

**A BRIDGE TOO FAR:
THE EFFECT OF INFORMAL TIES ACROSS FORMAL BOUNDARIES
ON INDIVIDUAL EXPLORATION PERFORMANCE***

Marie Louise Mors†
London Business School
Regent's Park, London NW1 4SA
United Kingdom
E-mail: lmors@london.edu
Phone: +44-207-000-8728

Susan Lynch
INSEAD
Boulevard de Constance
77305 Fontainebleau
France
Email: susan.lynch@insead.edu
Phone: +33-1-6072-4000

Bjørn Løvås

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†Corresponding author

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ABSTRACT

This paper examines the effect of informal relationships that connect actors across formal organization boundaries on their relative exploration performance. We distinguish between informal ties that connect actors across formally defined organization boundaries, and the extent to which actors have informal ties that bridge disconnected elements of the social structure. Further, we separate the effects by internal and external network ties. Consistent with extant research, we argue that internal indirect ties allow for mobilization of resources and therefore have a positive effect on exploration performance. In contrast, external indirect ties have a negative effect on exploration. We further posit that internal cross-specialization ties – ties that cross formally defined areas of specialization – are an important mechanism by which actors access information and resources from different knowledge domains. Nevertheless, to successfully mobilize such resources across formal organization boundaries, individuals benefit from having strong indirect ties in their internal networks. Similarly, external cross-specialization ties only have a positive effect on exploration performance when actors have external indirect ties in their networks. Detailed data on 1386 informal relationships of 79 senior partners in a large management consultancy lend support to these arguments.

INTRODUCTION

“I have built a network of people, of relationships in the firm...which can be seen as the old-boy network...it is different from the organizational chart of any other official formal organization, and...it can help internal instances like sharing information, knowing where to find something...The issue we have at Consulting Corporation is how we marry the (informal) network to the formal structure.”

Senior partner, Consulting Corporation

How do informal relationships affect individual performance in formal organizations? Ever since Barnard (1938), scholars studying formal organizations have debated the relative merits of informal relationships in formal organizations (e.g., Blau 1955; March and Simon 1958; Weber 1947). Initial work on boundary spanning outlined the benefits and constraints for actors that were able to bridge organizational boundaries or different constituencies (e.g., Adams 1976; Aldrich and Herker 1977; Friedman and Podolny 1992; Gould and Fernandez 1989). More recently, scholars taking a boundary spanning perspective have emphasized the importance of informal relationships that cut across *formal* organization boundaries as essential to innovation performance and R&D efforts (e.g., Allen 1977; Ancona and Caldwell 1992; Hansen 1999; Powell, Koput, and Smith-Doerr 1996; Tushman 1977). Meanwhile, scholars adopting a social network perspective have argued that the value of informal relationships for innovation and exploration is largely determined by the larger *social* structure within which they exist (e.g., Burt 1992, 2004; Granovetter 1973; Ibarra 1993; Podolny and Baron 1997; Reagans and Zuckerman 2001). Nevertheless, even though these two research streams potentially offer complementary explanations, they have been developed in relative isolation (for exceptions see Fleming and Waguespack 2007; Reagans and Zuckerman 2001). The boundary spanning literature has all but ignored the social structure surrounding the informal relationships that connect individuals

across formal boundaries. The literature on social networks has not systematically addressed formal organization boundaries (cf. Puranam and Gulati 2007). As a consequence, we do not know how informal relationships that connect individuals across different elements of the formal organization structure differ in their effects from informal relationships that bridge across disconnected elements of the social structure. And, in the context of individual performance, we do not know if these two types of relationships are complementary, substitutes for one another, or if they moderate or mediate the effects of one another, or how they otherwise are related.

If such interactions between ties across the formal and informal structure exist, then by studying these two perspectives in isolation; we are likely to miss nuances in the way in which the different types of connections affect individual performance. Indeed, research on social networks has suggested that cohesive network structures may in fact facilitate the mobilization of information and resources (e.g., Podolny and Baron 1997) -- something that is not trivial for boundary spanners trying to bridge different formal areas of the organization.

Finally, there is a dearth of research addressing how - if at all - the formally defined institutional boundary of the firm moderates the effects of informal business relationships on individual performance. Although the notion of external boundaries is central to the literature on boundary spanning, this literature refers to any communication activity between a member of a focal R&D team and someone outside that team as an external relation, irrespective of whether or not this relation is to someone working for the same formal organization or to someone working for a different formal organization (cf. Allen 1977; Ancona and Caldwell 1992; Tushman 1977). It therefore does not distinguish between relations that connect individuals across formally defined areas of specialization

(and hence are *within* the same formal organization) and ties that connect members of a team to individuals that are not members of the same formal organization (many of which may be associated with the same areas of formal specialization). Hence a tie to someone within the same formal organization, but in a different department, is treated the same as a tie to someone outside the formal organization, but within the same area of specialist competence. Similarly, social network scholars have started to address the differences between external and internal ties, yet this notion of external is usually considered either as being external to an individual's immediate social environment (e.g. Burt 2000) or being external to an R&D team (e.g., Reagans and Zuckerman 2001; Reagans and McEvily 2003), rather than being external to the formal organization of which the focal individual is a member.

In this paper, we attempt to shed light on these issues by developing and testing theory that explicitly addresses the extent to which an individual's informal relationships connect individuals across formally defined areas of specialization – as defined by the formal organization structure within which that individual works – and how this affects that individual's relative exploration performance. In doing so, we distinguish between “internal ties”, which refer to informal relationships to someone working within the same formal organization, and “external ties”, which refer to informal relationships to someone working in a different formal organization. The specific research question addressed is: How do internal and external indirect and cross-formal specialization ties affect a manager's relative exploration performance? We examine this question by analyzing the relative exploration performance of a random sample of 79 senior partners in a large management-consulting firm. The data set consists of 948 informal business relationships that were internal to this firm and 474 business relationships that connected the 79 partners to clients outside their firm. Performance

data come from a separate survey of the direct superiors of these partners, which ranks the partners on several performance dimensions. We develop our arguments in the context of this particular setting.

To preview our findings, we find that internally partners benefit from indirect ties in their networks when trying to improve exploration performance, possibly because these ties allow for mobilization of resources inside the firm. Externally, we find lack of indirect ties more beneficial for exploration performance. However, when crossing formal areas of specialization in the organization – both internally and externally – the partners benefit from having indirect ties in their networks, suggesting a moderating effect.

THEORY AND HYPOTHESES

In this section, we elaborate on the link between indirect ties, cross-specialization ties, and exploration performance. We distinguish explicitly between ties in actor's internal network; i.e., ties inside the organization, and ties in an actor's external network: ties that connect actors outside the focal organization. We begin by addressing indirect ties in an actor's internal network and external network, and then move on to addressing internal and external cross-specialization ties. The arguments are developed in the context of this study; namely senior partners in an international consultancy.

Indirect Ties in an Individual's Internal Network and Relative Exploration Performance

Network theorist distinguish between direct and indirect ties (e.g., Gould and Fernandez 1989; Burt 1992; Granovetter 1973). Direct ties are those ties that connect actors directly with the contacts in their network. Indirect ties are the ties that connect the contacts in an ego's network. For example, in

Figure 1A, Ego₁ has three direct ties in her network, but no indirect ties. These direct ties are non-redundant in that each tie connects to one unique individual and that individual has access to unique information and resources. Whereas Ego₁ has no indirect ties, Ego₂ has several indirect ties. This means that there is redundancy in Ego₂'s network because these contacts are all interconnected; each of the contacts is not *unique* in the sense that they likely have access to the same information and resources exactly because they are connected. It would therefore suffice for Ego₂ to be connected to just one of those contacts and every other tie Ego₂ has is therefore redundant.

----- Insert Figure 1 about here -----

Indirect ties in an individual's internal network may improve relative exploration performance in two main ways. The first is by providing support and legitimacy for explorative activities. In comparison to the continued exploitation of existing knowledge and existing business opportunities, explorative activities are associated with uncertain and delayed returns (March 1991). Since investing in risky exploration almost always is at the expense of continued refinement of existing operations (Campbell 1969; March 1991), most organizations (Levinthal and March 1993) and client firms (Christensen and Bower 1997) exhibit a strong bias for continued exploitation of existing business and knowledge, at the expense of investing in exploration for new knowledge and business opportunities. This bias against exploration, in turn, implies that individuals who want to engage in successful exploration have to overcome a certain degree of resistance from their managers, peers, and even client contacts. To successfully do this, they have to have a degree of credibility and legitimacy over and beyond that afforded by simply being a member of the formal organization. Whereas an individual's role and position in the formal organization may provide sufficient legitimacy to successfully engage in the activities and responsibilities defined by it, this formally derived legitimate authority is unlikely to

provide the support needed to successfully engage in new and exploratory ventures. Such ventures will often take the individual actor outside the formally defined mandates and specialized competencies of the organizational unit to which that person belongs. In such a situation, indirect ties in an individual's network provide an alternative source of legitimacy and support.

