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Virtually Embedded Ties

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The Internet and other communication and information technologies have not only increased the efficiency and effectiveness of existing forms of interorganizational connection, but have also made possible the emergence of a new form – “virtually embedded ties”. Such ties have two essential features: first, they utilize electronic communication and information technologies; second, the use of those technologies allows them to overcome the exchange-related problems previously addressed through the formation of socially embedded ties. We argue that virtually embedded ties offer an important alternative to socially embedded ties in industries that are characterized by high levels of dynamism.

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Embeddedness is a pivotal element in explanations of economic action in organization theory and economic sociology. This concept highlights the ways in which economic action is embedded in a context that includes not only economic structures, but social structures as well (Dacin, Ventresca & Beal, 1999; Granovetter, 1985; Zukin & DiMaggio, 1990). Prototypical discussions have focused on the dynamics of socially embedded ties – economic relationships that are underpinned by direct, social ties among the actors involved (Galaskiewicz, 1979; Granovetter, 1973, 1985; Uzzi, 1997, 1999). Socially embedded ties
have been contrasted with arm’s-length ties – economic relationships among otherwise unconnected actors – and argued to be crucial to economic success in many contexts (Birley, 1985; Burt, 2000; Uzzi, 1997, 1999). This approach to embeddedness may be too limited, however, to deal with the technological and social conditions present in today’s economy. We believe that vastly improved access to rapid, low-cost sources of information and communication, along with the globalization of many industries, has led to a transformation in the ways that economic activity is embedded (Atkinson & Court, 1998; Bettis & Hitt, 1995; Gergen, 1991; Shapiro & Varian, 1999).

We aim to enhance our understanding of this transformation and facilitate research in this area by defining and demonstrating the theoretical significance of an important new form of embeddedness – “virtually embedded ties”. Virtually embedded ties are interorganizational linkages that are initiated and maintained through electronic technologies and that provide distinctive solutions to the same problems with exchange relationships that are addressed by socially embedded ties. We are not arguing that all electronically facilitated interorganizational linkages constitute virtually embedded ties, any more than those who have studied socially embedded ties would suggest that every face-to-face interaction would lead to such a tie. Rather, some of these linkages have distinctive characteristics that draw on the speed, efficiency, and global reach of contemporary technologies to mitigate the factors that can make arm’s-length ties problematic.

By defining the concept of virtually embedded ties and demonstrating its theoretical importance, this paper makes three significant contributions to our understanding of interorganizational linkages in contemporary society. First, it demonstrates that the simple dichotomy between arm’s-length market transactions and socially embedded ties is too simplistic to adequately capture the subtle and emerging characteristics of electronically facilitated interorganizational linkages. The concept of virtually embedded ties thus enriches our theoretical vocabulary through the ability to describe a form of interorganizational linkage that is distinct from both of these traditional forms. The second major contribution of the paper is the identification of the means through which virtually embedded ties can overcome the conditions of uncertainty, complexity and opportunism that make arm’s-length ties problematic. Our addition of virtually embedded ties to the potential means of overcoming these problems presents a significant extension to the literature on interorganizational ties. Third, this paper delineates a set of conditions under which the use of virtually embedded ties will provide a performance advantage over socially embedded ties; although we argue that both forms of embeddedness provide an alternative to arm’s-length ties, they are best able to do so under different conditions.

We present our argument in three major sections. First, we develop the concept of a “virtually embedded tie” and discuss its three principal components. Here, we argue that virtually embedded ties provide an alternative to socially embedded ties in overcoming some of the limitations of arm’s-length ties. Second, we examine the conditions under which virtually embedded ties can provide a performance advantage over socially embedded ties; we argue that the distinctive characteristics of virtually embedded ties make them a powerful alternative under conditions that exacerbate the potential weaknesses of socially embedded ties. Finally, we discuss some implications of virtually embedded ties for research and practice.
The Concept of Virtually Embedded Ties

In this section, we develop the concept of a virtually embedded tie in several steps. First, we review the concept of embeddedness, focusing on its relationship to arm’s-length ties and the exchange-related problems it can overcome. We then articulate the components of virtually embedded ties, drawing on Uzzi’s (1997) examination of socially embedded ties; here we examine the manner in which virtually embedded ties overcome the same exchange-related problems as do socially embedded ties but in distinctive ways. Next, we compare and contrast the concept of virtually embedded ties with virtual teams and online communities. Finally we illustrate the concept with a discussion of Zone Labs, Inc., a firm that has made extensive use of virtually embedded ties.

