MIS Quarterly

TWO-STAGE OFFSHORING: AN INVESTIGATION OF THE IRISH BRIDGE[1]

By: **Helena Holmström Olsson**[†]
Department of Applied Information Technology
IT University of Gothenburg
Gothenburg
SWEDEN
helena.holmstrom.olsson@ituniv.se

Eoin Ó Conchúir
Lero – The Irish Software Engineering
   Research Centre
University of Limerick
Limerick
IRELAND
eoin.oconchuir@lero.ie

Pär J. Ågerfalk[†]
Department of Information Science
Computer and Systems Science
Uppsala University
Uppsala
SWEDEN
par.agerfalk@dis.uu.se

Brian Fitzgerald
Lero – The Irish Software Engineering
   Research Centre
University of Limerick
Limerick
IRELAND
brian.fitzgerald@ul.ie

Abstract

This paper investigates two-stage offshoring as experienced by the Irish sites of two large global companies, headquartered in the United States, with significant software development operations. As part of these companies, the Irish sites act as a bridge in their offshoring arrangements: While the U.S. sites offshore work to Ireland, the Irish sites offshore work further to India and, hence, have experience of being both customer and vendor in two-stage offshore sourcing relationships. Using a framework derived from relational exchange theory (RET), we conducted multiple case study research to investigate and develop an initial theoretical model of the implementation of this two-stage offshoring bridge model. Our study shows that while both companies act as bridges in two-stage offshoring arrangements, their approaches differ in relation to (1) team integration, (2) organizational level implementation, and (3) site hierarchy. Although, there are opportunities afforded by the bridge model at present, the extent to which these opportunities will be viable into the future is open to question. As revealed in our study, temporal location seems to favor a bridge location such as Ireland, certainly with United States–Asian partners. However, location alone will not be enough to maintain position in future two-stage offshoring arrangements. Furthermore, our research supports the view that offshoring tends to progress through a staged sequence of progressively lower cost destinations. Such a development suggests that two-stage offshoring, as described in this paper, will eventually become what we would term multistage offshoring.

Keywords: Offshore sourcing, offshoring, customer–vendor relationship, relational exchange

Introduction ▮▮▮▮▮▮

In recent years increasing attention has been paid to the offshoring of information systems functions in organizations. As recognized by Carmel and Tjia (2005), offshoring can be understood as the shifting of tasks to any country outside the home country. More recently, however, the word offshoring has taken on a somewhat new meaning. It is understood as the shifting of tasks to low-cost nations often referred to as *developing nations* or *emerging nations*. In relation to software, there are several tasks, such as programming, software testing, and software maintenance, that are sent offshore. While manufacturing industries have been offshoring to lower-cost destinations for 30 years or more, it wasn't until the mid-1990s that a significant portion of software development work was being sent offshore. Potential cost savings, reduced cycle time arising from "follow-the-sun" software development, and access to a larger labor pool have helped fuel the amount of work being offshored from high-cost locations such as the United States, United Kingdom, and Scandinavia to lower cost economies such as India, China, Russia, and Malaysia.

However, the growth of IS offshoring is not limited to volume alone. The scope and nature of IS offshoring is expanding from a focus on cost and efficiency to encompass offshoring as a means of improving the organization's overall business performance (Feeny and Willcocks, 1998). This change has led to a realization that the *customer-vendor relationship* plays a critical role in the success or failure of an offshoring arrangement. Unfortunately, there are indications that the road to a harmonious relationship is not without peril. For example, approximately 25 percent of all service providers did not have their sourcing contracts renewed when renegotiating, and the average customer now spends around 15 percent of its IT budget on legal fees related to litigation of the contract (Goles and Chin 2005). Although there is a dawning recognition of the importance of the customer–vendor relationship, to date there has been a relative lack of empirical research on the topic. While many researchers mention the importance of the customer–vendor relationship, few make this the main focus of their work. This affords an important opportunity for research comparing and contrasting customer and vendor perspectives in interorganizational exchange relationships such as offshoring arrangements.

In this paper, we explore the dual role experienced by the Irish sites of two large U.S.-headquartered global companies with significant software development operations. As part of these companies, the Irish sites act as a "bridge" in their offshoring arrangements. While the U.S. sites offshore work to Ireland, the Irish sites offshore work further to India or Malaysia—hence forming a two-stage offshoring relationship.

In this arrangement, the Irish sites have experience of being both customer and vendor. To explore this dual role, we use the conceptual framework presented by Goles and Chin (2005). Based on relational exchange theory (RET) and with a focus on interactions, interdependencies, and reciprocities between parties, this framework identifies attributes and processes that comprise an interorganizational relationship.

Given that there has been little research on the customer–vendor relationship in offshoring, and none specifically on the bridge model where stakeholders play a dual customer–vendor role, we sought in this study to theorize how this bridge model could operate. We do so in order to conceptualize the phenomenon and to serve as a guide for data-gathering (see Forrester 1961; Wheeler 2002). Specifically, we utilize the building-blocks of theory development proposed by Dubin (1969) and Whetten (1989) to delineate constructs as well as the relationships between these constructs in the form of theoretical propositions. In building a theory, the steps following the specification of propositions are (1) determining empirical indicators and (2) producing hypotheses for empirical testing (see Wheeler 2002). In this research, we develop a theoretical model, including propositions that represent conceptual relationships between constructs, and draw on case studies to determine relevant empirical indicators for the constructs. Subsequent research could validate this model and produce measurable hypotheses for empirical testing, but building the initial model is a necessary first step.

Our research objective is thus: *To investigate and develop a theoretical model of the dual bridge role in a two-stage offshoring relationship.*

In what follows, we summarize pertinent literature and outline the theoretical framework and research method used in this study. We then present findings from an empirical study at two large software development companies involved in two-stage offshoring. We discuss our findings and present a theoretical model describing two different approaches to the dual bridge role experienced when acting both as customer and vendor in two-stage offshoring arrangements as experienced by these companies. We conclude the paper by discussing implications of our findings and future research directions.

Theoretical Background ▮▮▮▮▮▮

Offshoring Versus Outsourcing

An offshore location can be any other location outside the home country (Carmel and Tjia 2005). More recently, how-

ever, the word *offshoring* has taken on a new meaning. From being used to describe tax havens such as the Cayman Islands just off coast of the United States, it is nowadays understood as the shifting of tasks to low-cost destinations (Carmel and Tjia 2005). Low-cost destinations would typically be those falling into the economic grouping of *developing* or *emerging* nations, such as India, China, and Russia (known as the 'big three"), and Brazil, Romania, and Israel.

Outsourcing, on the other hand, has two implications. First, it means that tasks and processes are contracted to be performed outside the boundaries of the firm. Second, it is understood as an entire process being delegated to an outsider. Global IS outsourcing is often described as the contracting of IT services to vendors external to an organization where the market for both clients and vendors can be located anywhere in the world (Lacity and Willcocks, 2001). However, many firms nowadays have globalized via acquisitions (i.e., by acquiring smaller software firms and then integrating them into their global operations). Others have globalized by setting up subsidiaries or software centers. When such an offshore center is owned by the client company it is called a *captive center* (Carmel and Tjia 2005). Thus, these arrangements would not be considered outsourcing (as defined above) since they are performed inside the company rather than performed by a third party. According to Carmel and Tjia (2005), a better word would be *sourcing*—where sourcing could be from outside the firm (i.e., outsourcing) or inside the firm, in, for example, captive centers.

While the terms *outsourcing* and *offshoring* are often used almost as synonyms[2] we choose to distinguish between the two. Here, offshoring is about location: when an activity is offshored, it is performed in a different location to the main operation (which is then the onshore location). Outsourcing, on the other hand, is about governance: when an activity is outsourced, it is performed by another organization—a third party—as opposed to in-house by the organization itself. Consequently, any particular activity can be performed either offshore or onshore and can be performed in-house or be outsourced. Table 1 shows the distinction and relationship between the concepts. For the purpose of this study we use the concept *offshore sourcing* as suggested by Carmel and Tjia and position our study primarily in the "in-house offshoring" quadrant of Table 1. In particular, our study focuses on what we term *two-stage offshoring*, whereby a company offshores to one location, which then offshores work further, thus becoming a "bridge location"—as exemplified by the "Irish Bridge" in our study.

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[2]We would like to acknowledge Erran Carmel for initially inspiring our conceptualization of the distinction between offshoring versus outsourcing.

Offshore Sourcing

In reviewing the research on offshore sourcing, Levina and Ross (2003), suggest that the primary reason behind offshore sourcing is the need to reduce and control IT operating costs. This is supported by Goles and Chin (2005), who recognize that offshore sourcing practices began with a heavy emphasis on cost drivers. Over time, however, the emphasis in research has broadened to include studies describing variations in orientation (Nam et al. 1996) and extent of sourcing (Lacity et al. 1995). Furthermore, new modes of operation such as *multisourcing* (Lacity and Willcocks 2001), *near-shoring* (Lapper and Tricks 1999), and *best-shoring* (Fruitman 2003) are gaining prominence in response to changes in the type of work being sourced—and to political and market pressures (Thiagarajan 2000). However, research that explains client and vendor expectations and constraints, relationship aspects, and the outsourcing configuration itself is still rare (Jahner and Krcmar 2007).

