessary condition of user satisfaction, and dissatisfaction with any of these aspects can lead to resistance and/or ineffective use of the enterprise-level IS. As a result, we define user satisfaction with the enterprise system implementation in terms of users' satisfaction with their involvement in the development of the system, the operation and use of the system, and the support and service provided for the implemented system.

Joint IT competence

The resource-based view (RBV) of the firm (Wernerfelt, 1984; Wade & Hulland, 2004) identifies a firm's distinctive competences as its most valuable assets that must be developed and managed to maintain firm competitiveness. The fundamental rationale of RBV holds that the firm's unique capabilities in terms of technical know-how and ability are important sources of sustained competitive advantage and may enable the firm to generate rents from resource advantages (Nordhaug & Gronhaug, 1994; Grant, 1996). In line with this view, the competence of an organizational subunit has been conceptualized as a purposive combination of firm-specific assets that enables the group to accomplish a given task (McGrath *et al.*, 1995; Teece *et al.*, 1997). Moreover, these IT competences reside in the heads of the collective members of the team (Newell *et al.*, 2004) in the form of work-related knowledge, skills, and abilities (Nordhaug & Gronhaug, 1994). While individually held competences are central to group competence, they do not manifest in isolation; rather, they manifest through interaction with other organizational members during group work (Salomon, 1993; Hutchins, 1995). Thus, the essence of organizational IT capability is the integration of the individually held IT competences of distributed organizational members (Grant, 1996).

A number of important implications surface from this understanding of the relationship between individual and group competence. For one, the configuration of individually held competences, referring to how they are selected and combined, is critical for group performance (Grant, 1996). Furthermore, the combination of competences within a group can create synergies such that the product of combined competences is greater than the sum of its parts (Perkins, 1993; Salomon, 1993; Nordhaug & Gronhaug, 1994). Finally, the utilization of competence has a social dimension, related to the way members interact to produce group-level competences (Nordhaug & Gronhaug, 1994). Consistent with these notions, distributed cognition theory (Salomon, 1993; Hutchins, 1995) presents group competence as the outcome of interactions between diverse individually held competencies.

The theory emphasizes the social nature of cognition (Flor & Hutchins, 1991; Greenberg & Dickelman, 2000) and takes the complex cognitive system as its unit of analysis (Flor & Hutchins, 1991). Distributed cognition theory describes group competence as a 'joint' outcome (Salomon, 1993; Zhang & Patel, 2006), which is in essence a type of fit. The synergistic effect of integrating team members' knowledge and skills creates a joint competence that is greater than the sum of its individually held components.

One issue faced by teams characterized by diverse membership is that they are able to generate an assortment of viewpoints but can also have problems resolving these varied perspectives. Because distributed cognition is a social affair involving interpersonal interaction (Greenberg & Dickelman, 2000), a critical factor in establishing joint competence is the presence of a shared knowledge domain that pulls together diverse members' representations of the situation (Salomon, 1993; Hutchins & Klausen, 1996; De Haan, 2002), similar to the concept of shared mental models (Mathieu *et al*., 2000, 2004). Shared domain knowledge creates overlapping cognitive representations of the situation which serve as common ground for the diverse groups, and facilitates the establishment of shared understanding and expectation of the situation. This common vision allows team members to organize their expertise and behaviors which determine the effectiveness of the larger cognitive system (Hutchins & Klausen, 1996; Faraj & Sproull, 2000).

As the user base becomes increasingly tech savvy, the IT competence available for delivering successful enterprise systems becomes more distributed throughout the organization. It is through the coordination and integration of this distributed knowledge that IT competences are revealed in an organization (Peppard, 2007). When IT-competent team members residing in both the IT and the user departments integrate their IT competences, the implementation team establishes IT competence which is more comprehensive than the competence of the segregated groups (Mitchell, 2006). This emergent competence garners shared understanding and expectations of the situation, while maintaining availability of relatively diverse functional skill-sets and knowledge resources within the group (Salomon, 1993; Hutchins & Klausen, 1996), which drive the group's ability to coordinate activities and maintain cohesiveness throughout the implementation. Following the theory and research discussed above, we use the term joint IT competence to refer to this emergent IT competence, and formally define it as *the IT competence of an enterprise-level IS implementation team that emerges when stakeholders from the user base and the IS department integrate their individually held IT competences, which enables the team to carry out the planning, implementation, and evaluation of the system.*