As discussed by Podolny and Baron (1997), a dense network characterized by many indirect ties may be a prerequisite to playing any brokering role. This is also consistent with Tushman and Scanlan's (1981) study of boundary spanners, where they found that even if a boundary spanner was a member of a formal organizational unit (an R&D department), that person still needed informal connections within the groups to fully leverage the brokering opportunities presented by the informal connections to knowledge domains outside the formal group (cf. Fernandez and Gould 1994; Gould and Fernandez 1989). In addition, exploratory learning often requires novel recombination of existing resources and capabilities (e.g., Galunic and Rodan 1998; Moran 2005). To effectively do this, managers often need to mobilize scarce resources outside the normal routines and standard operating procedures of a firm. Such entrepreneurial action implies convincing informal contacts that it is a good idea to provide an actor with scarce resources, even though it is not that person's job to do so, and even though the venture may fail. This may be difficult to do, especially if the contact is uncertain about actor's ability and willingness to return the favour. In such a context; direct ties that are embedded in a cradle of indirect ties may provide the necessary information gathering and sanctioning potential to allow a focal individual to access scarce resources without having to rely on a formal contract or the legitimate resource allocation and authority system of the organization (cf. Løvås and Sorenson, forthcoming).

Hence, indirect ties in an individual's internal network may allow that individual actor to mobilize resources in a non-routine way, leading to a higher relative exploration performance. In contrast, lack of indirect ties means that the individual must rely on the organization's established systems and routines for accessing resources, which most likely will lead the individual to reinforce the organization's bias towards exploitation through a pattern of well established resource combinations. This in turn, will lead to lower relative exploration performance. In formal terms:

Hypothesis 1. *The number of indirect ties in a partner's internal network positively affects the relative exploration performance of that partner.*

External Indirect Ties and Relative Exploration Performance

A rich stream of research on social networks suggests that lack of indirect ties in an individual's *external* network allows for brokering across disconnected others (e.g., Burt 1992, 1997, 2000; Podolny and Baron 1997). By being connected to external contacts that do not know one another, an individual can broker innovative ideas and practices across knowledge domains (Burt 2004). To the extent external actors represent different knowledge domains (as defined by being part of different clusters of the social structure), the individual may be exposed to new ways of thinking, and discover new and novel ways to recombine existing knowledge and resources. In addition, the individual may benefit from a form of brokering unique to being the bridge between actors that are not themselves connected, which is to sell a product or service that is well-established in one cluster defined by the social structure, but is new and novel to another cluster of the social structure. The key idea here is that this would not be possible if these clusters were tightly connected, as knowledge about these

services and practices would diffuse directly between them, and therefore not allow the focal individual to play a brokering role (cf. Gould and Fernandez 1989).

In the context of this study, such brokering would make it possible for a partner to sell new ideas, knowledge, and services obtained by working with one client to other clients. The lack of connections between the clients makes it less likely that they will learn about these ideas and practices from one another. Hence, although these ideas may not be new to the partner, by virtue of being in such a brokering role, that partner will nevertheless be better positioned to develop new lines of business with existing clients, thereby contributing to a relatively higher exploration performance.

Hypothesis 2. *The number of indirect ties in a partner's external network negatively affects the relative exploration performance of that partner.*

Internal Cross-Specialization Ties and Relative Exploration Performance

In this section we will address internal cross-specialization ties and discuss their impact on exploration performance. As illustrated in Figure 1B, we here define cross-specialization as those ties that actors have across formal specializations in the organization. Cross-specialization ties differ from indirect ties in two important respects. The first and most obvious of these is that for internal cross-specialization ties; the source of heterogeneity is ties that bridge across differentiated elements of the *formal* organization structure. In contrast, for indirect ties, the source of heterogeneity is ties that bridge across disconnected elements as defined by the *social* structure of people working in the organization (non-redundancy comes from lack of indirect ties). The second and subtler difference relates to the role of connections between direct contacts. A cross-specialization tie perspective

assumes neither an absence nor a presence of indirect ties -- as defined by the extent to which an individual's direct contacts are themselves connected —(cf. Fleming and Waguespack 2007). In contrast, it is the lack of indirect ties (non-redundancy) that creates heterogeneity, that is, a non-redundant tie is by definition a tie to someone who is *not* connected to other members of the focal individual's network (see Burt 1992, 1997, 2000 and 2004 for extensive discussions of this).

We will argue here; that when an actor has informal relationships to individuals that work in a different formally designated area of specialization within the same organization, that will initially reduce that individual's relative exploration performance, before gradually resulting in higher relative exploration performance. The basic premise of this argument is that ties that cross formally defined areas of specialization within a firm differ in the influence and opportunities they present, from those that connect individuals working within the same formally defined area of specialization. This premise, in turn, is based on the assumption that formal organizations are formally differentiated systems that consist of specialization and integration (e.g., Lawrence and Lorsch 1967; Weber 1947), where specialized skills and competencies are grouped together and selectively linked to other units (e.g., Thompson 1967). Since these specialized units actively select, develop, and retain individuals with similar specialized skills (e.g., Allen and Cohen 1969), and since they develop their own specialized routines and competencies (e.g., Hannan and Freeman 1989; Nelson and Winter 1982), the formal structure of an organization represents a significant source of heterogeneity in terms of resources, capabilities, and schemes. Especially, as the members of the different formally differentiated units view the world differently. As a consequence, one would expect that informal relationships that connect a manager across these formally defined areas of specialization would provide that manager with access to a set of heterogeneous information, resources and opportunities,

potentially allowing that individual to see things differently, and thus presenting that individual with the opportunity to broker ideas and practices across different knowledge areas. In contrast, one would expect that informal relationships that connect a manager to other actors within the same area of formal specialization would provide deeper and more fine-grained access to the same set of mind-sets, resources and opportunities already available through the formal structure, potentially reinforcing that individual's knowledge of and commitment to these.

This argument is consistent with much research in social networks (e.g., Reagans and Zuckerman 2001; Reagans and McEvily 2003), with the exception that the source of access to different mindsets, resources and opportunities does not come from having ties that broker across unconnected clusters defined by the social structure, but rather from brokering across differentiated clusters as they are defined by the *formal* structures of specialization and (non)-integration in the firm (cf. Gould and Fernandez 1989). For example, Reagans and Zuckerman (2001) find that teams that draw their members from different cohorts are likely to have members that connect the team to outside opportunities or pools of knowledge that are not themselves connected, thereby providing the focal team with the opportunity to broker across different formally defined knowledge domains: "...a cross-functional team is expected to bridge holes between different functional areas in the larger organization" (2001: 504). The argument we develop here is consistent with Reagans and Zuckerman, but differs from theirs in that we measure access to different formally defined knowledge domains directly¹.

¹ Reagans and Zuckerman (2001) use organizational tenure as a proxy for heterogeneity in the network and as such do not measure directly whether actors cross different functional areas.

Cross-specialization ties within the same formal organization, then, have the somewhat paradoxical effect of producing diversity and homogeneity at the same time. They produce diversity in the sense that they connect individuals to contacts different from themselves in terms of different specialized skills and competencies. They produce homogeneity in the sense that these contacts are likely to have similar values, language, and interpretive schemes as the focal individual because they are within the same formal organization.

Since this is happening within the same formal organization, one would expect that it should be relatively easier to communicate across knowledge domains (cf. Argote and Ingram 2000). Exposure to different opportunities, knowledge and mindsets, however, does not necessarily translate into a higher relative exploration performance. Initial or very little exposure to different knowledge domains and different ways of thinking about the world may result in more confusion than illumination. Such confusion may stem from not having sufficient exposure to different domains or from having sufficient exposure but not having sufficient absorptive capacity to effectively interpret and internalize the potential learning (Cohen and Levinthal 1990; Reagans and McEvily 2003). This argument is consistent with research on boundary spanning, which suggests that to effectively interpret across differentiated knowledge domains, an individual needs sufficient grounding and connection to both (Tushman and Scanlan 1981). Hence, we argue that just having a few ties that cross into different formally defined areas of specialization is not sufficient to produce such a grounding and connection, and will result in lower relative exploration performance than not having any such ties at all.

Nevertheless, if an individual has a critical mass of ties across formally defined areas of specialization, these ties will have a positive effect on relative exploration performance. Beyond a certain minimum threshold, such ties provide sufficient grounding and connections to other knowledge domains to allow the individual to effectively interpret and absorb the different knowledge and mindsets that exist there, paving the way for innovative recombination of different knowledge, or for the transfer of knowledge and practices that are already established in one knowledge domain, but that are new and novel to another (e.g., Burt 2004; Hargadon and Sutton 1997).

In the context of the management consulting partners in this study, such exploration can happen in at least two main ways. First, in terms of developing new and innovative solutions for the company and clients, exposing the individual actor to organization members with a different set of skills and competencies, makes that individual actor more likely to produce new, valuable ideas and solutions (Burt 2004). This is largely a cognitive process, where exposure to different knowledge domains enables the partner to come up with new and innovative ideas or business practices. Second, ties to members in other areas of specialization may connect the focal individual to new business opportunities; that is, selling services to clients of the partner's contact, or selling some of the contact's services to the focal partner's contacts. Since this will rarely happen if the management consulting services on offer have been sold in this context before, it constitutes exploration in the sense that the service or practice introduced is new and novel to that particular sub-segment of the market.