From a theoretical point of view, research on offshore sourcing can be categorized into three different groups (Goles and Chin 2005). First, there is the group employing an *economic perspective*—primarily transaction cost economics or agency theory—to frame the question of whether or not to send tasks offshore. Second, there is the group exploring offshore sourcing using a *strategic management perspective* based on either the resource-based view of the firm or resource-dependency theory. Third, there is the group taking a *social perspective* on offshore sourcing. This group is differentiated from the previous two by its underlying assumption that there are shared norms and a harmony of interests between the parties that go beyond the formal contract. As recognized by Ring and Van de Ven (1994), interorganizational relationships are maintained not because they achieve stability, but because they maintain balance between formal and informal processes.

While these three perspectives are all valid starting points for studying offshore sourcing practices, in this paper we adopt the social perspective to explore the dual role experienced by two Irish software development companies (Irish branches of U.S. companies). In acting as bridges between the United States and offshore destinations in Asia, the Irish sites have experience of being both customer and vendor in offshore sourcing relationships. In studies adopting the social perspective, such as this study, the general conclusion is that formal contracts are indeed necessary but not sufficient for offshore sourcing success. Instead, the customer–vendor relationship is seen as increasingly important for the outcome of the offshore sourcing arrangement. Before investigating strategic management and economic perspectives of this bridge model,

Table 1. Offshoring Versus Outsourcing		
	In-House	**Outsourced**
Onshore	In-house (traditional model)	Subcontractor (third party) in the same locale
Offshore	Foreign branch of the same company (captive center)	Subcontractor (third party) in a foreign locale

it is arguably important first to understand the nature of this model in terms of its fundamental social relationship. Although such a task may be more difficult and research intensive, given our close access to the case study companies it was something we were in an excellent position to accomplish.

To further understand what constitutes interorganizational relationships there is the need for a theory that takes into account both the spirit of exchange and the implications of a contract. While many different theories could be useful in such an endeavor (Aubert et al. 2005; Cheon et al. 1995; Goles and Chin, 2005), relational exchange theory (RET) was deemed the most appropriate mainly because of its recognition of the importance of interactions, interdependencies, reciprocities, informally negotiated rules of exchange between parties, and focus on establishing common norms between customer and vendor (Goles and Chin 2005; Gottshalk and Solli-Sæther 2005).   Initial contacts with our case study organizations suggested that all these factors, and particularly the last, were central to the bridge model with its focus on in-house offshoring.

With its roots in marketing and law, RET holds that transactions between parties are increasingly governed by processes based on informally negotiated rules of exchange (Arndt 1979). It has been described as a rich and powerful framework capable of capturing the complex webs of interdependence that often characterize interorganizational exchange relationships (Spriggs 1996). RET suggests that exchanges between parties in a relationship are shaped by a set of expectations about behavior that are shared between exchange partners. RET also argues that contracts between parties are incomplete and cannot be expected to anticipate all possible contingencies that might arise (McNeil 1980). In an attempt to unify studies that have used RET, Goles and Chin propose a conceptual framework in which they identify constructs comprising an IS sourcing relationship. In this

framework, the nature and composition of a relationship is described in terms of *attributes* (i.e., characteristics that contribute to the functionality and harmony of a relationship) and *processes* (i.e., means by which the attributes are developed) (see Appendix A). These attributes and processes need to be present in order to establish and maintain functional and harmonious interorganizational relationships The processes and attributes are further explained and elaborated in our analysis.

In our study, the RET framework was used as the basis for exploring the constructs of an interorganizational relationship, that is, as an *a priori* framework that guided data collection and analysis (Patton 1990). In accordance with Klein and Myers (1999), we believe that interpretive research does not subscribe to the idea that a predetermined set of criteria can be applied in a mechanistic way, but that such a framework can help structure and position the research to allow it go beyond the anecdotal. As an *a priori* framework, the RET framework guided us in our attempt to understand a particular phenomenon (i.e., an offshore sourcing relationship) through the meanings that people assign to them (Boland 1985, 1991). As the organizing principle for qualitative interviews and further analysis, the framework helped us in our understanding of the nature and composition of the customer–vendor relationship in this hitherto unexplored approach to offshore sourcing.

Research Method

Research Sites

In this study, we explore the Irish sites of two large U.S.-based companies.[3] Of particular interest to this study is the

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[3]Both companies are anonymized.

fact that the Irish sites of these companies act as bridges in two-stage offshore sourcing. While U.S. sites offshore work to Ireland, the Irish sites offshore work further to Asia. Hence, the Irish sites of these companies have experience of being both customer and vendor in offshoring relationships— an experience that offers great potential for research comparing and contrasting customer and vendor perspectives on the two-stage offshoring relationship. Below, we provide some background on each research site and present the research method that was adopted in this study.

Pennysoft

The primary operation of Pennysoft, a large, privately owned U.S. company, involves the provision of financial services and investment resources. The company has been developing software at its site in Ireland since 2001, and currently employs around 100 people at this Irish site. The software products developed are supplied mainly to internal customers in the United States. Most projects involve coordinating with several teams in the United States and India. In many cases, the requirements are generated in the United States, with software development then taking place in both the United States and Ireland. Most quality assurance (QA) activities take place at the Indian site. The Indian site became involved in June 2005. The Irish site originally acted much as the offshore unit, with a high level of involvement in their work from the U.S. site. Today, the Irish site has taken more responsibility and is closely involved in managing the Indian site. In their projects, Pennysoft teams on different sites work closely while management is centralized to one "superior" site. At Pennysoft, we studied three different projects, all with project management and requirement engineering in the United States, development work and, to some extent, management in Ireland and QA work in India.

Semicon

Semicon, a NASDAQ-quoted company, is a leading manufacturer of chips and computer, networking and communications products. The Irish site in our study was acquired by Semicon in 2000 and employs 125 people, of which approximately 60 are software engineers. The software being developed "facilitates" the silicon products manufactured by the company, allowing for third-party vendors to access the functionality of the hardware.

Large projects at Semicon are comprised of several business units, including the software unit. The software program manager is based at the Irish site, and manages multiple sites within the software program, including India, Poland, China,

and Malaysia. Requirements for software projects are decided upon by the marketing business unit, and are then negotiated by the software program manager. Different software development sites then compete for the most valuable parts of the development work.

Several software development teams are located at the Irish site, each one led by a project manager. Generally, each team works on a defined portion of functionality of a software development project resulting in a project structure where teams work independently of each other with full responsibility, and where interaction between managers is more common than interaction between software developers.

All interviewees were chosen because of their experiences with the Irish site acting as an offshoring bridge.

Research Design

Given that little research to date has been conducted on the customer–vendor relationship in IS offshoring, this study was concerned with achieving an increased understanding of this phenomenon and the particular constructs that comprise such a relationship. It was, therefore, exploratory and qualitative in nature and involved the collection of rich data in real world interorganizational environments, what may be termed *revelatory cases* (Yin 1994). Such an approach is appropriate when research necessitates studying contemporary events, without the need to control variables or subject behavior (Yin 1994), as here. Relational exchange theory was used as a descriptive framework that guided data collection and analysis. With its focus on attributes and processes that comprise an interorganizational relationship, the framework presented by Goles and Chin (2005) was used as a basis for our interview protocol as well as for categorizing and analyzing empirical findings. Such an approach is recommended by Patton (1990), who argues that an interview guide is useful for focusing interviews and can also be used as a descriptive framework for analysis. The interview guide included a variety of questions concerning each of the attributes and processes described by RET. The interview guide also included questions, more general in nature, where interviewees were given the chance to explore their ideas on their offshoring experiences.

Data was gathered over a 20-month period from January 2005 to August 2006, and drew upon a number of sources (see Table 2 summarizing our research activities). These ranged from workshops and informal meetings to a two-phase series of interviews, both face-to-face and via telephone, and e-mail correspondence. The first phase of the project began in

Table 2. Summary of Research Activities		
Phase/Company	**Date**	**Research Activity**
Phase 1		
Pennysoft	January 2005	Workshop on global software development.
	March 2005	On-site meeting with company management.
	July 2005	Interviews with three project managers, technical product manager.
Semicon	July 2005	On-site meeting with company management.
	August 2005	Interviews with software engineer, software project manager, general manager, member of technical staff.
Phase 2		
Pennysoft	April 2006	Interviews with principal engineer, project leader (India-based), project manager. Telephone interviews with senior systems analyst, director of software management, senior software engineer, software developer (India-based), project manager.
Semicon	April 2006	Workshop on offshoring/outsourcing at university.
	June 2006	Interviews with product manager, technical leader, team leader, engineering project leader, project manager, staffing manager.
	July 2006	Workshop at university exploring findings.
	August 2006	On-site workshop with company management feeding back results.