The Concept of Embeddedness

Embeddedness refers to “the contextualization of economic activity in on-going patterns of social relations” (Dacin et al., 1999: 319; Granovetter, 1985). Zukin and DiMaggio (1990) identified four types of embeddedness: structural, cognitive, political, and cultural. In this paper we focus on structural embeddedness, which describes the effects of inter-actor ties on economic activity. We follow Zukin and DiMaggio (1990) and Uzzi (1997) in using structural embeddedness to refer to both the “configuration of the linkages between people or units” (Nahapiet & Ghoshal, 1998: 244) and the strength of individual ties (Granovetter, 1973, 1985; Gulati, 1998). We use the terms “socially embedded ties” – economic relationships that are underpinned by social ties – and “social embeddedness” – the cumulative extent and strength of an actor’s socially embedded ties – in order to differentiate these concepts from “virtually embedded ties” which we argue is a new and distinct form of embedded relationship.

Much of the literature on social embeddedness has focused on the ways in which social ties cause economic actors to deviate from the behavior predicted by neoclassical economics (Granovetter, 1985; Polanyi, 1944; Zukin & DiMaggio, 1990). As Dacin et al. (1999: 320) argue, “Definitions of embeddedness took shape in opposition to the stylized conceptions of markets featured in neoclassical economics in which market transactions are, by definition, strictly rational, faceless, and independent.” Neoclassical economics portrays arm’s-length ties as the necessary and important characteristic of efficient markets, and assumes that socially embedded ties among economic actors introduce inefficiencies to the system. In contrast to this idealized view of efficient markets, researchers have identified numerous situations where exchange relationships are characterized more by socially embedded ties than by arm’s-length ties (e.g., Gulati, 1998; Uzzi, 1999). Moreover, rather than interfering with the smooth operation of markets as predicted by economic theory, these socially embedded ties have been found to improve exchange relationships which are marked by conditions that make arm’s-length ties problematic (Uzzi, 1997, 1999).

We believe that computer and communications technologies have facilitated the development of “virtually embedded ties” – an alternative form of interorganizational relationship with its own distinctive characteristics. The dictionary defines virtual as “being such in power, force, or effect, though not actually or expressly such” (Webster’s Encyclopedic Unabridged Dictionary, 1989: 1596), and so a “virtually embedded tie” represents an in-
terorganizational linkage that has the effects of a socially embedded tie but does so through other means. We are not arguing that every use of electronic technologies to facilitate an interorganizational connection will result in a virtually embedded tie, but that some electronically mediated ties with specific components, which we describe below, have dynamics and effects that are distinct from the traditional view of either arm’s-length ties or socially embedded ties and consequently merit attention as a distinct form of interorganizational linkage.

The Components of Virtually Embedded Ties

What distinguishes virtually embedded ties from other inter-actor ties that rely on electronic forms of communication is the manner in which virtually embedded ties draw on computer and communication technologies to address the same exchange-related problems as socially embedded ties do through their social dimension (see Figure 1 for an overview). Uzzi (1997: 42) identified three components of socially embedded ties that “regulate the expectations and behaviors of exchange partners: trust, fine-grained information transfer, and joint problem-solving arrangements.” These components enable embedded ties to overcome critical exchange-related problems that arm’s-length ties cannot address effectively – opportunism, uncertainty, and complexity (Williamson, 1975, 1985). Here, we identify three parallel components of virtually embedded ties that allow organizations to use electronic technologies to address the same problems as those addressed by socially embedded ties. For each problem, we first summarize existing arguments with respect to how a component of socially embedded ties provides an advantage over arm’s-length ties. We then identify the corresponding component of virtually embedded ties and discuss the manner in which it can address the same problem.