Partnership-led implementation

User involvement in enterprise-level IS implementation projects can take a number of structural forms. Lawrence & Low (1993) point out that various degrees of user involvement 'are distinguished largely by the degree of influence and control vested in the user' (p. 195). This idea has been referred to elsewhere in the literature as the degree of user involvement (Ives & Olson, 1984) and as the intensity of user involvement (Mitchell, 2006). While user involvement and project-level partnership are related, they remain conceptually distinct terms. The literature suggests that a primary distinguishing characteristic of project-level partnership is the presence of *equally shared* decision-making power and responsibility between IS and user stakeholders on the team (e.g., Kirsch, 1997; Wheeler *et al*., 2002). Henderson (1990) defines partnership in action as 'the ability of the partners to influence policies and decisions that affect the operational performance of the partnership' (p. 8). In addition, Lasher *et al*. (1991) define partnership as 'a cooperative relationship, in which parties are equally responsible for the business success or failure of the project or product' (p. 551). Finally, Kirsch & Beath (1996), as well as Jiang *et al*. (2006), suggest that partnership must be developed by transforming relationships between IS and user departments in a way that both parties are compliant with the partnership form of governance. If either party chooses not to recognize the partnership, token partnership can emerge which can result in ineffective coordination (Kirsch & Beath, 1996). Following these past conceptualizations, we define partnership as *a form of implementation team governance in which the user and IS department stakeholders involved in the project share equal levels of decision-making power and responsibility over the implementation*.

Conceptual model

The objective of this study is to examine joint IT competence and its impact on partnership and user satisfaction with the implementation. Guided by theory and past research, the conceptual model (Figure 1) positions joint IT competence as a direct determinant of user satisfaction. It also positions implementation-level partnership between IS and the user base as an important antecedent of user satisfaction. The following subsections describe the research model and develop the hypotheses in more detail.

Joint IT competence and user satisfaction

Past studies identify project team competence as one of the most important critical success factors of enterprise-level IS implementations (Somers & Nelson, 2001), and suggest that when the individually held IT competences of diverse project team members are integrated, the implementation team is much more capable of carrying out implementation tasks (Newell *et al*., 2004; Mitchell, 2006; Peppard, 2007). Joint IT competence fosters more efficient and effective communication by leveraging shared meaning and understanding of the situation (Akkermans & van Helden, 2002). Shared understanding and clear communication between the groups

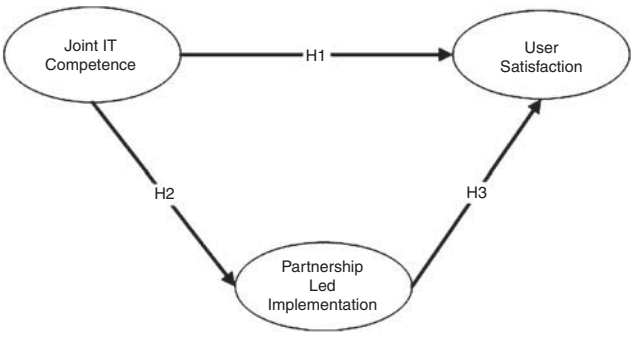

Figure 1 Conceptual model.

can lead to richer understanding across the groups about the requirements of the system from both technical and functional perspectives. Furthermore, shared perspective can garner more accurate perceptions in the user base concerning the features and limitations of the implemented system, creating more aligned expectations and increased satisfaction with the system implementation.

Distributed cognition theory and the literature on high-performance teams further suggest that when team members integrate their knowledge structures, especially in the domains of the tasks and technology involved in the project, they are able to more efficiently and effectively coordinate their actions in a group setting (Hutchins & Klausen, 1996; Mathieu *et al*., 2000, 2004). Enhanced coordination between the IS and user departments can lead to new insights and solutions to problems, as well as identification of opportunities that might not be considered otherwise (Hutchins & Klausen, 1996; Mitchell, 2006). Novel perspectives and solutions to problems increase the likelihood that the implemented system will fit into the business and that users will be satisfied with the outcome. Findings from industry provide anecdotal evidence of the relationship between joint IT competence and project outcomes. For example, a case study on Continental Airlines' implementation of a large-scale data warehouse project revealed that having highly IT-competent individuals from both the IS department and the user base involved in the implementation played a strong role in the success of the implementation (Anderson-Lehman *et al*., 2004). These research findings and evidence from industry imply that the joint IT competence of the implementation team is a key determinant of enterprise-level implementation success. As a result, we hypothesize