In formal terms, we hypothesize that:

Hypothesis 3a. *There is a u-shaped relationship between the number of cross-specialization ties in a partner's internal network and that partner's relative exploration performance.*

In addition to on average positively affecting relative exploration performance, we expect that there will be a positive interaction effect between the number of cross-specialization ties and the number of indirect ties in an individual's internal network. The two reasons for this relate to those discussed above. First, an individual with many ties to contacts in other areas of the firm is more likely to discover new knowledge and / or new ways of doing business. This will result in a higher need to operate outside the existing resource allocation and authority systems of the firm, requiring more legitimacy and support within the unit, as well as the ability to access scarce resources from areas outside the unit, where that individual cannot easily rely on the formal resource allocation system of the firm. As discussed above, having indirect ties in the internal network will both increase an individual's legitimacy and support, as well as facilitate access to scarce resources. As an individual's number of internal cross-specialization ties increases, that person is likely to spend more time and energy outside the unit. This, in turn, may lead to a legitimacy problem. By having many indirect ties between the direct contacts in the network, however, the legitimacy and support afforded by such cohesive networks may compensate for the reduced support associated with focusing time and energy outside the unit. Specifically, the higher the number of cross-specialization ties in a partner's internal network, and the higher number of indirect ties in that same network, the higher the relative exploration performance. In formal terms:

Hypothesis 3b. *There is a positive interaction effect between the number of cross-specialization ties in a partner's internal network and the number of indirect ties in a partner's internal network on the relative exploration performance of that partner.*

External Cross-Specialization Ties and Relative Exploration Performance

External cross-specialization ties differ from internal ones in that they provide even less “bandwidth” for successful communication and learning to take place. Having cross-specialization ties to someone in a different organization, implies not only having to communicate and interpret across different specialist knowledge domains, but also having to do so across the different cultures and schemes that often characterize different formal organizations. That communication is more troublesome across formal organizations than within them is a central premise of the boundary spanning literature. Allen and Cohen (1969) argued: “In industrial and governmental laboratories, however, the organization is of primary importance to its members. The organization demands a degree of loyalty and affiliation far outweighing that required by academic departments; and mutual experience and schemes of ordering the world that are bureaucratically imposed are characteristic of the organization and can be quite different from the schemes of members of their particular discipline in other organizations...The existence of different coding schemes in different organizations introduces the possibility of mismatch and attendant difficulties in communication between organizations” (1969: 12).

Having to connect across two formal organization boundaries – the external boundary of the organization and the boundary defining specialist expertise and competence – is a bridge too far with respect to successfully developing new knowledge and business opportunities. Hence, we do not expect such ties on average to have a positive effect on relative exploration performance.

Nevertheless, we argue that for individuals who also have a certain number of *external indirect* ties, having external cross-specialization ties will have a positive effect on relative exploration performance. These external indirect connections may allow for richer interactions in the overall network, which in turn affects the individual actor's exploration performance. Interaction in close-knit groups has been shown to facilitate learning and sharing of knowledge (Brown and Duguid 1991; Kogut and Zander 1992). One of the reasons for this is that such groups are able to develop a shared language of communication (Boisot 1995). As people interact over time they develop a common knowledge base on which to conduct exchanges. Without such a common knowledge base, communication may be difficult as organization members are likely to have different understandings of the knowledge they have access to, depending on where in the organization they are located and how they usually interpret certain types of knowledge (Allen and Cohen 1969). Moreover, once such a common knowledge base exists, it will be easier for parties to communicate and learn, as they are able to draw on previous learning (Cohen and Levinthal 1990; Reagans and McEvily 2003). Thus, when actors connect across both firm boundaries, and into different areas of specialization, they may benefit from richer exchanges in the network.

In the context of this study, the implication of this is that, on average, for a management consulting partner who specializes in the insurance industry to be connected to an executive in the software industry is not sufficient to successfully develop new knowledge or business models. In contrast, for a partner in the insurance industry, having external ties to a client in the software industry will have a positive effect on relative exploration performance when there is some level of redundancy in that partner's external network. In formal terms,

Hypothesis 4. *There is a positive interaction effect between the number of cross-specialization ties in a partner's external network and the number of indirect ties in a partner's external network on the relative exploration performance of that partner.*

SOCIAL NETWORKS AT A MANAGEMENT CONSULTING FIRM

The empirical project began with in-depth interviews of 32 senior partners at a major management consultancy, henceforth referred to as Consulting Corporation². Table 1 provides some basic descriptive information about each of the interviewees, and the Appendix describes the methodology. At the time of the study, the firm employed more than 55,000 professionals delivering a wide range of management consulting services in more than 100 countries, making it one of the largest, most diversified, global professional services firms worldwide. Our study focused on the group of 1,100 semi-autonomous senior partners that own and manage Consulting Corporation.

----- Insert Table 1 about here -----

The senior partners of Consulting Corporation expressed their most important responsibilities as centered around two main activities. The partners were systematically measured in their evaluations, and rewarded for, their performance in both of these activities. These two activities involved selling projects and mobilizing the resources needed to implement these projects. More specifically, the partners were expected to seek outside the firm to identify and negotiate access to attractive business opportunities. Meeting revenue targets required each senior partner, on average, to generate nearly \$10 million per year in consulting revenues. While the partners did rely on selling additional business to existing clients, they were also expected to develop new business with new clients.

² We have assigned pseudonyms to the management consulting firm, the partners working there, as well as their clients. This is to protect their anonymity and the confidentiality of the data.

In addition to growing the business, the partners were also measured on their contribution to the firm in terms of developing new knowledge and expertise. As with any consulting firm, to stay competitive Consulting Corporation had continuously had to renew itself and develop new knowledge and expertise that would help improve and expand the client business.

Network Survey

To test our hypotheses in a more systematic way, we used a network survey instrument to collect additional data. Though the partners had strong opinions about how social networks affected their jobs, garnering accurate data on the social structure surrounding partners' relationships, as well as information about the placement of these contacts in the formal structure required more extensive network data than that provided through the interviews. The qualitative interviews revealed that partners relied on and maintained diverse relations connecting them both to other colleagues in other offices (i.e. other countries), as well as to external actors (i.e., clients and other external contacts). We therefore decided to use an egocentric network instrument³.

We developed a network questionnaire based on the methodology originally used by Burt (e.g., 1997, 2004; for a more detailed discussion see 1992: 121-125). First, participants were asked to respond to a set of name generators (e.g., "Who are your most reliable sources of valuable information in terms of identifying attractive business opportunities?"). Next they had to answer a set of name interpreter questions about each of these primary contacts (e.g., "how often do you currently talk to each person?"). Finally, we asked the respondents to fill in a matrix connecting each pair of direct contacts

³ Given the diverse set of contacts, especially outside the firm, it was almost impossible for us to develop a list of all possible contacts for each respondent to consider. Consulting Corporation itself had 55,000 employees that a respondent might identify as an important contact, and the inclusion of external contacts made such a list essentially endless.

that they named, that is, the indirect ties in their network. Although this approach provides a sound basis for collecting information on indirect ties in an egocentric survey, our qualitative interviews suggested that the original name generators might not seem relevant to the partners in Consulting Corporation. We therefore customized six of the seven name generators to the primary responsibilities of the senior partners at this firm (Table 2 provides the exact wording of the name generators, as well as some descriptive statistics)⁴. An additional name generator question allowed the partners to add “... any other individuals who are an important part of your network and do not fit into the previous categories.” In order to accommodate the unique characteristics of this context, minor modifications were also made to the name interpreter questions. Nevertheless, the approach and questions used to measure indirect ties follows Burt’s methodology exactly (Table 3 shows the wording of the name interpreter questions used in this paper)⁵.

----- Insert Tables 2 and 3 about here -----

The Managing Partner at the CEO’s office sponsored this second stage of our data collection. Before piloting the survey instrument, she arranged to have three partners and managers answer a final draft of the survey instrument and discuss their responses with us. This exercise indicated close correspondence between the intended meaning of the questions and the respondents’ interpretations of them. We subsequently piloted the survey through the internal mail to six senior partners in

⁴ Pilot tests of the survey revealed that respondents often wanted to backtrack in the survey as they recalled additional important contacts in their network. To increase the reliability of the survey, we adopted a two-stage approach: First, the interviewers asked respondents to “please identify the individuals, both internal and external to the firm, who are the most important to your work at Consulting Corporation?” This step was done on a blank piece of paper and generally yielded an unstructured list of around 15-20 names. Second, the interviewer asked the respondent to complete the name-generating questions as per usual, without feeling bound by the initial list.

⁵ Statistical tests suggested few significant differences in terms of the number of contacts generated across the ten geographical regions. Partners working in the London office identified more contacts (20.82 on average), and those in the Tokyo office identified fewer contacts (15.38 on average). The same trained researcher conducted the interviews in Tokyo and London. The relatively smaller networks in Japan may reflect the depth and cohesiveness that characterizes economic relationships in that culture. The relatively larger networks in London may result from the city’s unique role as a global economic and financial center, with higher rates of people moving to and from the city.

Consulting Corporation. The pilot turned out to be problematic. The partners felt that the relatively large size of their networks (18 ties on average)⁶ made answering the survey both complex and time consuming. This was mainly a consequence of the last question, which asked the partners describe the relationships between the contacts in their networks (for the average respondent with 18 direct ties, this question required the partners to consider 153 alter-alter relationships; those identifying the maximum number of 24 contacts would need to review 276 dyadic combinations).