Dealing with opportunism: Trust vs. transparency. The first problem addressed by both socially and virtually embedded ties is the risk of opportunism on the part of exchange partners. Overcoming this problem has been described as a primary advantage of social embeddedness over arm’s-length ties (Fukuyama, 1995): strong, socially embedded ties

<table>
<thead>
<tr>
<th>Exchange-Related Problems Ineffectively Addressed by Arm’s-length Ties</th>
<th>Key Components of Socially Embedded Ties</th>
<th>Key Components of Virtually Embedded Ties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunism</td>
<td>Trust</td>
<td>Transparency</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>Exchange of fine-grained, proprietary information</td>
<td>Widespread sharing of private and public information</td>
</tr>
<tr>
<td>Complexity</td>
<td>Joint problem solving</td>
<td>Community-based problem solving</td>
</tr>
</tbody>
</table>

Figure 1. Components of embedded ties that deal with problems in exchange relationships.
lower the risk of opportunism by effecting high-trust relationships (Granovetter, 1985; Putnam, 1995; Uzzi, 1996) based on interpersonal bonds. Both Granovetter (1985) and Uzzi (1999) point out that although social embeddedness does not guarantee trustworthy behavior, “it provides an essential priming mechanism that promotes initial offers of trust and reciprocity that, if accepted and returned, solidify through reciprocal investments and self-enforcement” (Uzzi, 1999: 484). Socially embedded ties increase the level of trust in relationships because the interorganizational ties are personal and social, and consequently the costs of opportunism include social costs, as well as the costs of damaging long-term, close commercial relations (Uzzi, 1997). This contrasts strongly with arm’s-length ties, in which expectations of opportunism are high (Williamson, 1985).

Although it might seem that the lack of face-to-face contact and potentially infrequent interactions among actors would mean that electronically facilitated linkages would share the problem of opportunism with arm’s-length ties, we argue that this is not always the case. The first distinctive component of virtually embedded ties is that expectations of opportunism are mitigated not through the development of trust relationships, as with social embeddedness, but by increased transparency. The Internet-based relationships that we describe as virtually embedded ties are associated with information systems through which opportunistic behavior can be quickly and easily reported to a wide community of actors: systems such as Web-based discussion forums, Internet newsgroups, e-mail lists, and ratings services (e.g., the vendor rating on eBay) all provide efficient mechanisms for the rapid dissemination of information on potential partners. Moreover, these systems have developed along with a broad set of norms on the Internet that value the free flow of information above almost anything else (Barlow, 1994; Gates, 1999) and that tend to encourage the frank exchange of information regarding the practices and products of companies. These norms likely interact with the tendency of individuals to report incidences of dissatisfaction, rather than satisfaction (Technical Assistance Research Program, 1981), to further increase the reputational costs of opportunism. Thus, unlike socially embedded ties, which increase the costs of opportunism through the damage it might do to specific, long-term relationships, virtually embedded ties increase the costs of opportunism through the degradation of a firm’s reputation and the subsequent effects on its ability to develop new relationships with consumers, suppliers or partners.

Dealing with uncertainty: Exchange of fine-grained, proprietary information vs. widespread sharing of private and public information. The second problem with arm’s-length ties that is mitigated by both socially embedded ties and virtually embedded ties is the risk associated with uncertainty. A key distinction between arm’s-length ties and socially embedded ties concerns the information sharing associated with each. Arm’s-length ties are associated with minimal levels of information sharing, typically restricted to the least information necessary to complete an exchange, and often restricted to price information alone (Coase, 1937). This reliance on the price system for information is most effective for simple exchanges in which actors need not understand why prices are as they are, or evaluate an offering in any depth; in such cases, the price system can effectively summarize a wide variety of disparately held, local knowledge (Hayek, 1945). When transactions are more complex, however, market imperfections create uncertainty that limits the effectiveness of arm’s-length ties due to their very limited information sharing. In contrast, a critical
component of socially embedded ties is the exchange among partners of fine-grained, proprietary information (Uzzi, 1996, 1997) – information that actors would normally not reveal to others because of its strategic or operational value. This sharing of proprietary information decreases uncertainty, especially with respect to the strategic and operational plans of partners in socially embedded ties (Larson, 1992; Uzzi, 1997).

We argue that virtually embedded ties are associated with information sharing that is distinct from both of these situations. Thus, the second distinctive component of virtually embedded ties is widespread information sharing that is relatively detailed and includes both private and public information. We argue that information sharing is widespread and detailed because of the information efficiencies associated with permanently stored, electronic communications: the interaction of actors via electronic, and largely textual, means allows for more efficient creation, transmission and storage of information than would be possible through face-to-face encounters or even through a written medium that was not electronically facilitated. The nature of the information associated with virtually embedded ties is unlikely to be the proprietary information shared among socially embedded firms (Uzzi, 1997), since there is unlikely to be the expectation of a quid pro quo. Rather, the types of information that are likely to dominate virtually embedded communications include both public (already available through some other, unrestricted channel) and, more importantly, what we refer to as “private” – information that is based on the individual experience of the organizational actors involved, but that is not necessarily considered proprietary. We argue that this widespread sharing of private and public information lowers the risk of uncertainty by increasing organizational actors’ abilities to forecast and plan, not so much with respect to the moves of specific actors, as with socially embedded ties, but in terms of broader events and trends in the industry or markets served.