H1: *The joint IT competence of the enterprise-level IS implementation team will positively impact users' satisfaction with the system implementation.*

Joint IT competence and partnership-led implementations

There are a number of reasons to expect the degree of joint IT competence found in the implementation team to influence the degree of partnership established between IS and users. For one, distributed cognition theory suggests that joint IT competence is rooted in the establishment of knowledge-based partnerships between users and IS, generating team-level competence that cannot be monopolized by either group. In a discussion of the mechanisms involved in establishing group-level competence, Salomon (1993) points out that 'the product of the intellectual partnership that results from the distribution of cognitions across individuals or between individuals and cultural artefacts is a joint one; it cannot be attributed solely to one or another partner' (p. 121). The informal partnership that results from joint IT competence should encourage equally shared decision-making and responsibility over the implementation. Because neither group 'owns' joint IT competence and instead relies on the information partnership, it is reasonable to expect that decision-making and responsibility will be similarly distributed throughout the team. The shared domain knowledge of highly joint IT-competent teams can foster mutual appreciation for the various aspects of IT that affect the reciprocal performance of the different groups (Nelson & Cooprider, 1996), create shared perspective of the situation, and permit group members to coordinate one another's actions (Hutchins & Klausen, 1996). Shared knowledge and shared perspective between the groups can also foster trust, which can lead to appointing equal decision-making power to the groups. For these reasons, we expect that joint IT competence will play an important determining role in the degree of partnership established between IS and the user base; as a result we hypothesize

H2: *A project team's joint IT competence will positively influence the degree of partnership established between the user base and the IS department throughout the implementation.*

Partnership-led implementation and user satisfaction

Like project team competence, partnership between the IS group and the business is also a well-recognized critical success factor of systems implementations (Henderson, 1990; Lasher *et al*., 1991; Ross *et al*., 1996). Horizontal coordination schemes such as partnership facilitate a high degree of open communication between the IS department and the user base, helping to ensure that both the technical and business aspects of the project receive appropriate attention. Partnership can also create a sense of shared accountability and dual ownership of the project (Ranganathan *et al*., 2004), which can substantially increase users' support for the system (Jiang *et al*., 2006). Finally, partnership helps leverage the growing capability of the user base to make important decisions regarding the implemented system, which have traditionally been made by the IS department (Peppard, 2007). Allowing the ultimate users of the system to make these decisions increases the likelihood that the delivered system will meet their requirements and be received

positively. An example of these benefits can be found in the case of the Gemini project – a large-scale IS project implemented at the University of Illinois Medical Centre (Ranganathan *et al*., 2004). According to those involved in the project, success was largely due to the IS–user partnership, which established a sense of co-ownership and 'joint leadership' (p. 158) of the project. Overall, this evidence leads us to expect partnership to play a positive role in users' satisfaction with the enterprise system; thus, we hypothesize

H3: *IS–user partnership will positively impact user satisfaction with the implemented system.*

Research methodology

Scale development

The items for the joint IT competence construct were derived from a series of interviews conducted by the researchers with 22 IS professionals at senior executive and project levels (approximately evenly divided) residing in the Southeast region of the United States. These individuals were employed in such industries as higher education, health insurance, state government, distribution, and manufacturing. Detailed face-to-face interviews were first conducted. Where follow-up interviews were required, telephone-based interviews were conducted. After completing initial field interviews, the content of the discussions was analyzed to identify overarching themes to serve as measurement items for the construct. In all, a total of four distinct items were identified as encompassing IT competence in this context. As discussed earlier, competence comprises expertise as well as the ability to apply that expertise to a given situation. The expertise component of IT competence includes both explicit and tacit knowledge regarding the technology (Bassellier *et al*., 2001). The interview process indicated that expert knowledge and special information regarding the application of the technology are two key distinct aspects of IT knowledge relevant to enterprise-level implementations. Furthermore, the interviews suggested that the application of technical expertise to an enterprise system implementation can take the form of planning and implementing the technology, as well as assessing and evaluating the technology in the business. To maintain a highly generalizable measure across organizations and implementation methodologies, we measured IT competence along these distinct attributes. A similar approach, utilizing pre-survey field interviews, was used to develop the measurement items for the partnership and user satisfaction constructs as well.