To address this problem, we decided that five trained researchers administered the network surveys in person. Pilot tests of face-to-face interviews with six senior partners in the U.S. and London revealed that this approach was preferential to administering the survey through internal mail. In addition, although the researchers only served to answer clarifying questions, their presence and the pre-booked appointment slot meant that the partners were undisturbed while answering the survey. This approach did require a modification to the sampling procedure: Surveying a random sample of senior partners across Consulting Corporation would require flying the researchers to more than 50 locations around the world. This would far exceed the project's budget and available manpower. Consequently, we used a cluster sampling procedure, selecting senior partners at random from ten major offices: San Francisco, Chicago, New York, London, Paris, Frankfurt, Milan, Madrid, Tokyo, and Sydney⁷.

In order to ensure maximum participation, each of the sampled partners received three communications encouraging their involvement in the survey. First, the Global Managing Partner of Consulting Corporation sent each partner an e-mail explaining the primary objective of the survey,

⁶ Though substantially larger than networks identified in extant work, this likely reflects the senior positions of the respondents. For example, Burt (2004) reports that the networks of vice presidents in the electronics firms he surveyed contain two to four times as many contacts as those of middle managers.

⁷ A secretary selected every fifth partner in each of these offices from alphabetical lists that included all partners associated with that office.

that is; to learn more about how the firm worked. In this e-mail it was also explained that the firm would not have access to individual responses, and the importance of their participation was emphasized. Then each of the managing partners of the 20 different competency and market units personally called the partners that reported to them to explain the nature of the survey and to ask for their involvement. Finally, each of the trained researchers contacted the assistants of the sampled partners to schedule a one hour meeting within the one or two week time slot allocated to that geographical location. Ten partners were dropped from the initial sample: Four partners left the firm between the sample selection and the interview period; an additional six partners had engagements that kept them away from their offices during the period of the trained interviewers' visit. In total, the researchers scheduled meetings with 133 partners and 102 surveys were completed, yielding a 71% response rate⁸. Table 4 provides some descriptive information about the partners that were surveyed.

----- Insert Table 4 about here -----

MEASUREMENT

The usage of an ordinal dependent variable potentially causes problems for OLS regression, which may yield inefficient estimates (McCullagh 1980). Instead, we therefore use ordered probit regression to test our hypotheses. By including multiple intercepts, this procedure allows for the possibility that respondents potentially do not perceive hierarchically ordered categories as equally distant. Since the standard errors are normally distributed we used ordered probit regression rather than ordered logit

⁸ Even with these extensive follow-up procedures, many of the sampled senior partners were unable to complete a survey. Business frequently called them out of the office. This resulted in rescheduling of appointments. Also, in a couple of cases, illness kept the partner away from the office for the entire duration of the researcher's visit at that location. Tests comparing the 133 senior partners originally sampled to the 102 completed surveys did not reveal any significant differences in means on the available demographic information (e.g., office, practice, tenure with firm).

regression⁹. In particular, we estimate the ordered probit regression using robust standard errors clustered on rater number. Rater number is a number assigned to each of the 21 supervising partners that evaluated the senior partners on performance. This clustering procedure allows for differences across the evaluations of the supervising partners, which provided the information for the dependent variable.

Dependent variable

Performance data were gathered in a separate survey of the supervising partners of the senior partners. Unfortunately legal and confidentiality issues regarding annual review documents at Consulting Corporation meant that we were unable to gather this information directly from human resources. It was therefore agreed with the sponsors of the study that the supervising partners who had conducted the annual review would provide an assessment of each of the sampled partners along several important dimensions. First, the supervising partners were asked to evaluate each of the partner's relative performance on two dimensions: (i) the ability to identify and develop new business opportunities, as compared to the same partner's relative ability to implement existing business opportunities¹⁰ and; (ii) the ability to develop new knowledge and expertise, as compared to the ability to effectively and efficiently exploit knowledge and expertise that already existed with the firm. We chose such a forced trade-off for two reasons. Theoretically, exploration for new business opportunities and knowledge almost always comes at the expense of further refinement and efficient

⁹ Nevertheless, we ran all the models reported in this paper using both ordinary least square and ordered logit regressions. There were no significant differences between these results and those reported in this paper using ordered probit regression.

¹⁰ It was emphasized that "new business development" referred to the development of fundamentally new business activities, both with existing clients and with new clients, or the development of fundamentally new client engagements based on an existing set of practices. New here meant a sort of business activity that the firm had not yet engaged in, as opposed to an expansion or renewal based on existing practices with existing clients. In a management consulting context, the latter represents perhaps the most important way in which a firm achieves efficiency in its operations, and thus reflects exploitation of existing business operations rather than exploration of new ones.

exploitation of existing business and knowledge (Campbell 1969; March 1991). Since the unit of analysis in the study is the performance of individual partners – who for most practical purposes act as profit centers within Consulting Corporation -- forcing a trade-off between these two important dimensions is appropriate. Second, from a methodological perspective, because successful exploration is associated with uncertain and delayed return, and since it is much more difficult to measure than traditional performance variables such as revenue generation and profit margins, forcing the supervising partners to make a relative comparison would potentially be more reliable than asking them to provide an evaluation on an absolute scale.

Each of the supervising partners then assessed the senior partners' performance with respect to revenue generation, profit margins, people development, and innovation. These performance data were collected via 30-minute interviews conducted by one of the authors with the supervising partners in February and March 2000, shortly after the official annual reviews of the partners were completed. The evaluation survey was developed with the help of the managing partners sponsoring the project, and tested on two lead partners.

It was decided to conduct these interviews over the telephone. This ensured that surveys were completed correctly and required minimum time from the partners. Some problems with scheduling, cooperation of the lead partners, and changes in responsibilities of lead partners, or the partners that participated in the network survey, meant that it was not possible to collect performance data on 23 of the partners. Performance data on 79 of the 102 partners surveyed were collected from 21 lead partners. We tested the data for systematic differences on the main independent variables of those

partners that performance data were collected on, in comparison with those that these data were not obtained for, and found no evidence of bias¹¹.

Relative exploration performance. As discussed above, the senior partners face a trade-off between investing their time and energy in developing new business opportunities and implementing existing business operations, as well as a trade-off between investing their time and energy in developing new knowledge and making efficient use of existing knowledge. Given the time and resource constraints of a senior partner, this trade-off is most accurately understood as uni-dimensional (March, 1991). Tasks that involve a high degree of exploration require different types of information, knowledge and skills from tasks that involve a high degree of exploitation. The managing partners responsible for the annual performance review of the partners surveyed were asked to rate the balance of strength of the partner participants along the dimensions on a five point Likert scale: from one: “Much better at implementing existing business” to five: “Much better at new business development”, and from one: “Much better at leveraging existing knowledge and expertise;” to five: “Much better at developing new knowledge and expertise.” We combined these two measures to create a single overall measure of the individual partner’s *relative exploration performance*. Taking the mean of the two separate measures created this variable (*Relative exploration performance*). Measured this way, a partner’s score on relative exploration performance is most accurately understood as an overall capacity for exploration (represented by new business development and new knowledge development) in comparison to an overall capacity for exploitation (represented by execution of existing business and leverage and reuse of existing knowledge).

¹¹ To test if there were any systematic biases between the 102 senior partners that network data were collected on and the 79 that performance data were collected on, we tested for differences in the mean value of the main independent variables. Levene’s test (1960) revealed that there were no significant differences with respect to any of these measures.

Independent variables

Cross-specialization ties internal and *cross-specialization ties external* are measured as the total number of ties a partner has to someone outside their global industry group (i.e., Resources, Products, Financial Services Industry, Communications and High Tech, and Government). As discussed above, these five global industry groups clearly were the main sources of formal specialization and differentiation within Consulting Corporation, both in terms in terms of assignment of responsibilities in the market place (for example, a partner in the financial services industry was expected to have banks and insurance companies as clients) and in terms of the internal organization structure (for example, partners in financial services reported to the same global supervising partners, were members of the same industry practice groups, and were evaluated and rewarded according to their ability to develop the firm's practice in that global industry group). Practically, the information used to classify each tie was obtained from Question number 27 in the survey, which asked the surveyed partner for affiliation information of each of his external and internal contacts (see Table 3).

Indirect ties internal and *indirect ties external* are measured as the average number of indirect ties surrounding each direct tie in a senior partner's internal and external networks. This measure is created in two steps. First, for each contact named, we count how many of the respondent's other contacts that that individual knows. As respondents could name as many as 24 direct contacts, the total number of possible indirect ties in each dyad ranged from 0 to 23; in reality, the average dyad had 2.8 strong indirect ties (where the respondent indicated that both of his contacts definitely knew each other well) and 4.5 weak indirect ties (where the respondent indicated that both of his contacts knew each other, but not very well. Question 28 in Table 3 gives the exact wording of the question

asked to map the indirect ties and Table 5 provides more descriptive statistics¹²). In computing the measure for indirect ties, we only counted strong ties. This is consistent with research suggesting that more information and influence flow through strong ties than weak ties (e.g., Uzzi 1997, 1999; Hansen 1999) and with theorizing focusing on the constraints associated with strong indirect ties (e.g., Burt 1992)¹³. The raw score for each tie in a partner's external network was then averaged across these to create *indirect ties external*, and the raw score for each tie in a partner's internal network was averaged to create *indirect ties internal*¹⁴.