An important consideration with respect to any form of interorganizational linkage is the veracity and validity of the information shared. Although there is relatively little disincentive to stop individual actors from sharing false or misleading information, two related mechanisms work to increase the overall veracity and validity of information shared through virtually embedded ties. Information shared through such ties is often seen by a wide variety of actors, any of whom might call into question its veracity or validity, and the value of an online information sharing forum is diminished by incorrect or misleading information; consequently, participants are likely to quickly point out incorrect or misleading information as such. Moreover, a distinct advantage of virtually embedded ties is the ability of virtually embedded actors to engage in widespread search and comparison of information: since the costs of forming virtually embedded ties is very low, decision making processes can draw on information from a large number and a wide variety of virtually embedded ties. Although this does not necessarily overcome the problems associated with anonymous actors engaging in hoaxes or intentionally inundating online information sources with misinformation (as might be evidenced during political elections, for instance), it does ensure an opportunity for alternative information and perspectives to be sought out.

Dealing with complexity: Joint problem solving vs. community-based problem solving. Finally, the third exchange-related problem that both socially embedded ties and virtually embedded ties work to manage is complexity. An important advantage of socially embedded ties over arm’s-length ties is that they facilitate joint problem solving in which partners work
together to address issues which can more efficiently and effectively be solved through joint consideration and action (Helper, 1990; Uzzi, 1997). This form of problem solving involves a commitment by more than one person to resolve the problem, and extended interaction among the specific individuals committed to resolve the problem. For instance, two partners involved at different stages in manufacturing a product might work together to develop a way of increasing the quality and consistency of the final product through a joint analysis of design and production processes. In contrast, the impersonal nature of arm’s-length ties, along with their relatively strict focus on exchange as the primary purpose, discourages joint problem solving.

We argue that virtually embedded ties facilitate problem solving that overcomes the problem of complexity but in a manner that is distinct from that of socially embedded ties. Virtually embedded ties solve problems that stem from complexity not through dyadic cooperation, as is typical of social embeddedness, but through community-based cooperation (Seidel & Stewart, 2000). The third distinctive component of virtually embedded ties – community-based problem solving – is characterized by non-reciprocal contributions among a network of organizational actors whose individual commitment to solving any specific problem may be relatively minor or fleeting. Community-based problem solving is exemplified by situations in which organizations face problems with technical equipment that they address through interactions on the website of a manufacturer or reseller that hosts a discussion forum for customers. Increasing the quality and consistency of a product through this approach would involve drawing on the varied contributions of many actors whose experience and expertise is shared and archived in such forums. Community-based problem solving is common within a wide array of online forums that are devoted to such topics as products (e.g., automobile-specific discussion forums), services (e.g., www.flyertalk.com, a forum for frequent fliers), and professions (e.g., CPA Vision Web Views, a forum for accountants). This form of problem solving can most easily be understood when contrasted directly with the joint problem solving approach associated with social embeddedness. If, for instance, a firm was unsatisfied with the performance of a machine purchased through a socially embedded tie, the two firms might work together directly to resolve the problem, perhaps by altering the machine in some way. In contrast, if this problem occurred within the context of a virtually embedded tie, the purchasing firm would more likely draw on the community of other users of the machine (through the manufacturer’s website or some other Internet discussion forum) in order to learn how it might be better used or adapted to increase performance.

We believe that there are two key drivers behind this behavior. The first is that individual contributions to this form of problem solving can often be made very easily and inexpensively. Unlike the joint problem solving associated with socially embedded ties, which relies on relatively time-consuming simultaneous coordination of communication and action between two parties, community-based problem solving can involve very small contributions of knowledge from a range of parties provided on a relatively flexible basis. Second, community-based problem solving often hinges on the expertise of a core group of individuals who gain reputational effects based on their contributions (Seidel & Stewart, 2000). This approach to problem solving rarely involves a quid pro quo form of inducement; rather, contributions of individual actors are often seen by a large number of other actors which leads to contributors gaining widespread reputations more quickly than...
could be achieved through normal word-of-mouth mechanisms. Such reputational effects can sometimes be converted into economic benefits, as evidenced in the Linux open-source community in which contributors leverage the reputational effects of important programming contributions for employment mobility and software development contracts (DiBona, Ockman & Stone, 1999; Seidel & Stewart, 2000).