In line with past project-level IS research (i.e., Subramani *et al*., 1999), two versions of the survey instrument were developed – one for the IS department and another for the user base. The two versions of the questionnaire differed in that phrases were substituted as appropriate based on the target respondents – users *vs* the IS department. All constructs were measured in both instruments except for user satisfaction, which was assessed only by the user base. Details of the measurement items used in the survey are presented in Appendix B.

Enterprise-level IS projects are generally IS initiatives that connect various distinct business processes across an enterprise, and are a means of integration and data sharing between various new and legacy systems (Mitchell, 2006). Enterprise-level multiuser database management systems (MDBMS) often serve as the backbone for several critical upper-tier systems, and the success of these upper-tier systems relies heavily upon the success of the underlying MDBMS. Few other systems play such a foundational role in the corporate IS infrastructure. Given the relative importance of these systems, we expected the implementation of these systems to involve more intense participation from users, and the presence of these systems in the organizations sampled to be highly probable. As a result, we applied the survey to MDBMS implementations.

Survey procedure

A set of the two versions of the questionnaire was delivered to the CEO or another senior manager of 1799 companies randomly selected from the 'Compact Disclosure' database, which contains information on U.S. service and manufacturing organizations with 500 to 10,000 employees. These initial contact persons were then asked to identify the most involved and knowledgeable persons from the IS and user sides of the enterprise-level implementation effort. Included in this request was the requirement that both IS and user respondents were involved with the project from its inception through implementation. Past research in IS and strategy suggests that the senior managers of a company are in the best position, given their vantage point, to identify the most knowledgeable and involved respondents (Hambrick & Mason, 1984; Marchand *et al*., 2001). As a result, it was expected that the respondents to the survey were the best informed about the unit's capabilities to implement and use the system, and could provide a deeper perspective from the users' standpoint. Furthermore, considering the respondents' involvement with the enterprise-level project from beginning through completion, it was expected that the identified individuals would hold global perspectives of the implementation effort.

The senior manager distributed the questionnaires and subsequently solicited the completed questionnaires. After 3 months of telephone and mail follow-up efforts, completed questionnaires from 91 companies were received. The responses from 12 companies were dropped because only the IS or user department participated. Thus, the overall effective response rate is 4.4%. This response rate reflects the substantial difficulty in soliciting responses from multiple managers from the same company and is in line with previously published research based on matched-pair surveys involving senior managers (Enns *et al*., 2003). For example, Ko *et al*. (2005) were able to obtain matched pair data on 96 projects in

their study, and Enns *et al*. (2003) obtained 75 matched pair responses from the 1087 surveys mailed out, for an effective response rate of 6.9%. Testing for response bias (Armstrong & Overton, 1977) was conducted, and revealed no statistically significant differences in the firms ($\chi^2 = 28.636$, $P = 0.279$). For 31 companies, multiple respondents from different functional departments within the company participated. In these cases, data from these multiple respondents were averaged to calculate a set of single user-side responses.

Data analysis

The distributed perspective suggests that group-level competence consists not only of the individual contributions of team members but also of the synergistic properties generated from the interaction itself. Past studies incorporating the distributed approach to examine the effects of integrating resources suggest that a multiplicative approach is the most appropriate for calculating these interactive outcomes (e.g., Smylie *et al*., 2002; Bach & Stark, 2004; Spillane *et al*., 2004). Following this perspective, we transformed the data items to more effectively tap into the construct of interest by multiplying the responses to the matched questions across the IS and user departments. Specifically, each measure of joint IT competence was calculated as

$$JITC_i = (IS\_Dept\_IT\_Competence_i) \times (User\_Dept\_IT\_Competence_i).$$

In order to measure the degree of partnership in the enterprise-level IS implementation team we transformed the responses to anchor on the midrange value, which explicitly describes the relationship between IS and users as partnership-based. Any response that departs from the midpoint (in the extreme cases – answers 1 and 7) indicates an imbalance in leadership responsibilities between the groups, favoring either the IS department or the user group. This transformation was accomplished by calculating the absolute distance of the response from the middle and subtracting it from 4. Specifically, partnership was measured using the following transformation formula:

$$Partnership\text{-}Led_i = 4 - |4 - Response_i|.$$

Measurement model assessment

In accordance with the recommended decision rules (Appendix A) provided by Jarvis *et al*. (2003), all latent constructs in the model were conceptualized as formative constructs (Petter *et al*., 2007). With each construct, all associated measurement items are conceptually distinct from one another, and make up the constructs (Bollen & Lennox, 1991). Close examination of the survey instruments suggests that each measurement item taps into a separate aspect of its respective construct, and only when taking all measurement items together are the constructs adequately represented. Analysis was conducted using the partial least squares (PLS) estimation technique (Chin, 1998; Gefen *et al*., 2000) as applied in the software package SmartPLS version 2.0.M3 (Ringle *et al*., 2005). In addition to being an appropriate technique for assessing models including formative constructs, PLS offers the benefit of lower sample size requirements (Chin *et al*., 2003) and has been used extensively in IS research (Venkatesh & Morris, 2000). It has been suggested that the PLS algorithm used to analyze the data in the present study requires at least 10 times as many data points as the maximum number of indicators or latent constructs leading to a given latent construct (Gefen *et al*., 2000). The data set used to empirically test the conceptual model of the present study meets this requirement.

Descriptive statistics for each of the key constructs employed in the model are provided in Table 1. Because the scales differ across constructs, standardized values were utilized throughout the remaining analyses.

Reliability of the constructs was assessed by examining the variance inflation factor (VIF) for each of the measurement items of the joint IT competence and partnership-led implementation constructs (Petter *et al*., 2007). VIFs were calculated using SPSS v. 16 for Windows by regressing the items for user satisfaction on the remaining items in the model. Petter *et al*. (2007), as well as Diamantopoulos & Siguaw (2006), recommend a general cut-off value of 3.3 for identifying suspect items, with values above 10 indicating that multicollinearity is a serious problem. The results indicated all VIF scores were below the suggested cut-off point except for the item measuring the presence of special information in the implementation team, as can be seen in Table 2. While above the more conservative cut-off value of 3.3, the values associated with this item are well below the cut-off value of 10, indicating that no serious multicollinearity problems exist with the item.

Further assessment of the formative measures was conducted using item weights as opposed to item loadings, as the latter are typically used in assessing reflective measures (Chin, 1998; Petter *et al*., 2007). The results of the model were evaluated based on t-values from a bootstrapping procedure with 500 iterations (Chin, 1998; Yi & Davis, 2003). The item weights and their significance levels are provided in Table 3.

All item weights were statistically significant for the user satisfaction and partnership-led implementation measures, and all but one of the item weights for the joint IT competence measure were significant. Examination of the insignificant measurement item did not reveal any clear wording problems. When developing formative measures, it is most important for the researcher to stress the theoretical relationship between the measurement item and the construct for determining the need for the item in the scale (Bollen & Lennox, 1991; Jarvis *et al*., 2003; Petter *et al*., 2007). Specifically, the researcher must determine whether removing a measure that captures a distinct aspect of the construct, as a means of improving

Table 1 Descriptive statistics

Variable	*Mean*	SD
Joint IT competence	25.800	11.235
Partnership-led implementation	2.280	1.013
User satisfaction	4.600	1.566

Table 2 Variance inflation factors

	User satisfaction		
	Involvement	*Operation*	*Support*
Partnership – users	1.17	1.16	1.17
Partnership – IS	1.07	1.07	1.07
JITC – knowledge	2.96	3.09	2.96
JITC – special information	4.30	4.54	4.30
JITC – planning	2.60	2.64	2.60
JITC – assessment	2.65	2.66	2.65

Table 3 Measurement items and weights

Variable	*Weight*	*Variable*	*Weight*
Joint IT competence		*Partnership-led implementation*	
Knowledge	0.755**	Partnership – users	0.971**
Special information	0.095	Partnership – IS	0.269*
Planning	0.407*		
Assessment	0.852**	*User satisfaction*	
		Involvement	0.792*
		Operation	0.481**
		Support	0.376**

Notes: *$P<0.01$; **$P<0.001$.

construct validity, negatively impacts content validity (Jarvis *et al*., 2003; Petter *et al*., 2007). As discussed earlier, the knowledge-based components of competence include explicit knowledge about the technology as well as more tacit knowledge regarding application of the technology to the business (Bassellier *et al*., 2001). Thus, expert knowledge about the technology by itself does not fully capture the knowledge component of joint IT competence. Joint IT competence also consists of any special information about how to apply the technology to the business. Consequently, the measure of individuals' capability to provide special information about a technology is a necessary component of joint IT competence, and it was deemed appropriate to leave the measurement item in the model. Table 4 presents correlations between each of the latent constructs.