----- Insert Tables 5 and 6 about here -----

Control variables

The models also included several network controls (see Table 5 for descriptive statistics). *Financial performance* is measured as the product of revenue generation and profit margins, obtained through the performance survey of the supervising partners. Controlling for financial performance ensures that the supervising partners are not confusing high revenue generation and high profit margins with relative capacity for new business development and new knowledge generation.

¹² While a more complete measure of the relationship between two alters would be to ask those two alters directly about their relationship, as opposed to asking the partners to rate the relationship between these two people, it was not practically possible for us to obtain such a measure. Specifically, it would involve verifying and cross-referencing approximately 16,600 relationships with people across numerous organizations and across many different countries. In addition, it is common practice to use egocentric measures for indirect ties in a network (cf. Burt, 1992; 2007). Finally, because the people that the partners listed in their networks were the most important contacts for them in their work and the ties had existed on average 5.5 years, it seems reasonable to assume that the partners knew those contacts well enough to estimate the relationships between them.

¹³ Nevertheless, additional analysis not reported here revealed that only counting strong ties essentially produces the same effects as a measure that includes weak indirect ties at half the weight of strong indirect ties, or as including strong and weak indirect ties with equal weighting. In contrast, only counting weak ties reveals more subtle nuances in the data, and results in changes to some of the results reported here. These nuances are moderated not only by the presence of strong indirect ties, but also by whether they are between two contacts that both work in the same firm as the partner, between two contacts that both work in a different firm as the partner, or between one contact that works in the same organization as the partner and one that works in a different organization as the partner. Adopting such an approach would not only complicate the theoretical argument unnecessarily, but would also take us outside the scope of this paper.

¹⁴ Calculating the measure in this way at the dyadic level facilitates aggregation to separate measures for external and internal networks of a partner, while still allowing the indirect ties that cut across this internal-external boundary to be included in the tally of average indirect ties in each sub-network.

Partner demographics. Background data on each partner's *age*, *gender*, and *education* were collected. Individual ability to develop new business and knowledge may derive from individual attributes such as experience, seniority or education. One might expect younger partners to be better at developing new business opportunities and new knowledge than their older colleagues, and to the extent that new business development depends on unique human capital, one would also expect partners with higher education to score higher on these dimensions. The demographics also include a variable measuring the partner's tenure and the numbers of years the partner was with Consulting Corporation before being promoted to partner (*years before partner*). The longer each partner has worked for the firm, the more familiar he or she is likely to become with the organizational routines and basic workings of the firm. This familiarity could lead to a bias towards exploitation, at the expense of new business and knowledge development. On the contrary, partners with low scores for *years before partner* are less likely to be familiar with the routines of the firm. Consistent with March's (1991) argument about enculturation and exploration, these partners could be expected to have relatively higher exploration performance.

Industry specialization in the formal organization structure. As discussed above, the senior partners at Consulting Corporation were organized in five global industry groups: Government, resources, products, financial services, and communications and high tech. The pace of change in these industries may vary (Brown and Eisenhardt 1997). Partners working in a fast changing industry may therefore be rated relatively better at exploration because the projects they work on require them to constantly explore new ideas and projects. Conversely, partners who are working in a relatively

slow changing industry may be rated relatively better at exploitation. We use dummy variables for each industry as controls.

Properties of Direct Ties

Size internal and *size external* are measured as counts of the number of ties in a partner's external and internal networks, respectively. A large network may provide more opportunities for discovering new business opportunities and knowledge than a small network, as the partner that has a large network may be more likely to bridge across different knowledge domains (Burt 1992, 2004). *Frequency internal* and *frequency external* capture how often a partner on average communicates with the contacts in her internal and external networks. This measure came from a question asking respondents "On average, how often do you currently talk to each person?" Frequency of communication may indicate a higher capacity to communicate within and across organizational boundaries, and has been found to be a characteristic of successful boundary spanning individuals (Tushman and Scanlan 1981). *Closeness internal* and *closeness external* are measured as the strength of the direct relationship between the ego and each contact in an ego's network. This measure came from a question asking respondents to rate, "How close are you with each person?" on a five-point scale (from 1=distant to 5=especially close). Weak ties may make partners more efficient at searching for new knowledge and business opportunities within the organization (Hansen 1999). Emotional affect and the trust engendered by strong ties may substitute for indirect relations in facilitating exchange under conditions of uncertainty (Uzzi 1996, 1997). The measures are constructed by taking the average score on *closeness* of direct ties in a partner's external and internal networks, respectively.

RESULTS

Table 7 reports the ordered probit estimates (with robust standard errors clustered on rater number) on relative exploration performance.

----- Insert Table 7 about here -----

The first model estimated the effects of the non-network related control variables on relative exploration performance. Financial Performance is not significant, lending assurance that the dependent variable is independent of revenue generation and profit margins. Neither age, gender nor education have significant effects on relative exploration performance. In contrast, this model indicates that the longer time a partner took before becoming a partner at Consulting Corporation, the lower her relative exploration performance. This is consistent with March's (1991) argument about enculturation; which holds that recent hires into a firm provide a stimulus towards exploration as they are not yet fully socialized into an organization's way of conducting business. In this empirical context, such socialization largely happens before an individual becomes a senior partner with the firm. Hence, the more senior a partner was when that person was hired, the less the partner would have been exposed to these socialization forces. The first model also includes controls for the five global industry groups, around which the firm's articulated strategy and formal organization structure was anchored. The results indicate that working in resources, government, and the financial services industries lead to lower relative exploration performance. This could be, for example, because the senior executives of large banks and insurance companies that constitute the majority of clients in the financial services industry are less geared towards experimenting with new business models and new knowledge than clients in other industries. It might also be because this firm is generally focused around large implementation projects – and such projects are likely to be biased towards exploitation

and consequently may foster less exploration, regardless of the industry in which the partners work. If that is the case, then the partners in the firm would generally face a bias towards exploitation and face difficulties exploring.

Model 2 introduces three sets of network controls. Neither the size of the partners' networks nor the average closeness of their relationships has an effect on relative exploration performance. Frequency of communication with their contacts inside the organization is also not significant, but frequency of communication with external contacts has a positive and significant effect on relative exploration performance. This is consistent with a central premise in the boundary spanning literature, which holds that communication intensity across boundaries is the defining characteristic of successful boundary spanning individuals (e.g., Allen 1977; Tushman 1977).

The third model introduces the average number of indirect ties in a partner's external and internal networks, respectively. The number of indirect ties in a partner's external network has a negative effect on relative exploration performance. Specifically, the more closed the partners external networks are, the lower their exploration performance. This is consistent with extant theory on the brokering benefits that come from having ties that bridge across unconnected social clusters (e.g., Burt 1992, 1997, 2004; Reagans and McEvily 2003). In contrast, the number of indirect ties in a partner's internal network has an equally strong positive effect on relative exploration performance. This is consistent with more recent research on social networks, which holds that individuals may derive legitimacy and support benefits from having indirect ties in their immediate work environment (Burt 2000; Podolny and Baron 1997). Moreover, teams may benefit from having a dense web of indirect ties between their members, while allowing them to broker across differentiated knowledge

domains external to the team (Reagans and Zuckerman 2001; Reagans and McEvily 2003). The results reported in this model provide support for hypotheses 1 and 2 and are consistent with this previous research.¹⁵

Model 4 introduces internal cross-specialization ties and internal cross-specialization ties squared. The main term has a strong negative effect on relative exploration performance whereas the square term has a strong positive effect. These results support Hypothesis 3a, which held that there is a u-shaped relationship between the number of cross-specialization ties in a partner's internal network and relative exploration performance. Also notice that including these variables in Model 4 strengthens rather than weakens the effects of the number of internal and external indirect ties; both have increased effect sizes while the standard errors remain about the same. Model 4 also includes a term for external cross-specialization ties. As expected, external cross-specialization ties have no effect on exploration performance.

Model 5 adds the interaction term between internal cross-specialization ties and internal indirect ties. This interaction term is positive and highly significant. This result lends support to Hypothesis 3b, which held that there is a positive interaction effect between the number of cross-specialization ties in the internal network and the number of indirect ties in the same network on that individual's exploration performance. This finding is consistent with recent work by Fleming and Waguespack (2007), which shows that leaders are more likely to emerge among those who are able to span boundaries in cohesive networks.

¹⁵ The results differ in that the external-internal boundary in this study is defined by the institutional boundary of the formal organization. Previous studies, on the contrary, measured the external boundary by the extent to which a tie is external to an individual's immediate work group or an R&D team, yet still within the institutional boundaries of the firm.

Model 5 also introduces external cross-specialization ties and the interaction effect between external cross-specialization ties and external indirect ties. The effect is positive and significant, lending support to Hypothesis 4, which held that there is also a positive interaction effect between external cross-specialization ties and the number of external indirect ties on relative exploration performance.