January 2005 with a university-hosted workshop comprising the research team and practitioners from Pennysoft. The topic of the workshop highlighted the complex nature of today's software development environment and the new challenges that are introduced in offshoring arrangements. This workshop was complemented with a meeting where the research team visited the Pennysoft site and subsequently carried out face-to-face qualitative interviews. A similar visit and subsequent interviews were carried out at Semicon in July and August 2005. A total of 12 interviews were conducted during this first phase, each interview approximately 1 hour in duration. All interviews at Pennysoft were recorded and transcribed. Semicon, however, declined to allow audio recording for security reasons. Therefore extensive handwritten notes were taken during those interviews, and were fully transcribed immediately after each interview. The interviews in the first phase served to give a good overview and general understanding of the two companies and the many different projects that involved geographically distributed teams in offshoring arrangements.

Following the first phase, as other key informants emerged during the interview process, the second phase of the project (April 2006 to August 2006), comprised 14 interviews and 3 workshops. Twelve of the interviewees were based at the Irish sites of the companies. Two more Pennysoft interviewees were India-based—one Indian team developer who

was visiting at the time of the interviews and one Indian developer who offered to be interviewed over the phone. In total, five of the interviews in this phase were telephone interviews with one of the researchers asking questions while the other researchers in the team listened, took notes, and asked for clarification as required. This set-up made it possible to discuss each interview in detail and to compare notes and interpretations. Three of the interviewees from the first phase were included also in the second phase, allowing for more in-depth discussions and comparisons. In some cases, follow-up telephone conversations, as well as e-mail correspondence, took place to clarify and refine emerging issues. To further discuss findings and emerging issues, the second phase also included a university-hosted workshop attended by both companies. At this workshop, strategies for offshoring and outsourcing were discussed along with different theoretical frameworks that can be used to analyze empirical studies of the phenomenon. At the request of Semicon, the company hosted the research team at a final workshop to feed back the results from the research study, allowing for refinement of the results.

In total, this research project comprised 4 workshops, 2 formal meetings with company management, 22 qualitative interviews and e-mail correspondence with company representatives.

Data Analysis

The RET-based framework provided a set of useful "seed categories" (Miles and Huberman 1984) reflecting the assumptions and proposed underlying constructs of the research. In our analysis, we used these seed categories to structure the initial *comparative analysis* during which we identified similarities and differences in the data, thereby refining the data into *categories* (conceptual constructs that appear pivotal and emerge from the raw data). These categories reflected both the fundamental aspects of the bridge relationship, aligning with the seed categories from RET, and more over-arching conceptualizations driven by issues brought up by the interviewees. In this process, we paid careful attention to Klein and Myers' (1999) principles for conducting interpretive research. In particular, the principle of dialogical reasoning (i.e., sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings) and the principle of multiple interpretations (i.e., sensitivity to possible differences in interpretations among the participants) worked as guiding principles in our interpretation and analysis of the empirical data.

For the analysis we followed the *open coding* and *axial coding* techniques proposed by Strauss and Corbin (1998). Open coding is concerned with both labeling the phenomena and concepts inherent in the data, and grouping these concepts into categories. Axial coding is concerned with identifying the relationships between categories and validating these relationships in the data. The open coding categorized the data into concepts, which tended to match the original seed categories due to the use of the RET-based framework to guide our interviews. A sample of open coding of data is shown in Appendix B. As data was coded into categories, various theoretical questions, hypotheses, and code summaries arose. These were captured in analytic *memos*, which were used to help integrate our understanding of the phenomena subsequently and to refine further data collection.

By moving from comparison of incidents within a category to comparison of incidents with the emerging properties of a category during axial coding, we organized and articulated the theoretical components into higher-level (or *core*) categories. The identification of these emergent core categories was driven by the analytical views expressed by the interviewees when asked to reflect on their own experiences of the Irish bridge. Given their deep understanding of the offshoring phenomenon, the lower-level categories that emerged initially were partitioned and combined to form an overall understanding of the two-stage offshoring phenomenon, as represented by the Irish bridge. Following this, higher-level core categories emerged, going beyond the seed categories of RET.

As categories became integrated and further data collection did not tend to cause any modification of categories, but rather reinforced already-identified properties, the categories were deemed *theoretically saturated*. When theoretical saturation is achieved, additional interviews add nothing to what is already known about the properties of categories.

As a result of the coding process, three core categories emerged: (1) team integration (i.e., cross-site integration versus loose inter-site coupling); (2) organizational level implementation (i.e., managerial level versus software engineering level); (3) site hierarchy (i.e., hierarchy of parties versus parties acting as peers). The offshore activities of the two companies in the study can be differentiated when analyzed according to each of the categories. Table 3 shows which seed categories fed into each of the emergent categories. An "✕" denotes where that attribute or process formed part of the emergent category, according to the empirical data. The seed category "cultural compatibility" did not come to relate directly to any of the emergent core categories. Cultural compatibility was recognized as an offshoring issue by the interviewees, but was not identified as pivotal in the characterization of their activities. Only the relations between seed categories and emergent categories that arose in the empirical data are identified here.

Reliability and Construct Validity

Interpretive research has been questioned in relation to reliability and validity issues in particular. While reliability and validity are interrelated, we will discuss each separately here. Reliability is at heart concerned with the repeatability of the research. In order to improve research reliability overall, we sought to provide a traceable, documented justification of the process by which research conclusions were reached, thus providing an audit trail of the process (Guba 1981). Our primary mode of research was the case study interview. Case studies can be very valuable in generating an understanding of the reality of a particular situation, and can provide a good basis for discussion. The approach has been widely used in research seeking to understand phenomena through the meanings people assign to them (Boland 1985: Orlikowski and Baroudi 1991) and the process whereby information systems influence and are influenced by a specific context (Walsham 1993). Usually, there is no attempt at experimental design nor any control of variables. Also, since the information collected is often specific to the particular situation at a particular point in time, results are not really generalizable in the traditional sense. Scott (1965) does a creditable job of identifying a central problem with the case study method:

Table 3. Emergent Core Categories			
	(1) Team Integration	**(2) Organizational Level Implementation**	**(3) Site Hierarchy**
Attributes			
Trust			✕
Interdependence	✕	✕	✕
Consensus			✕
Commitment		✕	✕
Cultural compatibility			
Flexibility			✕
Processes			
Communication	✕	✕	
Coordination	✕	✕	✕
Cooperation	✕	✕	✕
Conflict resolution			✕
Integration	✕	✕	

The sustained researcher who burrows deeper and deeper into a single situation is faced with the danger of emerging so impressed with the complexity and uniqueness of "the one dear case" that he may have difficulty in thinking abstractly about his materials or in attempting to generalize from them (p. 262).

In order to improve reliability in relation to the case study approach, we followed Kirsch's (2004) model of creating a case study protocol which defines the procedures to be followed in identifying and selecting the case study sites, determining who to interview and how interviews should be conducted. We prepared an interview protocol based on the relational exchange theory framework seed categories to guide the interview process without constraining it. The interview process was deliberately a reflexive one so as to allow for refocusing as the research progressed, in that responses to certain questions could stimulate new awareness and interest in particular issues which could then require additional probing. Eisenhardt (1989) also recommends such a strategy, labeling it *controlled opportunism*. As mentioned above, all interviews were transcribed, generating a total of 123 pages (42,927 words) of data[4] which were subsequently coded.

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[4]As explained above, the Semicon interviews were not recorded but transcripts were created based on notes taken during interviews. The word count would likely have been higher had these interviews been recorded since the process of transcription based on field notes effectively involves a first round of analysis as the notes typically reflect primarily what the researcher deemed most relevant *in situ*.

Also, the method of venting was used to avoid the problem of *multiple realities* (Kaplan and Duchon 1988). This is a process whereby results and interpretations are discussed with professional colleagues (Goetz and LeCompte 1984). For example, our set-up of the interviews, with one researcher asking the questions and the other listening and taking notes, allowed for a detailed discussion within the research team after each interview. In this discussion, different interpretations were recognized and an increased understanding emerged within the team since we were able to systematically discuss our different interpretations. In addition, findings were continuously presented and discussed with colleagues and practitioners at the four project workshops. In order to further improve reliability we considered triangulation and corroboration from multiple sources. Thus, we conducted the research in two companies with multiple interviewees in each and also considered other archival documents within each organization.

While validity is a multifaceted concept, it is at heart concerned with the extent to which the actual research in practice matches that which it purports to be about. In interpretive research this is primarily concerned with the "truth value" of the research (Miles and Huberman 1984). There are several categories of validity, but the most relevant to interpretive research are construct validity and external validity.

Construct validity has to do with the extent to which the constructs as operationalized relate to the phenomenon the research purports to address. Yin (1994) suggests three tactics for addressing construct validity: (1) drawing on

multiple sources of evidence, (2) establishing a chain of evidence, and (3) member-checking the research results with key informants. We have already discussed the use of multiple sources of evidence in relation to reliability above. In relation to establishing a chain of evidence, this is addressed by means of the audit trail, which is recoverable in tracing the research through a series of steps from the establishment of the initial research question, through site selection, data gathering, and analysis, to the final conclusions. The final tactic, that of member-checking with key informants, was accomplished through the intensive research planning and feedback workshops organized with the case study companies. At each of these workshops, the research team presented findings to participants from both companies, and engaged in discussions and feedback sessions that proved very valuable for confirmation/clarification of results and as input for future research directions.