When data for the independent and dependent variables are collected from the same informants, common method bias may lead to inflated estimates of the relationships between the variables (Podsakoff & Organ, 1986; Green *et al*., 2005). Harman's one-factor test (Harman, 1976; Podsakoff & Organ, 1986) is a commonly prescribed approach for assessing *post hoc* the possible presence of common method bias in IS research (Woszczynski & Whitman, 2003). Following the procedure discussed by Podsakoff & Organ (1986), Harman's one-factor test was conducted on the complete model using the comprehensive data set as well as a data subset comprising only the users' responses. In both cases, the results of Harman's one-factor test indicated that problems associated with common method bias are not significant in this study (Podsakoff & Organ, 1986).

The structural model was assessed based on the significance of the path coefficients between the constructs and R^2 values obtained for the dependent variables. As Figure 2 illustrates, joint IT competence contributes to user satisfaction with the system implementation both directly and indirectly through partnership-led implementation. Specifically, joint IT competence (path coefficient = 0.464) and partnership-led implementation (path coefficient = 0.177) explained 31% of the variance in user satisfaction with the system implementation. In addition, joint IT competence (path coefficient = 0.399) explained 16% of the variance in the degree of partnership established between users and IT during the implementation. In sum, all paths are significant and in the hypothesized directions, providing support for all three hypotheses.

Discussion and implications

Past research frequently identifies the IT competence of the IS department as a key component of the successful delivery and exploitation of IT in the business. However, over time the user base has grown technically competent through constant exposure to IT and frequent participation in IS implementation efforts. These IT savvy users are now demanding a stronger technical role in leadership of these initiatives. This current study examines IT competence at the joint IS–user implementation team level, as well as its impact on the partnership between users and IS department stakeholders and user satisfaction with the implementation.

The findings from this research have important implications for management. First and foremost, the results support the prescription that managers view the IT competence of knowledge workers across functional areas as having strategic potential, and take stock of the various pockets of IT competence residing across the business

Table 4 Inter-construct correlations

	Join IT competence	*Partnership*	*User satisfaction*
Joint IT competence	1		
Partnership-led implementation	0.398598	1	
User satisfaction	0.533953	0.361388	1

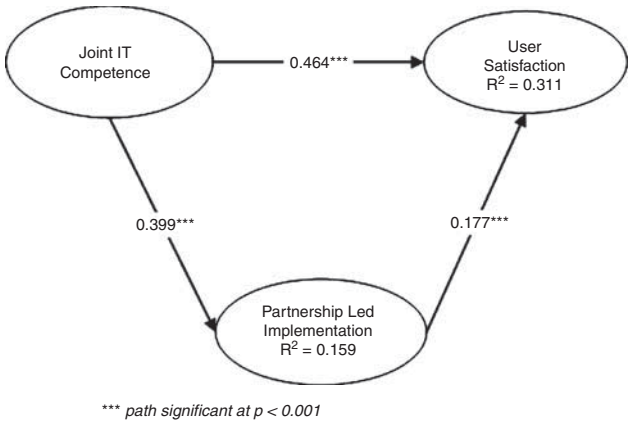

Figure 2 Structural model results.

(Grant, 1996; Peppard, 2007). Enterprise-level IS implementations are extraordinarily complex undertakings that require a knowledge-based, organizational perspective of the factors involved in the success of these IT investments (Peppard *et al*., 2000). While the diverse functional competences that business professionals bring to the implementation team should not be overlooked, a key challenge for the organization is to integrate and coordinate the organization's individually held knowledge and skills (Peppard, 2007). The current study suggests that the presence of a shared and integrated IT competence bonds the implementation team together by merging diverse perspectives from both sides of the IS–user divide, leading to successful delivery of IT investments (Salomon, 1993; Hutchins & Klausen, 1996). Thus, managers should take a portfolio approach to understanding how the organization's IT competence resources are distributed across the enterprise, identifying key areas of competence within the business units. This approach can help organizational leaders effectively identify promising candidates for complex enterprise-level IS implementations such as the ones studied here. Furthermore, managers should be cognizant of the challenge of integrating the diverse perspectives of team members involved in enterprise-level implementations. Rather than focusing entirely on the functional business competences of the user base, they must recognize the value of IT-competent users in communicating across functional lines and coordinating implementation activities.