In Table 8, Models 1 and 2 test hypothesis 3 by splitting the sample along the number of internal cross-specialization ties. This test provides additional support for hypotheses 3a and 3b and means that we do not have to rely only on the models estimating square terms and interaction effects. Splitting the sample along the number of internal cross-specialization ties effectively “interacts” the independent variables with internal cross-specialization ties. If the effects of the independent variables on relative exploration performance are contingent upon the number of internal cross-specialization ties (as suggested by Hypotheses 3a and 3b), then these variables should have different effects in the two subsets of the sample. In Model 1; only partners with less than two cross-specialization ties in their internal network are included (N=43)¹⁶. Although not significant, it is consistent with Hypothesis 3a, that internal cross-specialization ties have a negative effect on relative exploration performance for those partners that have relatively few internal cross-specialization ties. External cross-specialization ties are also not significant for this subset of the sample. In Model 2, only partners with two or more internal cross-specialization ties are included (N=36). Consistent with Hypotheses 1, 2, and 3, internal cross-specialization ties, internal indirect ties, and external cross-specialization ties all have strong, significant effects on relative exploration performance for this subset of the sample. We also see here that in this part of the sample internal cross-specialization ties changes sign and becomes positive. As the term is not significant in Model 1, we cannot conclusively confirm the u-shape, however, we can establish that at least partners that have more than a threshold

¹⁶ The mean value of internal cross-specialization ties in the full sample (n=79) is 1.76.

of two internal cross-specialization ties perform better in terms of exploration performance. This is in line with the arguments developed in relation to Hypothesis 3a.

----- Insert Table 8 about here -----

DISCUSSION AND CONCLUSION

While we believe the findings in this study help further our understanding of the complex interactions between informal, formal and institutional boundaries in organizations, there are some limitations: This study is a case study of a single organization. While such a study allows for a more in-depth examination of the issues explored here, it means that it may be difficult to generalize to other organizational settings. Nevertheless, focusing on a single firm allowed us to control for many factors other than social networks that affect the variables of interest. In the same way as focusing on a single industry leads to more precise statistical estimates when studying firms (see Carroll and Hannan (2000: 85-99) for a discussion), studying individuals in work roles within the context of a single firm controls for firm-level variation (combined with the substantial cost of collecting this type of data, this fact likely accounts for the predominance of single site studies in the literature on social networks).

The consulting industry may be different in terms of how individuals rely on their social networks from other industries. Yet, prior research has identified the importance of social networks to the operation of professional service firms (Maister 1993; Nohria and Eccles 1992). Furthermore, most studies in the social network and boundary spanning literatures have been of more junior organizational members working within much smaller contexts (for example, R&D labs, and formal organizations with less than 500 members). Although the unique characteristics of this dataset have made it possible to clearly distinguish between informal relationships that connect individuals across

social, formal, and institutional boundaries, these same characteristics that have made this possible may limit the validity of the comparison of results with other studies.

Despite these limitations, we believe this study helps further our understanding the quite complex ways in which social, formal, and institutional boundaries interact in quite complex ways to moderate the effects of informal relationships on individual exploration performance. Perhaps most noteworthy is that individual exploration performance increases when individuals have ties within the organization not only when those ties connect them across formally differentiated areas of specialization, but also when they are able to draw on indirect ties in this internal network. This allows them the dual benefits of bridging into distant knowledge and opportunity domains (via internal cross-specialization ties), while at the same time benefiting from the legitimacy and resource mobilization advantages provided by having many indirect ties in the same network. This insight would not have been possible without clearly distinguishing between ties that bridge across formally defined organization boundaries (i.e., cross-specialization ties) and those ties that bridge across boundaries defined by disconnected elements of the social structure (i.e., the *lack* of indirect ties between direct contacts).

Similarly, we found that actors are only able to reap the benefits of external cross-specialization ties when they have indirect ties in their external networks. While this runs counter to the finding that actors in general score higher on exploration performance when they have few external indirect ties, it underscores the fact that there are complex interactions between these two distinct dimensions of actor networks: Namely indirect and cross-specialization ties. Particularly, previous research has established that lack of indirect connections in an actor's external network is positively associated

with innovation or exploration performance (e.g., Reagans & Zuckerman 2001; etc), and that external cross-specialization ties lead to higher exploration performance (e.g., Allen, Tushman). Yet, we did not previously know that crossing both the external firm boundary and an area of specialization was a *bridge too far* that might require the assistance of interactions in the external network, i.e., external indirect ties. Hence, future studies may benefit from distinguishing more clearly between social and formal boundaries in organizations and examining in more depth how these boundaries affect individual exploration and innovation performance.

APPENDIX

This appendix gives some more detail about how we conducted the qualitative interviews at Consulting Corporation.

Qualitative Interviews

The study was sponsored by the worldwide managing partners for strategy and for global operations in Consulting Corporation. These partners selected 38 individuals located in five countries in Western Europe. In addition to operating in different national contexts, the sponsors selected these partners to represent a wide variety of industries and functional specializations. We allocated an 11-week timeframe, in April, May and June of 1998, for this first stage of the project. During this time-period six of these partners could not be interviewed, as a result of illness or scheduling difficulties. Hence, we completed a total of 32 interviews. All of the sessions, nearly 50 hours (49:50) in total, involved face-to-face interviews with the authors (see Table 1 for an overview of the partners interviewed). To facilitate analysis, we taped and transcribed all except one of these interviews¹⁷.

Each interview began with an unstructured discussion about the nature of the challenges that the individual partner faced and how he or she felt social networks enabled or constrained him or her in meeting these challenges. Participants had clearly considered this issue consciously before the interviews, as many of them continued on at length, revealing considerable sophistication in their perceptions of how these networks operated. Following this first stage, the interviews then proceeded into a semi-structured discussion of how both internal and external networks facilitated or hindered

¹⁷ One subject asked interviewers not to record the session. Both interviewers took careful notes, which they immediately transcribed and crosschecked for accuracy following the interview.

the interviewee in the performance of his or her job, and these networks were built and maintained. Finally we discussed how the partners felt the formal structure of the firm influenced these issues.

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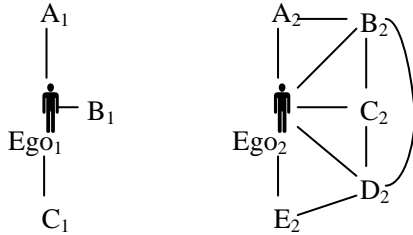
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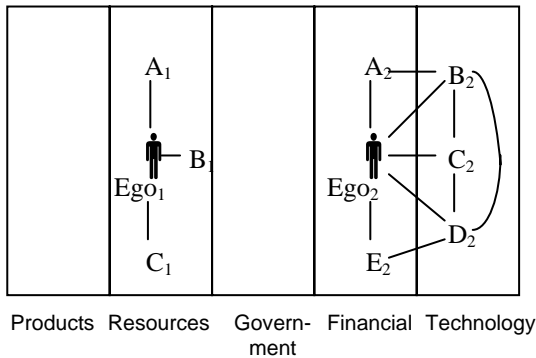
Figure 1. Informal Networks, Indirect Ties, and Formal Firm Boundaries

A. Informal Networks: Direct and Indirect Ties



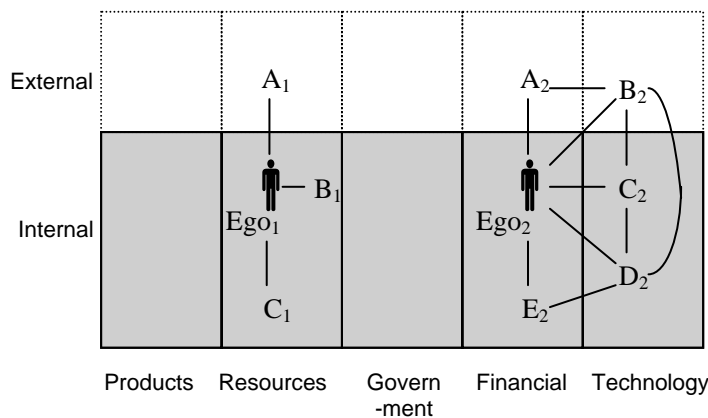
Ego₁ has three direct (non-redundant) ties, but no indirect ties. Ego₂, on the other hand, has five indirect ties and thus no non-redundancy in the network.

B. Informal Networks, Indirect Ties, and Formal Boundaries *within* the Firm



Ego₁ has only ties within the same area of competence (resources), whereas Ego₂ has three ties to contacts in another area of competence (technology). Specifically, while Ego₁ has no ties across formal boundaries inside the firm (cross-specialization ties), Ego₂ has three cross-specialization ties (across formal boundaries within the firm).

C. Informal Networks, Indirect Ties, and Formal Boundaries of the Firm



Ego₁ has two ties within the focal formal organization and one tie outside, whereas Ego₂ has three ties to contacts within the organization and two external ties. More specifically, while Ego₁ has one tie across the formal firm boundary, Ego₂ has four ties across formal boundaries: Three cross-specialization ties – of which one tie is also external to the firm – and one external tie within the same specialization.