Finally, external validity has to do with the extent to which the research results apply in other real-world settings. The fact that interpretive research often takes place in real-world settings can help improve external validity. One of the limitations of this study might appear to be the fact that it is based on only two cases and thus there is limited scope for generalization, at least in a traditional sense. Lee and Baskerville (2003) identify a fundamental and long-standing problem with the type of generalization based on the type of statistical sampling frequently sought in research, namely the problem of attempting to generalize to any other settings beyond the current one. Following this conventional model, researchers have suggested increasing sample size or number of case study organizations, but Lee and Baskerville argue cogently for the ultimate futility of this flawed strategy. They present an overarching framework that proposes four distinct categories of generalizing, only one of which corresponds to statistical sampling-based generalization. One of the other categories in their framework, that of generalizing from empirical description to theoretical statements, is more applicable to our research study. This view of generalizing from thick description to theoretical concepts, specific implications, and rich insight is also recommended as a strategy by Walsham (1993) and Klein and Myers (1999), who argue for such a theoretical link as being key to distinguish "interpretive research…from just anecdotes" (p. 75).

Research Findings and Discussion ■■■

In this section, we present and discuss the results from the qualitative interview study. In accordance with the concep-

tual framework adopted in this study, we first present our empirical data using two categories: attributes and processes. Within each category, the different constructs comprising an interorganizational relationship are presented and further illustrated with quotes from the interviews. We then highlight the different approaches taken by the companies when acting in the bridge role. Finally, we analyze the different approaches taken by the companies in three interrelated sections.

Foundations of the Irish Bridge

Attributes of Two-Stage Offshoring Relationships

Below, we present the attributes (i.e., the characteristics that contribute to the functionality and harmony of a relationship) comprising a customer–vendor relationship. Each attribute is illustrated with quotes from the interviews.

Trust: Trust refers to the expectation that a party will act predictably, fulfill its obligations, and behave fairly. Many of our respondents at both companies agree that trust is critical and that an offshoring relationship is more about trust than it is about contracts. Often, there exists a contract at the level of "my team will deliver this amount of work" but it is not so much a contract as a set of objectives agreed between managers. The importance of trust was emphasized by a technical leader in Semicon.

> *A lot of our work did rely on trust. Without good trust between the sites, the project would not have been able to work….We had to take the other site's word for it.*

As recognized by one manager in Pennysoft, the relationship between two parties is not about contracts, it is about trust and trying to blend the teams into one. However, this can be difficult when dealing with new sites, something that the Irish site has experienced in its bridge role between offshore locations.

> *When getting work sent to us, from, for example, the U.S.—then we know our capability. When offshoring to someone else…it's different, as you don't know if they're capable of doing the work.*

Likewise, there needs to be an understanding of the capabilities and the limitations that exist at different sites. While, for example, requirements may need to be very detailed in the beginning, a long-term relationship in which the parties know each other can allow for more flexibility and more loosely specified requirements.

You really have to understand and trust the capability of the people you are working with. We aren't necessarily offshoring complete projects. It's more handing over well-defined tasks. And so you need to have an understanding of...not only what work you can send to them but how well it must be defined.

Since we started dealing with the U.S., trust has developed so now they know that they will get what they ask for. They know that if there are any issues they'll be told as early as possible. In the beginning they looked more closely at how we did things, making sure that we were meeting all the dates. That same kind of thing is what we are trying to do now with India....Eventually, I imagine that when India has some experience we won't be doing that as much anymore.

At Semicon, the Asian sites have existed for a longer period and work more independently in contrast to the Indian teams within Pennysoft. One team will not delegate small pieces of work to another. Therefore, a team does not need to trust the capabilities of the other, as each team has been assigned to the project by senior management based on preexisting capabilities of each party. It is only for specific cross-location collaboration projects that parties need to trust the output of the others. In that case, as one manager stated, trust and expectations can be based on previous relationships.

Trust is affected by my previous dealings with other people or sites. I know how professional they will be and if they will deliver on time.

As recognized by Klepper (1995), trust has long-term benefits as it allows a focus on long-term objectives, it suppresses opportunism and increases cooperation, it enables risk-taking, and it reduces conflict. In our study, both project managers and software developers emphasize the importance of trust in a relationship—whether it is as customer or vendor. While there exists a formal contract on a high level, the day-to-day practices are more about establishing and maintaining team spirit and a collaborative atmosphere within and between teams. As can be seen in the quotes above, the Irish sites have the opportunity to learn from previous experiences with the United States when dealing with new offshore locations such as India.

Interdependence: Interdependence refers to the extent to which each party's attainment of goals is dependent on the other party. Interdependence is described as beneficial for cooperation between parties—if close cooperation is the intended approach by the organization. The two companies

in our study have different approaches to interdependence in their offshore sourcing relationships, discernible in our study when asking one of the project managers from Pennysoft about the extent to which each party's attainment of goals is dependent on the other party.

I cannot afford that India does not work. If my team is unsuccessful, then I'm unsuccessful, no matter where they're located.

This opinion suggests a connection between interdependence and partnership success as suggested by Kanter (1994). However, our respondents in Pennysoft also emphasize the difficulty in establishing and maintaining interdependence due to the wish to grow at each individual site. Especially, sites in India seek to grow very quickly and one possible scenario, as outlined by one of the interviewees, would be India bypassing the Irish bridge in the future and instead dealing directly with the United States.

In contrast, the approach taken by Semicon is to minimize day-to-day interdependence of software developers across sites in their two-stage offshore relationships. Senior managers aim to clearly identify and minimize interdependencies early on in project lifecycles—software development teams work as independently as possible. A reduction in cross-site interdependence implies a reduction in cross-site communication and coordination costs (Carmel and Agarwal, 2001). Therefore, this company aims to reduce interparty collaboration and interdependence in order to optimize their offshore sourcing projects. As noted in both companies, however, interdependence can still exist even if the work of the teams involved is loosely coupled, as deliverables from one team may be required by the next team to complete their phase of the project.

Consensus: Consensus refers to the extent of general agreement between parties. This is emphasized as very important, and while interviewees at both companies realize the potential benefit of a written contract, they admit that, generally, decisions are agreed upon between managers and what really makes the decision is the level of expertise in the different teams spread across different locations.

Most things are agreed by consensus...changes as well.

What really makes the decision is the level of expertise among resources in different locations.

It's not so much a contract, it's more a set of objectives agreed between managers.

In Semicon, there exists some degree of formal agreement when a team needs to cooperate with parties within a different group of the same company. This agreement is called the "statement of work," but does not constitute a legally binding agreement. The fact that managers agree upon objectives instead of specifying these in formal contracts reveals a high level of consensus (as well as trust) at the managerial level in both companies. However, this might be the result of the particular sourcing arrangement. While contracts may be critical in outsourcing arrangements to a third party, they may be of less importance in an arrangement where the work being sent offshore is still performed inside the company (i.e., in a captive center), as is the case in both companies in this study. Nevertheless, consensus is considered an important issue especially when you act as the vendor in an offshore sourcing relationship.

Commitment: Commitment refers to the willingness of the parties to exert effort and devote resources in order to sustain an ongoing relationship. Commitment reflects the parties' view that the relationship will be sustained over time (Henderson 1990). To encourage commitment, our respondents emphasize regular meetings and discussions. Also, it is suggested that it is better to speak directly to a person instead of sending e-mails since phone conversations are felt to encourage commitment and strengthen relationships over time.

> *To encourage commitment we hold meetings and we discuss. The best is to bring it out in the meeting and speak to the person instead of sending off e-mails and copying senior managers on it.*

While commitment could be experienced differently when one is the customer compared to when one is the vendor, this is not the case at Pennysoft.

> *I think commitment is the same in any relationship—no matter if you are customer or vendor...we put in the same amount of work for the U.S. as India does for us.*
>
> *It all comes down to individual relationships.*

Commitment can also be strengthened if all parties in the relationship rely on the outcome of the project work. This may be contrasted with a once-off offshore outsourcing relationship, where the external vendor may not be willing to exert the extra effort that would be required to complete a project on time. A project in Semicon that involved two teams in the software development activities did not experience a problem with commitment, as both parties needed the output as a basis for their future projects.

> *Generally, commitment wasn't a problem. Both sites were of the same division in the same company. Both sites had the same culture—that was a help. We worked in the same way. Both sites needed the project to work, and that enforces closer commitment.*

A project manager in Pennysoft also realized that shared ownership of projects can increase commitment. This is discussed in the "Integration" section below.

Cultural compatibility: Cultural compatibility refers to the extent to which each party can coexist with the others' beliefs and values. Interestingly, interviewees from neither company reported any major problems. While India and other Asian countries are still considered culturally very different, they stress proper training, quality of developers. and opportunities for travel as solutions to potential problems.