Relationship to Virtual Teams and Online Communities

In developing a new concept, a key issue is specifying its relationship to other existing concepts, both in order to fully discuss the meaning of the new concept and to ensure that it is indeed articulating a novel idea. We believe that there are two key sets of concepts that need to be discussed with respect to virtually embedded ties—virtual teams and online communities.

The emergence of virtual teams and online communities is rooted in the same technological innovations in which we anchor virtually embedded ties. Virtual teams are interdependent groups of people who use technology to communicate and collaborate across space, time and organization boundaries (Baker, 2002; Kirkman, Rosen, Gibson, Tesluk & McPherson, 2002). Although both virtual teams and virtually embedded ties represent new forms of inter-actor connection made possible by contemporary technologies, they differ in important ways. Most fundamental, perhaps, is that virtual teams are constituted as social groups that are ongoing for some significant duration, whereas virtually embedded ties are understood here as potentially one-off connections. This difference is illustrated by the role of trust: research on virtual teams within organizations suggests that members of these teams may develop “task-based trust” among team members (Carmel, 1999; Kirkman et al., 2002), which is based on repeated, successful interactions among the same individuals so that they learn to rely on each others’ abilities and efforts. In contrast, the transparency that we associate with virtually embedded ties is important precisely because these ties often occur on an ad hoc basis and individual actors often need to engage in one-off interactions with others.

Online communities represent another important concept that we argue is related to but distinct from virtually embedded ties. The literature on online communities has largely focused on the processes that create sustained social relationships and shared cultural attributes and values within the virtual realm (Preece, 2000; Rheingold, 2000; Smith & Kollock, 1999; Werry & Mowbray, 2001). These characteristics distinguish online communities from other electronic networks in much the same way that traditional communities are distinguishable from other groups of individuals (Karp, Stone & Yoels, 1977). As described in this literature, there are fundamental differences between the concept of an online community and virtually embedded ties. One such difference is that relationships in online communities often involve no economic aspect whatsoever, whereas a defining aspect of virtually embedded ties, like socially embedded ties, is that they facilitate economic action (in fact, one might usefully re-label them virtually embedded economic ties and socially embedded economic ties). Thus, online communities often involve what might be referred to as electronically facilitated social ties: as Rheingold (2000: xvi) describes in his discussion of online communities, he cared for the people he met through the computer and the relationships he began online often developed beyond the electronic medium. Because trust-building is often a
central aspect of successful online communities (Preece, 2000) and this trust is based on the formation of stable, ongoing relationships among members, if economic relationships do emerge within online communities, they may in fact resemble socially embedded ties more closely than virtually embedded ties. Thus, online communities are characterized by sustained social relationships that often lead to the development of trust; in contrast, virtually embedded ties may involve infrequent or one-time connections that rely on transparency rather than trust to discourage opportunism. So, while we believe that virtually embedded ties may exist within some online communities, the latter concept describes a much broader and more diffuse set of networks than we are examining here.

Zone Labs Inc.: An Illustrative Example

A firm that exemplifies the use of virtually embedded ties as a core element of its strategy is Zone Labs, Inc. – a privately held software company that was founded in response to the vastly increased potential for electronic theft and mischief that has accompanied the growth of the Internet. The Zone Labs management team set out to “fulfill a vision of safe and secure Internet access” (Zone Labs, 2002). The company provides a variety of Internet security products for individuals and businesses. Since its founding in 1997, Zone Labs has established a large number of virtually embedded ties in networks that include consumers, businesses, corporate IT managers, and security professionals. Through its website, customers gather product information, discuss implementation issues with other customers and company technicians, and download and purchase Zone Labs’ products; potential employees learn about employment opportunities and submit their resumes; and resellers learn the details of the Zone Labs Authorized Reseller Program and apply to join the program. These interorganizational linkages represent a useful example of virtually embedded ties both because they clearly illustrate the difference between virtually embedded ties and socially embedded ties, and because their dynamics exemplify those associated with the three components of virtually embedded ties.