Table 1. Overview of Qualitative Interviews Conducted

| Partner | Office | Industry group | Competency | Tenure | Duration | Date |
|----------------|---------------|----------------------------|-------------------|---------------|-----------------|-------------|
| 1 | London | Natural Resources | Change | 20 years | 1:03 | 04/13/98 |
| 2 | London | Consumer Products | Technology | 23 years | 1:05 | 04/14/98 |
| 3 | London | Financial Services | Strategy | N/A | 3:28 | 04/15/98 |
| 4 | London | Natural Resources | Strategy | 9 years | 0:51 | 04/16/98 |
| 5 | London | Financial Services | Change | N/A | 1:13 | 04/17/98 |
| 6 | London | Natural Resources | Technology | 28 years | 1:23 | 04/27/98 |
| 7 | London | Communications / High Tech | Process | 25 years | 1:50 | 04/28/98 |
| 8 | London | Financial Services | Process | 20 years | 1:56 | 04/28/98 |
| 9 | London | Consumer Products | Strategy | 24 years | 1:58 | 04/29/98 |
| 10 | Paris | Communications / High Tech | Technology | 20 years | 1:14 | 05/11/98 |
| 11 | Madrid | Communications / High Tech | Technology | 12 years | 1:38 | 05/11/98 |
| 12 | Paris | Financial Services | Strategy | 15 years | 2:13 | 05/11/98 |
| 13 | Paris | Consumer Products | Process | 8 years | 1:13 | 05/12/98 |
| 14 | Paris | Communications / High Tech | Process | 30 years | 1:00 | 05/13/98 |
| 15 | Paris | Natural Resources | Process | 22 years | 1:20 | 05/14/98 |
| 16 | Paris | Communications / High Tech | Process | 23 years | 1:15 | 05/14/98 |
| 17 | Frankfurt | Consumer Products | Technology | 18 years | 1:09 | 05/19/98 |
| 18 | Frankfurt | Communications / High Tech | Technology | 20 years | 1:11 | 05/20/98 |
| 19 | Frankfurt | Financial Services | Change | 17 years | 1:32 | 05/20/98 |
| 20 | Milan | Natural Resources | Technology | 12 years | 2:13 | 05/25/98 |
| 21 | Milan | Communications / High Tech | Technology | 15 years | 1:19 | 05/26/98 |
| 22 | Milan | Financial Services | Technology | 15 years | 1:09 | 05/27/98 |
| 23 | Milan | Consumer Products | Process | 20 years | 1:07 | 05/27/98 |
| 24 | Milan | Financial Services | Process | N/A | 1:06 | 05/27/98 |
| 25 | Milan | Financial Services | Strategy | 13 years | 1:38 | 05/29/98 |
| 26 | London | Financial Services | Strategy | 21 years | 1:00 | 06/03/98 |
| 27 | London | Communications / High Tech | Strategy | 20 years | 0:51 | 06/04/98 |
| 28 | London | Government | Process | N/A | 1:12 | 06/04/98 |
| 29 | Paris | Financial Services | Process | 26 years | 1:35 | 06/16/98 |
| 30 | Madrid | Consumer Products | Strategy | 22 years | 1:20 | 06/30/98 |
| 31 | Madrid | Financial Services | Change | 23 years | 1:26 | 07/01/98 |
| 32 | Madrid | Natural Resources | Strategy | 15 years | 5:15 | 07/01/98 |

Table 2: Name Generator Questions*

| | <u>Min</u> | <u>Mean</u> | <u>Max</u> | <u>SD</u> |
|--|------------|-------------|------------|-----------|
| 1. Who are your most reliable sources of valuable information in terms of identifying attractive business opportunities? | 2 | 5.1 | 6 | 1.26 |
| 2. Who are your most valuable contacts in terms of gaining new business (i.e. closing deals)? | 1 | 4.4 | 6 | 1.51 |
| 3. Who do you consider your most important sources of valuable knowledge and expertise (e.g., industry, competency, functional)? | 0 | 4.7 | 6 | 1.54 |
| 4. On whom do you rely to help you develop skills and knowledge in your area of expertise? | 0 | 3.8 | 6 | 1.75 |
| 5. Who are the associate partners or managers on whom you rely to get things done? | 1 | 4.8 | 6 | 1.37 |
| 6. On whom do you rely to sponsor and support your projects and activities? | 1 | 4.2 | 6 | 1.52 |
| 7. Please list any other individuals who are an important part of your network and do not fit into the previous categories. | 0 | 3.3 | 6 | 2.1 |

* The survey provided space for nominating six people on each of the seven name generators. Respondents could also fill the number of additional contacts (beyond six) they had in that category in another box.

Table 3. Name Interpreter Questions

| Q#* | Question | Scale |
|-----|--|---|
| 17. | How close are you with each person? (circle best approximation) | distant 1...2...3...4...5. especially close |
| 19. | On average, how often do you currently talk to each person? | daily weekly monthly less often |
| 27. | <p>Please provide the following affiliation information where applicable.</p> <p><u>Consulting Corporation, clients and others</u></p> <ul style="list-style-type: none"> - Country - Industry <p><u>Others only</u></p> <ul style="list-style-type: none"> - Please specify your relationship to this person (e.g., neighbor, friend) | <p><u>Consulting Corporation only</u></p> <ul style="list-style-type: none"> - Portfolio - Operating unit - Competency |
| 28. | <p>Go to the column named 1 in the grid. Each cell in this column describes the relationship between the 1st person listed and the 2nd person listed, the 1st person listed and the 3rd person listed, and so on. If the 1st person listed is especially close to the 2nd person listed, circle EC in the top cell column (like this: D.EC). On the contrary, if the 1st person is distant from the 2nd person listed, circle D in the top cell column (like this: D.EC). Leave D.EC blank to indicate that the two people are neither distant nor especially close.</p> | <p style="text-align: center;"> D EC </p> <hr style="width: 100%; border: 0.5px solid black;"/> <p style="text-align: center;"> Distant Neither distant nor especially close Especially close </p> |

*The question numbers identify the order of the question in the survey.

Table 4. Characteristics of Partners Studied

| | Mean | SD |
|--------------------|----------|------|
| Age | 44 years | 4.7 |
| Gender | 92% male | |
| Tenure in firm | 16 years | 5.1 |
| Tenure as partner | 6 years | 3.9 |
| Direct reports | | |
| Partners | 4.5 | 11.8 |
| Associate partners | 9.0 | 18.7 |
| Senior managers | 24.5 | 65.8 |
| Total | 38.0 | 96.3 |

Table 5. Descriptive Statistics (N=79)

| Variables | Mean | std. | Min. | Max. |
|---|-------|-------|------|-------|
| 1. Relative exploration performance | 3.01 | 0.79 | 1.50 | 5.00 |
| 2. Financial performance | 12.94 | 6.38 | 1 | 25 |
| 3. Age | 43.72 | 4.45 | 37 | 55 |
| 4. Gender | 0.08 | 0.27 | 0 | 1 |
| 5. Education | 3.72 | 0.55 | 3.00 | 5.00 |
| 6. Time to partner | 9.61 | 3.58 | 0 | 15 |
| 7. Resources | 0.23 | 0.42 | 0 | 1 |
| 8. Products | 0.20 | 0.40 | 0 | 1 |
| 9. Government | 0.04 | 0.19 | 0 | 1 |
| 10. Financial services | 0.30 | 0.46 | 0 | 1 |
| 11. Communication & high technology (CHT) | 0.23 | 0.42 | 0 | 1 |
| 12. Size internal network | 12.86 | 3.89 | 4 | 20 |
| 13. Size external network | 5.48 | 2.89 | 0 | 13 |
| 14. Frequency internal | 2.03 | 0.43 | 1 | 3 |
| 15. Frequency external | 2.60 | 0.62 | 1 | 3.75 |
| 16. Closeness internal | 3.93 | 0.49 | 2.53 | 5.00 |
| 17. Closeness external | 3.38 | 0.74 | 1.40 | 5.00 |
| 18. Indirect ties internal | 1.53 | 0.85 | 0.14 | 3.75 |
| 19. Indirect ties external | 0.49 | 0.50 | 0 | 2.10 |
| 20. Cross-specialization ties internal | 1.72 | 1.91 | 0 | 8 |
| 21. (Cross-specialization internal ties) ² | 6.58 | 12.14 | 0 | 64 |
| 22. Cross-specialization ties external | 0.39 | 0.87 | 0 | 4 |
| 23. Cross-specialization ties internal*indirect ties internal | 2.55 | 3.47 | 0 | 20.51 |
| 24. Cross-specialization ties external*indirect ties external | 0.19 | 0.57 | 0 | 4 |