> *I haven't really experienced any problems....It really depends on the quality of the developers.*
>
> *To overcome cultural problems you need to employ good people from the start, have a good team lead. Also, a proper training in the architecture of the system is a huge advantage—I think that's where other projects might fail... they don't have proper training.*
>
> *We have learnt about the time-zone differences. It's much the same for U.S.–Ireland and Ireland–India. However, Indian culture is very different. What has really helped was having Indian people spending time in the U.S. or Ireland.*
>
> *This is not a huge problem. It's not as big as people make it out to be....All sites have learnt to deal with the other sites.*

Also, the Irish experience of being both customer and vendor (i.e., acting as a bridge between the United States and India) has helped in this complex situation. Particularly, our interviewees felt that to understand what it means to be offshore potentially helps when dealing with new offshore sites.

> *We understand what it means to be offshore, which makes us better potentially at managing offshore.*

Indeed, teams involved in offshore sourcing relationships should not overlook the potential effort needed by other teams to learn to deal with them. This was highlighted in an interview with a team leader based in a Pennysoft site in India.

Most of [the Indian developers] know how the folks in the U.S. behave, that they come in early. You talk about their weather, or their family, or their dog. In India, we don't ask how's the weather, because it remains the same always....[Also] with Ireland, the communication, initially, it was kind of hard to understand. The accent was a bit different. Now I can make out some difference between the U.S. and Ireland accents.

Flexibility: Flexibility refers to the willingness of both parties to make adaptations as circumstances change. Here, our interviewees emphasize the complex nature of software development and that these things tend to escalate in a distributed environment. In Pennysoft, what becomes important is to take day-to-day management seriously and to trust the expertise that is available. As when overcoming cultural differences, the Irish Pennysoft site has an opportunity due to its dual role in its two-stage offshoring arrangement and experience of acting both as customer and vendor.

Most circumstances are agreed by both parties... adaptations as well. Ireland has 10 years of experience so it's not a case that they [the United States] are telling us what to do.

Overall, flexibility is inherent in the relationship between the Pennysoft sites as they coexisted in extended teams. Flexibility may be of more concern between different teams and business units. This highly integrated bridge model also allows for flexibility between teams members.

We [in India] try to accommodate [requested changes], if we can help. But we don't want to change anything in the quality of deliverables....We can try to figure out if we can [take extra work]. There are some situations that I say, "I am going home now, can't somebody in Ireland do this [instead]?"

Semicon's teams are also permitted to reject work in order to maintain their quality levels and to stick to realistic schedules.

Every site has the right to push back work if they believe they are unable to carry out the requested work.

In Semicon, however, the corporate culture encourages projects to have a very stable set of requirements once they have been agreed upon. Many stakeholders may be affected by a change in project direction due to the complex nature of the software development projects involved. If a team

requests that a project direction to be modified, clearance is needed from all parties before a change is allowed. Hence, flexibility in relationships is discouraged. As all teams in Semicon are aware of this aspect of corporate culture, they can work in better harmony without being at risk to project changes.

It is quite difficult to change the direction of a project [because of corporate policies]. This did help in our project, as changes in requirements were not a great threat to the project.

[The marketing group] will ultimately decide if the change is needed. Marketing will ask the site for an assessment of the impacts [the change] would have on other work...Also, if a change is approved, we need to meet again if there's a remapping of requirements.

As can be seen, the structure of teams and the corporate culture may exert an important influence on the degree of flexibility. While Pennysoft manages a high degree of flexibility in closely integrated teams, Semicon has chosen a different approach where teams are loosely coupled and work separately on specific modules. This latter approach enforces a lower degree of flexibility since the infrastructure for communication and coordination between teams is kept to a minimum.

Processes of Two-Stage Offshoring Relationships

Below, we present the processes (i.e., means by which the attributes are developed) comprising a customer–vendor relationship. Each process is illustrated with quotes from the interviews.

Communication: Communication refers to the proactive formal and informal sharing or exchange of information. The amount and type of communication at the two companies between geographically dispersed teams varies greatly. At Pennysoft, inter-site communication is intense and the interviewees describe daily meetings and phone calls as prominent activities. This happens as a result of the Irish site's role as bridge in the extended teams which include other offshore colleagues. While managers are the ones traveling, developers use information technology for keeping contact and communication happens cross-site at all levels:

We have communication at all levels. Developers communicate cross-site and managers communicate cross-site.

To facilitate communication we use phone, e-mail and video conference systems. Also, we travel. I traveled to India once and the India team lead traveled to Ireland.

My manager has meetings with India once a week and there are U.S.–Ireland–India meetings every week as well.

As could be expected, the bridge role is discernible when discussing communication processes. As pointed out by one manager at Pennysoft, the Irish site initiates most meetings.

I think we initiate most meetings...acting as the bridge between the other two.

The location of Pennysoft's Irish site allows for it to enjoy a temporal overlap between both the U.S. and Indian teams. In fact, it was found in one of the projects that the Irish site was added to allow for more efficient communication. Originally, the U.S. site dealt directly with India, and all inter-site communication involving the Irish site went through the United States. However, the Irish site is now moving toward a closer partnership with their Indian colleagues, with direct communication being facilitated by a 4 to 5 hour overlap in daily working hours. The Irish site has overlapping work hours with India during the morning (Irish time), and U.S. colleagues can be reached from 1:00 or 2:00 p.m. onward. This has helped the Irish team to become a bridge location between the United States and India. The Indian team leader from another project also agreed that the Irish bridge is advantageous, as it allows the team in India to maintain regular working hours while also allowing for communication with the Irish site.

At Semicon, the situation is different. Here, communication does not happen at all levels, in order to reduce communication overhead. Generally, software engineers do not communicate with their peers at other locations; the bridge model simply does not occur at the software engineering level. Instead, inter-team communication can be seen at a managerial level where the bridge role does occur, as one manager agreed.

I had project meetings with managers in the U.S. during my afternoon. I talked with Taiwan in my morning [to update them on the project meetings], because not all sites could be present at the project meeting.

The Irish sites of both companies in our study enjoy temporal coverage with both the U.S. and Asian sites, facilitating cross-site communication. However, one project manager at Semicon did not agree that this temporal overlap justified the effort of managing the bridge model at a software engineering, day-to-day level.

When working with the Indians, I only still have the morning to communicate with them. After our lunch, they'll already be going home. 80 percent of my communication with the Indians is still over email....The U.S. might as well work directly with India and wait for 4 hours if they have an important question....In software development, you plan over a period of 6 months, not hours....There is not enough of a justification to take the Irish side into it [as the bridge].

As shown in our study, communication overhead can be reduced by choosing to implement the bridge model only at the managerial level, as is illustrated in the Semicon quotes above.

Coordination: Coordination refers to the management of interdependencies between parties. Here, the Pennysoft interviewees emphasize the importance of having clearly defined processes. This, they said, will help when dealing with different sites that may have different daily routines.

This whole thing is more about having a good software process...not only about being spread across locations.

One of the bonuses that I saw when I came into the team was that there were very clear processes. There were very clear coordination checkpoints.

In acting as the bridge between the United States and India, the Irish site has important knowledge that can be transferred when initiating new contacts and setting up new projects at different sites. Also, there is the belief that team members in India are more comfortable in calling the Irish site for advice instead of calling the U.S. representatives. If so, the Irish site has clearly a very important role to fill as an intermediate between the other two.

When setting up a new offshore location you both need to be on the same page, what the process is, what the escalation route is and what your responsibilities are.

There are regular meetings between Ireland and India. But there are no meetings with India–Ireland–U.S. This is one of the issues we want to

address. People in India are probably more comfortable calling up Ireland asking for help instead of calling up the U.S.

Semicon's approach to coordination allows for coordination of teams at a managerial level, where the Irish site acts as the managerial bridge. However, day-to-day coordination in the offshore sourcing relationships is kept to a minimum.

We know that inter-site coordination is inefficient. We decided to reduce the number of sites involved in any project. We decided to make work as orthogonal as possible.

At Semicon, coordination between teams is closely managed. Inter-team coordination is rare but does still occur at times, depending on the type of work involved.

[The] Bangalore [team] are dependent on our deliverable, both parts must come together, and therefore we need to have some interaction. These interactions are very much planned for at the beginning of the project.

The manager also pointed out that coordination does happen between teams at the integration phase of software development. During the integration phase, the output from all teams is combined, and this often requires physical meetings due to its complexity.

At integration phase, the sites need to come together, as it is intensive work....[This] usually happens in [Ireland]....Geographically, it is easier for everyone to travel to [Ireland]. That is a geographical advantage we have.

Cooperation: Cooperation refers to the undertaking of complementary activities to achieve mutual benefits. At Pennysoft, the Irish site often has the role of coordinating new projects and trying to get cooperation going between other offshore sites. However, while this bridging role might be sustainable in the near future, it might not be viable in the long-term. Many interviewees at Pennysoft see difficulties in maintaining this role in future cooperation.

Our location is an advantage but it also depends on our depth of expertise....There are other locations that can compete in terms of temporal position so we have to maintain and improve our expertise.

We often coordinate in setting up projects....Our location is good for setting up projects. But I

honestly don't know if it's sustainable...everyone wants to move up the value chain.

The head of one of the projects in Pennysoft stated that cooperation between all parties would be to the benefit of all. However, cooperation may be challenged by site competitiveness, with sites competing with others to get the best work. He had learned from past experiences, lessons that he is now applying to the bridge role in order to enhance cooperation in the two-stage offshoring relationships.