Subsequent to identifying areas in the business rich with IT competence, managers should proactively move to reinforce weak areas of IT competence in the user base. Training and encouraging hands-on experience with IT are a first step in developing and strengthening IT competence in areas lacking this valuable resource (Bassellier *et al*., 2003). A more immediate approach to developing additional IT competence in the business is to view it as a necessary skill-set in the hiring process. While the typical hiring process in business areas focuses almost entirely on functional competence related to the primary duties, this study highlights the value of evaluating a candidate's IT knowledge and experience when making hiring decisions. The business will likely find that, by taking a more holistic needs-assessment of a position in the company, employee selection criteria are not entirely meeting the needs of the business.

The results of this study also have implications for governance structures in IS implementation teams. This study found that when IT-competent individuals from the IS department and the user base are involved in enterprise-level IS implementations, equally shared decision-making power and responsibility serve as an effective governance structure for ensuring user satisfaction with the system implementation, in line with past research (Kirsch, 1997; Jiang *et al*., 2006). A core challenge cited in the literature for managers is convincing the business that IT projects really are about business change and securing the necessary buy-in and involvement for implementations (Peppard, 2007). Appointing equal decision-making power and responsibility over the implementation is a powerful way of convincing the business that the implementation is about business change and garnering the buy-in necessary for success. When a high degree of joint IT competence is present, managers should not limit the roles of business professionals to mere 'sideline' consultants with little control. Instead, leadership should recognize that partnership can positively impact user satisfaction with the system implementation, which can ultimately lead to higher payoff from the IT investment.

Leveraging this increasingly important IT competence and leadership capability in the user base can be viewed as a challenge faced by the IS department staff. The technical skills once viewed as sufficient for the IS department now require augmentation with strong project leadership skills which include team building and developing a strong communication platform that can increase the cohesiveness of functionally diverse business partners. Training and hiring processes can work toward sensitizing the IS group to consider and accept technical ideas and approaches generated by the user base. Building the bridge between the IS department and the business is an organizational issue that requires efforts on the part of both parties (Peppard, 2007). As business professionals become increasingly tech savvy and capable of assuming leadership roles in implementation projects, the IS department's capability to leverage that IT competence can have an impact on the business value delivered through IT.

Limitations and future research

Like most empirical research, there are some limitations of this study that should be pointed out. First, the timing of the survey required that respondents answer based on some degree of recall of the project. We attempted to control for this limitation by asking senior managers to identify the most appropriate individuals (IS department and user departments) who were involved in the project,

from its beginning to completion, and assign those individuals as the respondents. Past research in IS and management suggests that the senior executives of a company are in the best position, given their vantage point, to identify the most knowledgeable and involved respondents (Hambrick & Mason, 1984; Marchand *et al*., 2001). While user department respondents were selected as the best informed member of their unit concerning the IS implementation, and would seemingly be the best informed about the unit's competencies and satisfaction with the implementation, it is possible that some user respondents may not completely capture all possible user respondents' perspectives. However, given the difficulty in identifying user respondents in a matched-pair study, we believe this is an effective approach to capturing users' perspectives in this context. A future study might take a longitudinal approach to examining the relationship between joint IT competence and user satisfaction, measuring joint IT competence during implementation and assessing user satisfaction at a later point in time. Future research might also use a more explicit measure of IT competence residing within the IS and user departments. Another limitation of the current study is that the findings of this study are limited to the U.S. sample frame provided by the COMPACT Disclosure database. Subsequent studies need to test the validity of these results in European and Asian firms where the degree of IT-related competence and/or desire to lead IS implementation efforts may differ. In countries characterized by high collectivism and low power distance, projects led by a true partnership might yield higher levels of user satisfaction than those in countries with different value systems. Furthermore, it would be worth exploring whether cultural aspects impact the fundamental understanding of partnership. For example, the same governance structure may be perceived as a purer form of partnership in a high power distance culture, but perceived as a lesser form of partnership in a low power distance environment. It should also be noted that this study examined only one type of enterprise system. While the MDBMS is a commonly employed enterprise system that requires a great deal of resources to implement, the focus on a single system limits the generalizability of the findings. Nonetheless, future studies might examine the relationship between joint IT competence and project success across multiple enterprise systems to uncover any system-related characteristics that affect the relationships found in this study. Finally, while the measurement of partnership incorporates responses from both user and IS departments, the construct is captured using a single-item scale. Future research may use a multidimensional approach to capturing partnership.