Table 6. Bivariate Correlations (N=79)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | |
|---|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|------|------|-----|-----|------|-----|-----|
| 1. Rel. exploration perf. | 1.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Financial performance | .18 | 1.0 | | | | | | | | | | | | | | | | | | | | | | |
| 3. Age | -.07 | -.13 | 1.0 | | | | | | | | | | | | | | | | | | | | | |
| 4. Gender | -0.10 | -.02 | .05 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| 5. Education | .13 | .03 | .22 | -.03 | 1.0 | | | | | | | | | | | | | | | | | | | |
| 6. Time to partner | -.28 | -.02 | -.30 | .07 | -.29 | 1.0 | | | | | | | | | | | | | | | | | | |
| 7. Resources | -.05 | -.08 | .21 | -.04 | -.05 | .08 | 1.0 | | | | | | | | | | | | | | | | | |
| 8. Products | .23 | -.04 | -.07 | 0.33 | .03 | -.08 | -.27 | 1.0 | | | | | | | | | | | | | | | | |
| 9. Government | -.00 | -.20 | .03 | -.06 | -.14 | .08 | -.11 | -.10 | 1.0 | | | | | | | | | | | | | | | |
| 10. Financial services | -.22 | .14 | -.08 | -.09 | -.12 | .02 | -.36 | -.33 | -.13 | 1.0 | | | | | | | | | | | | | | |
| 11. CHT | .07 | .05 | -.07 | -.16 | .22 | -.06 | -.30 | -.27 | -.11 | -.36 | 1.0 | | | | | | | | | | | | | |
| 12. Size internal network | -.03 | -.05 | -.02 | -.04 | -.23 | -.03 | .13 | -.04 | .01 | .02 | -.12 | 1.0 | | | | | | | | | | | | |
| 13. Size external network | -.04 | -.02 | .13 | -.13 | .12 | .08 | .23 | -.21 | .08 | -.03 | -.04 | -.30 | 1.0 | | | | | | | | | | | |
| 14. Frequency internal | -.02 | -.14 | .05 | .02 | -.26 | .07 | .06 | .02 | .27 | .04 | -.25 | .52 | -.17 | 1.0 | | | | | | | | | | |
| 15. Frequency external | .18 | .02 | .18 | .08 | -.04 | .10 | -.04 | .09 | -.09 | -.05 | .05 | .05 | .23 | .01 | 1.0 | | | | | | | | | |
| 16. Closeness internal | .02 | .14 | .06 | .01 | .16 | .06 | .02 | -.05 | -.10 | -.05 | .11 | -.45 | .42 | -.50 | .10 | 1.0 | | | | | | | | |
| 17. Closeness external | .08 | -.09 | .08 | .17 | .26 | -.17 | .08 | .07 | -.09 | -.12 | .02 | -.18 | .11 | -.15 | -.21 | .35 | 1.0 | | | | | | | |
| 18. Indirect ties internal | .12 | .01 | .16 | -.08 | .16 | -.09 | .10 | .04 | -.11 | -.15 | .08 | .14 | .16 | -.09 | -.02 | .24 | .05 | 1.0 | | | | | | |
| 19. Indirect ties external | -.31 | .04 | -.03 | -.04 | -.10 | .28 | .31 | -.20 | -.02 | .03 | -.14 | .01 | .39 | -.04 | -.13 | .17 | .06 | .20 | 1.0 | | | | | |
| 20. Cross-spec. ties internal | .13 | -.01 | .19 | -.03 | -.10 | -.14 | .29 | .04 | .03 | -.09 | -.24 | .42 | -.11 | .30 | .00 | -.10 | .05 | -.05 | .05 | 1.0 | | | | |
| 21. (Cross-spec. ties int) ² | .19 | .01 | .21 | -.04 | -.10 | -.16 | .23 | .03 | -.03 | -.01 | -.23 | .34 | -.14 | .18 | .02 | -.08 | .06 | -.10 | .05 | .93 | 1.0 | | | |
| 22. Cross-spec. ties external | .20 | .07 | .20 | -.08 | .28 | -.34 | -.14 | -.12 | .22 | -.14 | .31 | -.16 | .29 | -.15 | .21 | .13 | .04 | .03 | -.01 | .04 | .00 | 1.0 | | |
| 23. Cross-spec. int*indir int | .20 | -.11 | .30 | .03 | .09 | -.16 | .26 | .14 | -.02 | -.21 | -.15 | .30 | .03 | .15 | -.08 | .05 | .16 | .45 | .14 | .71 | .60 | -.02 | 1.0 | |
| 24. Cross-spec. ext*indir ext | .09 | -.08 | .23 | -.05 | .14 | -.15 | -.05 | -.09 | .40 | -.05 | .01 | -.18 | .39 | -.01 | .15 | .21 | .14 | -.00 | .27 | .10 | .04 | .74 | .07 | 1.0 |

Table 7. Results from Regression Analysis^a

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|--|------------------|------------------|------------------|------------------|------------------|
| Financial performance | 0.03 (0.02) | 0.04 (0.02) | 0.04 (0.02) † | 0.04 (0.02) • | 0.06 (0.02) •• |
| Age | -0.03 (0.03) | -0.06 (0.03) † | -0.07 (0.04) † | -0.10 (0.04) • | -0.14 (0.05) •• |
| Gender | -0.63 (0.44) | -0.86 (0.57) | -0.83 (0.54) | -0.69 (0.48) | -0.81 (0.50) |
| Education | 0.07 (0.24) | 0.10 (0.26) | 0.02 (0.25) | 0.07 (0.24) | -0.20 (0.24) |
| Years to partner | -0.10 (0.02) ••• | -0.12 (0.03) ••• | -0.10 (0.03) ••• | -0.07 (0.04) • | -0.08 (0.04) • |
| Resources | -0.57 (0.22) •• | -0.32 (0.27) | -0.12 (0.28) | -0.07 (0.31) | 0.27 (0.30) |
| Government | -0.21 (0.71) | 0.13 (0.44) | 0.31 (0.51) | 0.18 (0.51) | -0.29 (0.47) |
| Financial services | -1.05 (0.35) •• | -0.92 (0.35) •• | -0.77 (0.35) • | -0.94 (0.38) • | -0.89 (0.43) • |
| Communications and high tech | -0.57 (0.26) • | -0.51 (0.29) † | -0.49 (0.26) † | -0.53 (0.36) | -0.35 (0.36) |
| Size internal network | | -0.03 (0.05) | -0.05 (0.05) | -0.06 (0.05) | -0.04 (0.05) |
| Size external network | | -0.05 (0.05) | -0.03 (0.05) | 0.00 (0.05) | -0.01 (0.06) |
| Frequency internal | | 0.24 (0.36) | 0.23 (0.41) | 0.61 (0.38) | 0.83 (0.44) † |
| Frequency external | | 0.61 (0.22) •• | 0.60 (0.22) •• | 0.47 (0.24) • | 0.51 (0.23) • |
| Closeness internal | | -0.04 (0.27) | -0.22 (0.30) | -0.22 (0.31) | -0.11 (0.31) |
| Closeness external | | 0.20 (0.25) | 0.27 (0.23) | 0.23 (0.23) | 0.10 (0.25) |
| Indirect ties internal | | | 0.32 (0.16) • | 0.48 (0.18) •• | 0.10 (0.22) |
| Indirect ties external | | | -0.60 (0.27) • | -0.89 (0.28) ••• | -1.25 (0.32) ••• |
| Cross-specialization ties internal | | | | -0.54 (0.15) ••• | -1.14 (0.19) ••• |
| (Cross-specialization internal) ² | | | | 0.11 (0.03) ••• | 0.15 (0.02) ••• |
| Cross-specialization external | | | | 0.23 (0.21) | 0.07 (0.27) |
| Cross-spec ties int*indir ties int | | | | | 0.24 (0.06) ••• |
| Cross-spec ties ext*indir ties ext | | | | | 0.72 (0.38) † |
| Pseudo R-squared | 0.07 | 0.10 | 0.12 | 0.17 | 0.21 |
| Fit ^b | 147.71 ••• | 753.70 ••• | 653.66 ••• | 5177.89 ••• | 3133.26 ••• |

^a Ordered probit regression. Dependent variable is relative exploration performance. Standard errors adjusted for clustering on rater number. Cut points omitted. N=79. †p < .10, •p < .05, ••p < .01, •••p < .001 (two-tailed test for variable coefficients). ^bChi-square test.

Table 8. Results from Regression Analysis Testing U-Shape on Cross-specialization Ties^a

| | Model 1 | Model 2 |
|------------------------------------|-----------------|------------------|
| Financial performance | 0.03 (0.03) | 0.12 (0.03) *** |
| Age | -0.15 (0.07) • | -0.26 (0.06) *** |
| Gender | -1.82 (0.75) • | -1.44 (0.61) ** |
| Education | -0.70 (0.33) • | 0.73 (0.52) |
| Years to partner | -0.09 (0.06) | -0.09 (0.04) • |
| Resources | 1.26 (0.98) | 0.54 (1.72) |
| Products | 1.56 (0.84) † | -0.19 (1.55) |
| Financial services | 0.75 (0.78) | -2.38 (1.63) |
| Communications and high tech | 2.06 (0.65) *** | -5.17 (1.78) ** |
| Size internal network | -0.07 (0.07) | -0.05 (0.10) |
| Size external network | 0.02 (0.07) | -0.51 (0.14) *** |
| Frequency internal | 1.20 (0.64) † | -0.06 (1.20) |
| Frequency external | 0.27 (0.45) | 0.85 (0.54) |
| Closeness internal | -0.09 (0.63) | 0.68 (0.80) |
| Closeness external | 0.31 (0.30) | 0.85 (0.49) † |
| Indirect ties internal | 0.17 (0.33) | 1.79 (0.30) *** |
| Indirect ties external | -1.03 (0.75) | -1.82 (0.51) *** |
| Cross-specialization ties internal | -0.49 (0.40) | 0.52 (0.16) *** |
| Cross-specialization ties external | 0.11 (0.34) | 1.83 (0.41) *** |
| N ^b | 43 | 36 |
| Pseudo R-squared | 0.21 | 0.49 |
| Fit ^c | 1121.43 *** | 8171.52 *** |

^a Ordered probit regression. Dependent variable is relative exploration performance. Cut points omitted. Standard errors adjusted for clustering on rater number. †p < .10, •p < .05, **p < .01, ***p < .001 (two-tailed test for variable coefficients). ^bIn models 1 and 2, the sample is split along the number of internal cross-specialization ties: Model 1 includes partners with less than two internal cross-specialization ties in their network. Model 2 includes partners with two or more internal cross-specialization ties in their network. ^cChi-square test.