Ireland was very much in that boat 4 or 5 years ago [competing with other sites]. But once we got established we realized we don't have to be so aggressive to compete and cover up for any mistakes that we make.

Cooperation is encouraged in Semicon specifically in relation to code reuse. Six months before our second-phase interviews at Semicon, managers had begun to push for software code reuse between sites. As one project manager commented,

If there are two completely separate programs, and they are working on two features, each very similar, even then there will be contact between them to maximize code reuse.

In fact, in one case highlighted in interviews, two remotely located teams from two separate project structures joined forces to work on a single project. Both teams needed the component as a prerequisite for further work. The component was divided into two modules, one module per site. The modules were to be integrated as one component upon completion. This cooperation allows for both teams involved to maximize their output. Clearly, cooperation and interdependence, as previously discussed, are two closely related concepts, and while they do not necessarily happen on a day-to-day basis, they might happen for specific purposes such as specific modules for specific projects.

Conflict resolution: Conflict resolution refers to amicably replacing disagreement with agreement. All interviewees agree that e-mail is a common source of conflict. While conflicts are inevitable, conflict in an offshore sourcing relationship is especially problematic. Given the complexity of technology, the level of detail in contracts and the sometimes disparate goals of the parties, the benefit of constructive conflict resolution cannot be over emphasized (Anderson and Narus 1990). Since most conflicts happen on a one-to-one basis, the best solution is to pick up the phone and talk to the person. If there is a larger conflict, our interviewees' advice

is to set up a meeting and discuss the problem. Managers are believed to be helpful in solving conflicts since management relations cross-site are considered good.

> *E-mail is a common way of causing conflict. Telephone is better.*

> *I think you should avoid huge e-mail chains. Pick up the phone and talk to the person instead.*

> *If there are people across locations that can communicate with each other openly, then conflict resolution is easier. Managers can help solve conflicts since managers cross-site have quite good relations.*

> *You try to understand what the problem is, and you need to talk to the person at the other site.*

Integration: Integration refers to the intertwining processes and attributes into each party's structure and processes. Integration enhances the quality of the parties' internal business processes (Henderson 1990) as well as the linkages that bridge differences between firms and individuals (Kanter 1994). As with *interdependence*, the two companies in our study have differing approaches to integration in offshore sourcing relationships. In our study, Irish company representatives at Pennysoft have realized that travelling is beneficial for integration, since they wish to integrate their sites as extended teams. Especially, regular travel to the United States is mentioned as very positive for establishing a good long-term relationship. Learning from this experience, the Irish Pennysoft site now recommends company representatives travel to India when setting up new projects at this offshore location. Furthermore, sharing ownership so that everyone has a stake in the project is considered beneficial for integration.

> *Give everyone a share of the ownership. Therefore everyone has a stake in the project and...the project works well.*

However, while integration is recognized as valuable for interorganizational relationships (Goles and Chin 2005; Henderson 1990), our study reveals potential problems with integration in an offshoring context. For example, integration may be problematic for cooperation since each site has a push to grow in a way that doesn't necessarily fit with teams in other locations. In terms of time, however, the Irish Pennysoft site is closely integrated with both the United States and India. This makes Ireland's current position strong as an intermediate in two-stage offshoring arrangements.

> *Integration is not always good for cooperation....At site level there is always a push to grow and that doesn't necessarily fit with teams in other locations.*

> *I think it's critical when setting up an offshore site to set realistic expectations and a time frame and not to over-commit. What I see is that a lot of managers are going to India from the U.S. and promising the world. Then the expectation is set with the offshore site that they're going to get this—and they come looking for it....[This] can make integration very difficult.*

> *The time zone is a big issue and that works in our favor. From a time perspective, we are in a good position. We have time overlap with both sites [U.S. and India]. However, we are not a low-cost destination anymore. Now, we are based on quality. If we can maintain quality—we can maintain position.*

Despite the challenges to integration, one of the Irish–Indian teams in Pennysoft has a joint development process document, allowing for closer integration of both parties' software development activities.

At Semicon, however, integration is avoided when possible. Instead, the teams are kept loosely coupled and not highly integrated. Integration does still occur when parties are cooperating to develop a single component and when code reuse is being implemented. A strong corporate culture means that interorganizational differences are minimized and extended team structures are avoided. Each team's work tasks are designed to be independent of other teams as much as possible, therefore avoiding the need for integration.

Realizing the Irish Bridge

Both companies in our study practice offshore sourcing to complete large software development projects, with teams in the United States, Ireland, and Asia. The Irish sites of both companies act as the bridge between U.S. and Indian locations, as identified in this paper. However, as highlighted by the empirical findings above, the two companies have very different approaches to the bridge model. This has implications for companies that may be planning to operate similar bridge models for two-stage offshoring arrangements. Companies that realize that they have implicitly adopted an approach similar to one of the approaches presented in this paper should also take note. We have identified two different approaches to the bridge model as experienced by the two companies in our study. These two approaches differ in

relation to (1) team integration, (2) organizational level implementation, and (3) site hierarchy.

The Irish Bridge: Team Integration

The structure of the teams involved in offshore sourcing projects affects the bridge model being adopted. Large off-shore sourcing project teams undoubtedly consist of team members located in several countries, possibly across several continents. The relationships between parties at different locations can be very close or can be kept to a minimum. At Pennysoft, software engineers may communicate with their offshore colleagues on a daily basis. This is due to the close integration between sites, where geographical distance does not define team boundaries. When we asked a senior systems analyst at Pennysoft whether his Irish team was treated as a separate team to the engineers in the United States, he replied,

> *No, not at all. It's not supposed to be either. The emphasis is that we have a joint team and that we work as one group. It's an extended group, we call it sometimes….Projects are split across the two sites. We're in contact every day.*

From this we see that, at Pennysoft, the relationship between sites is very close, with the company aiming for close cross-site integration. The complexity of software development is inherent to distributed software development, while the geographical and temporal distance between sites adds to the level of complexity. Therefore, close cross-site relationships require more communication and need to be closely managed. One of the systems analysts noted that this requires a different approach to software engineering.

> *I never worked in this way before. And to be honest, it was a big change. It means a lot more telephone meetings. A lot of instant messaging conversations. A lot of use of email….It requires different ways of working.*

The approach to bridge relationships in Semicon is almost the opposite of that at Pennysoft. The teams are comprised of co-located team members. Therefore, one team can only exist at one location. Semicon realized that, for them, managing extended teams is too complex and carries with it too much overhead in terms of communication and coordination costs. Interdependence is reduced by making each team's work as orthogonal as possible. The loose coupling between sites implies that the bridge model does not appear during day-to-day work at the software engineering level. A manager at Semicon noted that an extended team that did exist in the past was changed so as to loosen the coupling between teams.

> *[Ireland and Malaysia] work together, and there were very strong links/dependencies between both sites….We purposefully loosened the coupling between sites. Our goal is to have nothing to do with each other!...We're very explicit about the interactions that will happen between teams.*

The Irish Bridge: Organizational Level Implementation

The level of team integration in an offshore sourcing relationship has a direct impact on how the bridge model is realized. Our study highlights that the bridge model can be realized on different levels within the organization— on a managerial level only, and/or at a software engineering level. At Pennysoft, since the sites are closely integrated as extended teams, the Irish bridge is seen at both managerial and software engineering levels. Here, an Irish software project manager delegates and manages other sites, acts as the managerial bridge between sites, and is ultimately responsible for the timely completion of the project. Ownership of most projects still rests in the United States. Likewise, at Semicon, the Irish site also acts as the bridge at a managerial level, but also ownership of the entire software project rests there. Managers at both companies recognize that their Irish sites have an advantage when managing projects. As one manager at Pennysoft stated,

> *[At the Irish site] we're very process mature. Ireland understands business better. It takes time to get to that position.*

Management at Semicon also recognized the importance of the Irish bridge for them at a managerial level.

> *Program management at a managerial level is a huge value-add for us here in [Ireland]. By being the bridge, we are recognized as delivering whole projects….Upper management are therefore happy to see [the Irish site] managing the software pro-gram. They don't care where the actual develop-ment work has taken place.*

However, our study also highlights that the bridge model can be realized not only at the managerial level but also at a software engineering level. The level of team integration in the offshore sourcing relationships seems to have a direct impact on the bridge model at a software engineering level. At Pennysoft, the extended teams with close cross-site collaboration facilitate the bridge at this level. Teams in different locations work together and some software engineers

in India report directly to managers at the Irish site. Also, there is regular communication between all team members and their peers. This allows for Pennysoft to create software development teams leveraging the most relevant skills available at different locations.

The approach taken at Pennysoft is seen as a valuable bridge model when establishing new offshore sourcing relationships and teams. The Pennysoft site in India is quite new, and the engineers need to be trained. To do this, the approach with close cross-site integration and teams communicating and coordination across locations and levels was seen as beneficial. A one-to-one "buddy program" was set up between Irish and Indian developers, allowing for the Indian developers to learn directly from the Irish developers. Naturally, this required intense communication on a daily basis between both managers and software engineers.