Conclusion

The current study extends the research on enterprise-level IS implementation and partnership by addressing the changing landscape of distributed IT competence across the organization. This study introduces a theoretically grounded construct, labelled joint IT competence, which captures the emergent IT competence of the implementation team that results when user and IS–department stakeholders integrate their individually held IT competences. Guided by theory and past research, higher levels of joint IT competence are hypothesized to lead to increased user satisfaction with the system implementation, as well as to more equally shared decision-making power between users and IS during the implementation. Empirical testing of the hypotheses confirms the relationships between joint IT competence, partnership, and user satisfaction with the system implementation. The results hold important implications for managers and academics interested in improving IS implementation success and understanding the impact of an increasingly technically competent user base. Overall, given the key new insights in this study concerning joint IT competence, the doors are open for a fruitful research stream that builds on this study and begins to carve the way for a new era in competence assessment and governance of enterprise-level IS implementation teams.

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Appendix A

See Table A1

Table A1 Construct characteristics

	Partnership-led implementation	*Joint IT competence*	*User satisfaction*
(1) Direction of causality from construct to measure implied by the conceptual definition			
Are the indicators (items) (a) defining characteristics or (b) manifestations of the construct?	Item → Construct (Formative) Characteristics (formative)	Item → Construct (Formative) Characteristics (formative)	Item → Construct (Formative) Characteristics (formative)
Would changes in the indicators/items cause changes in the construct or not?	Yes (formative)	Yes (formative)	Yes (formative)
Would changes in the construct cause changes in the indicators?	Not necessarily (formative)	Not necessarily (formative)	Not necessarily (formative)
(2) Interchangeability of the indicators/items			
Should the indicators have the same or similar content?	N/A	No (formative)	No (formative)
Do the indicators share a common theme?		No (formative)	No (formative)
Would dropping one of the indicators alter the conceptual domain of the construct?		Yes (formative)	Yes (formative)
(3) Covariation among the indicators			
Should a change in one of the indicators be associated with changes in the other indicators?	No (formative)	No (formative)	No (formative)

Table A1 Continued

	Partnership-led implementation	*Joint IT competence*	*User satisfaction*
(4) Nomological net of the construct indicators Are the indicators/items expected to have the same antecedents and consequences?	No (formative)	Yes (reflective)	No (formative)
Overall conclusion:	Formative	Formative	Formative

Appendix B

Measurement items

Joint IT competence (measured using both the IS department and the user base)

1	*2*	*3*	*4*	*5*	*6*	*7*
Strongly disagree	*Disagree*	*Slightly disagree*	*Neutral*	*Slightly agree*	*Agree*	*Strongly agree*

At the time the technology was implemented, we believed that

1. Our unit had individual(s) with 'expert' knowledge of the technology.
2. Our unit had individual(s) who were in a formal/informal position to provide special information, regarding either the following technology itself, or regarding applications of the technology.
3. Our unit had individual(s) who could plan and implement the technology.
4. Our unit had individual(s) who could carry out various parts of the assessment and evaluation procedure of the technology.

Partnership-led implementation (measured using both the IS department and the user base) *Using the scale below, please circle the number that best describes your view at the time the technology was implemented. Please select only one option. The seven possible responses are presented below*:
At the time the technology was implemented, we believed that

1. IS department completely controlled the implementation of the technology.
2. IS department led the major decision-making; and user department(s)'s opinions were minimally accepted by the IS department.
3. IS department led the major decision-making, but user department(s)'s opinions were strongly reflected in the decisions made.
4. IS department and user department(s) had equal decision-making power; both parties equally shared the responsibilities and duties of the implementation.
5. User department(s) led the major decision-making, but the IS department's opinions were strongly reflected in the decisions made.
6. User department(s) led the major decision-making, but they occasionally requested minimal technical expertise or advice from the IS department.
7. User department(s) completely controlled the implementation of the technology.

User satisfaction (measured using only the user base)

1	*2*	*3*	*4*	*5*	*6*	*7*
Strongly disagree	*Disagree*	*Slightly disagree*	*Neutral*	*Slightly agree*	*Agree*	*Strongly agree*

Now that the following technology is implemented and in use, we believe that

1. Our unit is satisfied with the operation and uses the technology.
2. Our unit is satisfied with our involvement and participation in the operation and ongoing development of the technology.
3. Our unit is satisfied with the support and services for the technology.