In contrast, at Semicon, the Irish bridge does not exist at a software engineering level. Engineers do not communicate with their offshore peers during standard projects. This is due to the loose coupling between teams which aims to minimize the required interactions between teams. The Asian teams are already process mature and do not need the Irish bridge to function properly. Travel is used to train new team members if needed, as opposed to a buddy program as at Pennysoft.

> *We have sent several engineers to hand-hold at other sites, if the deliverable was new to the other site. After this period, we travel as needed.*

The bridge model is therefore affected by the organizational structure, depending on how closely the teams at different locations are integrated. This fact relates back to Conway's Law, which states that the structure of the system reflects the structure of the organization that designed it, and this is particularly true for large distributed projects (Herbsleb and Grinter 1999). Companies that practice a two-stage offshoring model such as the Irish bridge should be conscious of the effect that organizational structure can have on their end product.

The Irish Bridge: Site Hierarchy

Finally, our study reveals that different approaches to the bridge model also affect the hierarchical organization of teams. The extended teams in Pennysoft comprise several locations but are driven by one of the sites. In general, U.S. sites delegate to the Irish managers, who then delegate work further to the Irish and Indian sites. Typically, the Irish site deals with more complex design activities while the Indian

site generally takes on a quality assurance role for the Irish site. The Irish site closely manages the activities of the Indian site, implying a power hierarchy in the relationship between the two sites. During several of the interviews with employees from Semicon, however, it was noted that teams at Semicon are not perceived as being in a multiple-level hierarchical structure. All teams working on a large software development project involving offshore sourcing are viewed as peers. Teams do cooperate, but remain mostly independent of each other. A team leader does not delegate day-to-day work to an engineer based in another team. The implicit hierarchical systems in Pennysoft and Semicon may differ due to the level of maturity of the offshore teams. Pennysoft's teams use the bridge role at a software engineering level in order to train new Indian recruits, and to work with Indian teams that are not as well established as the Irish teams. At Semicon, however, it was noted that the Asian teams are well established with mature software development processes, and therefore do not need the Irish site to direct their day-to-day work. Instead, these teams work as peers, independent of each other.

A hierarchical structure in the dual bridge relationship can cause tension between sites, as discussed previously in the "Integration" section. It became clear from interviews at Pennysoft that there exists somewhat of a power struggle between sites. The Indian site is growing at an extraordinary rate, and one Irish manager reported tensions in the Ireland–India relations as a result.

> *Something that I'm experiencing at the moment is that as India are coming up to speed...the expectation [is that] they're going to be on an equal par with the Ireland team. They want to grow very, very quickly and go up the value chain like everybody else....We've seen it here in Ireland ourselves.... I'm starting to experience problems now that India is starting to go directly to the customer to say, "you don't need to bother going through Ireland."*

However, the Indian team leader for this project had a different view.

> *[The Irish manager] has delegated the [maintenance] work to me. He has informed the folks in the U.S. that if the work is in the [maintenance] category, you can probably send it directly to [me in India].*

Inter-site competition—or even power struggles—therefore poses a possible threat to the proper functioning of the bridge

model. As mentioned above, it was suggested in interviews to share ownership of the project between stakeholders so that the responsibility of completion of the project is shared. Also, there might be a need to set expectations so that the newer offshore sites do not expect to take full ownership of projects in the short term.

Conclusions and Implications ▐▬▬▬

The objective of this paper was to investigate and develop a theoretical model of the dual bridge role experienced by the Irish software development sites of two U.S.-based companies in their offshoring arrangements. While the U.S. sites off-shore work to Ireland, the Irish sites offshore work further to Asia—an arrangement we have referred to as *two-stage offshoring*. The Irish sites hold a dual role of communicating, and at times also managing, both the U.S. and the Asian teams. Hence, the Irish sites have experience of being both customer and vendor in an IS offshore sourcing relationship and our study reveals multiple ways in which this role can be accomplished.

To the best of our knowledge, this is the first study focusing on two-stage offshoring, whereby a company sources from an offshore location, which then in turn offshores work further. On the surface, this approach appears similar to offshoring through domestic third party providers with offshore employees, which indeed appears to be on its rise (Zweig et al. 2006). However, our study has shown that two-stage offshoring does not have to involve outsourcing, and that many of the "nearshoring" or domestic sourcing benefits over "traditional" offshoring (such as low socio-cultural distance and time-zone overlap) can be achieved also through in-house offshore sourcing. As such, this paper contributes to off-shoring research by bringing this increasingly important strategy onto the research agenda. Specifically, by arti-culating the main characteristics of this offshoring model, as it is being practiced in our two case study companies, we have shown that it is very much context-dependent and that research into this area should not assume that what works at one particular bridge location will work in another.

Figure 1 presents the conceptual theoretical model derived from this study. It illustrates how the seed categories (RET processes and attributes) lead to our three core categories with dimensions represented by the two identified approaches to implementing the bridge model. We suggest that further research could elaborate this model and seek to derive measurable hypotheses.

Our study has several significant implications for practice. It has highlighted that there is no single "royal road" toward successful implementation of a bridge model. While the approaches identified in the two case study organizations in this paper both involve two-stage offshoring, they differ significantly, primarily in relation to (1) *team integration*, (2) *organizational level implementation*, and (3) *site hierarchy* (see Figure 1).

Team Integration: Cross-Site Integration versus Loose Inter-Site Coupling

First, while *close cross-site integration* (i.e., when geo-graphical distance does not define team boundaries such as in extended or virtual teams) facilitates organizational unity and "teamness," it also creates additional communication and managerial overhead. *Loose inter-site coupling*, on the other hand, means that sites at different locations remain indepen-dent of each other. As opposed to close cross-site integration, loosely coupled teams work independently and communica-tion and day-to-day management between teams can be kept to a minimum. In deciding what approach to take, managers need to be conscious of the distributed organizational struc-ture across sites and how closely integrated each team should be with other teams. Basically, more mature teams with well-established development processes allow for more loosely coupled teams. In this context, Conway's Law should be noted (or rather its inverse—Yawnoc's Law, as it were): Instead of letting the structure of the organization decide the structure of the system, which may cause overly complicated system architectures, it is advisable to form teams around the structure of the system, and to architect the system according to features and functionality.

Organizational Level Implementation: Managerial Level Versus Software Engineering level

Second, the bridge model may be implemented at the mana-gerial level only, or both at the managerial level and at the operational software engineering level. Interestingly, the level of cross-site integration seems to have a direct impact on the level at which the bridge model is discernible in this respect. While organizations with extensive cross-site inte-gration between teams may implement the bridge model at both the managerial level and the software engineering level, organizations with loosely coupled teams may prefer to implement it at the managerial level only. When implemented at the managerial level, a project manager typically acts as a "managerial bridge" between sites. Thus, required inter-team
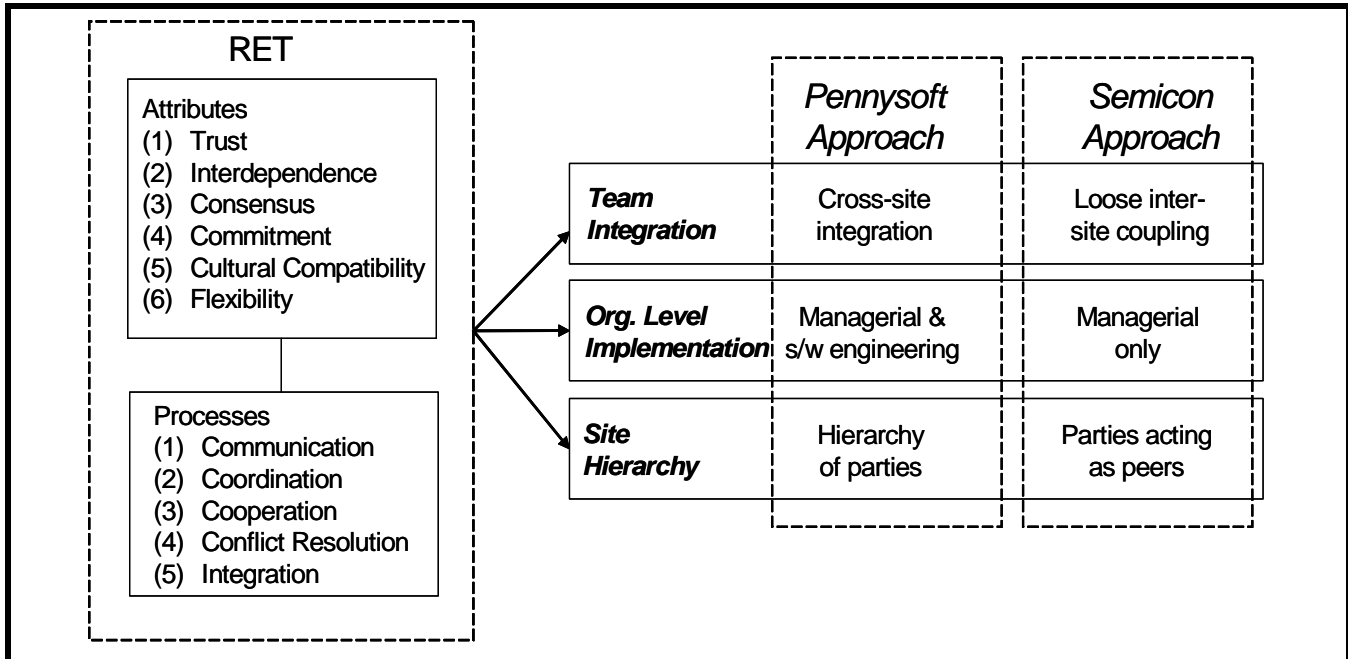
Figure 1. Two Approaches to the Bridge Model in Two-Stage Offshoring

communication can be kept to a minimum, while only team leaders report back to the bridge site. When implemented at the software engineering level, teams rely on each other and report directly to teams at other sites. This leads naturally to an increased number of interaction points.

Site Hierarchy: Hierarchy of Parties Versus Parties Acting as Peers

Third, the type of power relationships in place between sites influences how the bridge model may be implemented. When there is a hierarchy (implied or explicit) and one site is considered *superior* to its offshore site (e.g., when offshoring only mundane tasks due to a perceived lack of maturity at the offshore site), implementing the bridge model at the operational software engineering level may be feasible (top-managed from the superior site). However, when sites are organized as peers, the bridge location is able to delegate full responsibility to all other sites (upstream or downstream), but this also requires corresponding managerial skills at all sites. While the hierarchical approach may be useful in training new people and introducing new teams, well-established teams with mature software processes can work more independently and do not need the same managerial structure, hence they are more suitable for a peer-to-peer implementation of the bridge model. Interestingly, the long-term sustainability of the bridge relationship may suffer if the people at offshore loca-

tions are not perceived as equals. This could lead to offshore locations eventually trying to bypass the bridge location. Since the fear of this happening also affects attitudes, there might be an unwillingness to facilitate knowledge transfer from the bridge site to its offshore locations. Interestingly, this has also been identified as a possible threat to traditional offshoring—the "My job went to India and all I got was this lousy T-shirt" syndrome—which now seems to propagate also to the second tier offshore relationship.

Clearly, the different ways to approach the bridge offer different opportunities and also different perils. Many challenges have to be considered. Most evidently, perhaps, is the need to manage different expectations to ensure that a power struggle does not threaten the functioning of this two-stage offshoring model. To ensure this, ownership must be carefully considered. Ensuring that ownership is shared between stakeholders may, for example, instill a sense of responsibility for the project in all teams.

The question arises as to whether this two-stage offshoring model, as illustrated by the Irish bridge, will be a viable model in future two-stage offshoring arrangements. As seen in our study, overlapping time zones is a major selling point for the bridge location. However, it remains to be seen if the advantages of time-zone overlaps can render the bridge model viable in the long term. The variations of the bridge model in use in the companies in this study have been in progress over

a long period of time. Historically, the sites in Ireland were seen as offshore from the United States. However, with rising labor costs in Ireland, it is no longer a low-cost offshore location, but a mature site with high quality output and strong managerial skills. Such an evolution between locations may now be seen between the Irish and Asian sites, potentially threatening the relationship between these two. With increased maturity at the Indian sites, specifically, they are naturally unhappy to be managed from another site. Instead, they want project ownership and to be regarded as auto-nomous and effective for doing business. Furthermore, many locations have advantageous time-zone positions. Thus, to maintain a position as a bridge to offshoring locations in Asia, it is crucial for any bridge location to maintain and improve quality. While location will always be an advantage, location alone will not be enough to gain a place in future two-stage offshoring arrangements. Instead, depth of expertise and experience will be even more important for future competitiveness.

Interestingly, and on a final note, our research supports the view that offshoring tends to progress through a staged sequence of progressively lower cost locations. In our study, we have noted that Indian companies were also starting to offshore to even lower-cost destinations, such as China, Vietnam, and Malaysia. With this progress, such countries may resume the role traditionally held by India: low cost staff augmentation for highly defined tasks (Rottman and Lacity 2004) while India remains a strong player but with a different focus. Such a development suggests that two-stage off-shoring, which has been the focus of this paper, will even-tually become what we would term *multistage offshoring*. Clearly, this will require further research, but we suggest that the approach adopted here for the Irish bridge study can provide a useful foundation.

Acknowledgements

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About the Authors

Helena Holmström Olsson received her Ph.D. from Gothenburg University in 2004 and is currently an assistant professor and program manager for the Software Engineering and Management Program, Department of Applied Information Technology, at the IT University in Gothenburg, Sweden. She is also a senior research fellow at University of Limerick, Ireland, and is a member of Lero – The Irish Software Engineering Research Centre. Her research interests include globally distributed software development, agile software development, and open source software development. Her work has appeared in a variety of journals and conference proceedings such as *Information Systems Management, DATABASE, Communications of the ACM,* the International Conference on Information Systems, and the International Federation for Information Processing Working Group 8.2.

Eoin Ó Conchúir is currently a Ph.D. research student at the University of Limerick, Ireland. His research focuses on global software development and how to leverage the beneficial aspects of distributed development.

Pär J. Ågerfalk is a professor of Computer and Systems Science at Uppsala University, Sweden, where he holds the Chair in Computer Science in Intersection with Social Sciences. He received his Ph.D. in Information Systems Development from Linköping University and has held fulltime positions at Örebro University, University of Limerick, Jönköping International Business School, and Lero – The Irish Software Engineering Research Centre, where he is also currently a senior research fellow. His work on open source software, global software development, method engineering, information systems design, and conceptual modeling has appeared in a number of leading information systems journals and conferences and he is currently an associate editor of the *European Journal of Information Systems*.

Brian Fitzgerald received his Ph.D. from University of London and currently holds the Frederick A Krehbiel II Chair in Innovation in Global Business and Technology at the University of Limerick, where he is a Science Foundation Ireland Principal Investigator. His research interests include open source software, agile methods, and distributed software development. Over the years he has published 10 books and his work has appeared in most leading IS journals and conferences. He has served as a senior guest editor for several prominent journals, including *Information Systems Research*, *Communications of the ACM*, *European Journal of Information Systems*, and the *Information Systems Journal*.

Appendix A

Relational Exchange Theory Attributes and Processes ▬

Attributes That Contribute to the Functionality and Harmony of a Relationship	
(1) Trust	The expectation that a party will act predictably, fulfill its obligations, and behave fairly.
(2) Interdependence	The extent to which each party's attainment of goals is dependent on the other party.
(3) Consensus	The extent of general agreement between the parties.
(4) Commitment	The willingness of the parties to exert effort and devote resources in order to sustain an ongoing relationship.
(5) Cultural compatibility	The extent to which each party can coexist with the others' beliefs and values.
(6) Flexibility	The willingness of both parties to make adaptations as circumstances change.

Processes by Which the Attributes Are Developed	
(1) Communication	The formal and informal sharing or exchange of information.
(2) Coordination	The management of interdependencies between parties.
(3) Cooperation	The undertaking of activities to achieve mutual benefits.
(4) Conflict Resolution	To amicably replacing disagreement with agreement.
(5) Integration	The intertwining of processes and attributes into each party's structure and processes.

Appendix B

Sample of Open Coding of Interview Data

Example Quote	Key Phrase	Relational Exchange Theory	
"When getting work sent to us from the US we know our capability. When offshoring to someone else… *you don't know if they're capable of doing the work.*"	*"…you don't know if they're capable of doing the work."*	Trust	Attributes
"I cannot afford that India does not work. *If my team is unsuccessful, then I'm unsuccessful, no matter where they're located."*	*If my team is unsuccessful, then I'm unsuccessful, no matter where they're located."*	Interdependence	
"It's not so much a contract, it's more a *set of objectives agreed* between managers."	*"…set of objectives agreed…"*	Consensus	
"To encourage commitment we *hold meetings and we discuss.* The best is to bring it out in the meeting and *speak to the person…*"	*"…hold meetings and we discuss…speak to the person…"*	Commitment	
"What has really helped was having India *people spending time* in the US or Ireland."	*"…people spending time…"*	Cultural compatibility	
"The marketing group will ultimately decide if the change is needed. Marketing *will ask the site for an assessment of the impacts the change would have* on other work."	*"…will ask the site for an assessment of the impacts the change would have…"*	Flexibility	
"We have *communication at all levels*. Developers communicate cross-site and managers communicate cross-site."	*"…communication at all levels…"*	Communication	Processes
"When setting up a new offshore location you both *need to be on the same page, what the process is…* what your responsibilities are."	*"…need to be on the same page, what the process is…"*	Coordination	
"If there are two completely separate programs and they are working on two features, each that are very similar, *even then there will be contact between them* to maximize code reuse."	*"…even then there will be contact between them…"*	Cooperation	
"If there are people across locations that can *communicate with each other openly*, then conflict resolution is easier."	*"…communicate with each other openly…"*	Conflict resolution	0
"Give everyone a *share of the ownership*. Therefore everyone has a stake in the project and therefore the project works well."	*"…share of the ownership…"*	Integration	0