Zone Lab’s relationships with customers and suppliers illustrate clearly the difference between socially embedded ties and virtually embedded ties. The ties that bind Zone Labs to its customers and resellers are focused, single-purpose ties that concentrate on the exchange of goods, services and information regarding Zone Lab’s products: although these ties may be courteous or impassioned, their economic efficacy is not leveraged off a social foundation among partners that includes trust and the exchange of proprietary information. Rather, they achieve their economic benefits by creating an environment in which customers and resellers perceive a transparency on the part of Zone Labs that is accomplished through the communal sharing of information (which includes negative experiences with Zone Labs or its products) among network members, as well as by facilitating problem solving on a community basis. Low-cost ties among networks of interested actors provide the basis for sharing expertise and experience and allow Zone Labs to interact with a variety of stakeholder groups. Although norms of behavior may, and likely have, emerged among partners in these networks, this does not indicate the existence of socially embedded ties: norms of behavior are cultural forms which provide a context for all relationships (virtual and otherwise), and do not themselves suggest the existence of socially embedded ties.
Summary

In this section, we have argued that virtually embedded ties are those electronically initiated and mediated interorganizational linkages that overcome opportunism, uncertainty, and complexity through transparency, widespread sharing of private and public information, and community-based problem solving. Although we have been using socially embedded ties as a theoretical point of departure throughout this section, we want to end it with a summary statement of the relationship between these concepts. As we noted earlier, structural embeddedness describes the configuration and strength of inter-actor ties and their impact on economic action. Socially embedded ties thus represent one form of structural embeddedness, and we argue that virtually embedded ties represent a distinctly different form: each provides a set of mechanisms that overcome the limitations of arm’s-length ties, but each does so in its own unique manner. This conceptualization means that although actors engaged in arm’s-length ties or socially embedded ties may draw on electronic technologies to enhance those relationships, only interorganizational linkages that have the three components we described above will constitute virtually embedded ties. Thus, we argue that virtually embedded ties represent both a distinctive form of interorganizational linkage and an alternative to socially embedded ties when exchange relationships are incompatible with the use of arm’s-length ties: whereas socially embedded ties facilitate exchange through trust, exchange of fine-grained, proprietary information, and joint problem solving; virtually embedded ties do so through transparency, widespread sharing of private and public information, and community-based problem solving. As is the case with socially embedded ties, we argue that the use of virtually embedded ties will be associated with higher organizational performance than the use of arm’s-length ties under exchange conditions characterized by high risk of opportunism, high uncertainty, and/or high complexity.

Virtually Embedded Ties and Organizational Performance

In this section, we extend our argument by examining the conditions under which virtually embedded ties can provide a competitive advantage relative to socially embedded ties. We argue that the similar ability (through distinctive means) of virtually embedded ties and socially embedded ties to overcome the problems of opportunism, uncertainty, and complexity combines with their different characteristics to lead to particular contexts in which each form of connection can provide a performance advantage to organizations that rely on them. To set up our argument on performance advantages, we first contrast the characteristics of socially embedded ties with what we argue are key characteristics of virtually embedded ties. We then draw on Uzzi’s (1997) analysis that identifies situations in which reliance on socially embedded ties can have a negative impact on performance, and argue that these situations point to contexts in which the use of virtually embedded ties can provide a competitive advantage.

Characteristics of Virtually Embedded Ties and Socially Embedded Ties

In Uzzi’s (1997) examination of socially embedded ties, he found that these ties had the following characteristics: face-to-face interaction, multiplexity, reciprocity, voluntary con-
tributions, altruism and substantial costs to exit. Socially embedded ties develop through repeated interactions over time that emphasize face-to-face contact, including social engagements such as shared meals and attendance at sporting events (Uzzi, 1999), and reciprocated contributions (Coleman, 1988; Honig & Lampel, 2000). Most critically, these ties are not restricted to a single purpose: unlike arm’s-length ties which are focused only on exchange, socially embedded ties are multiplexed, involving both commercial and social dimensions (Dacin et al., 1999; Granovetter, 1985). These elements increase the time and resources necessary to establish socially embedded ties, which are only partially offset by the use of third-party relations, as is common to the formation of socially embedded ties (Uzzi, 1997). Moreover, the process of referrals and enduring relationships effectively concentrates networks of socially embedded ties so that exit from those networks can have particularly high costs.

These characteristics contrast markedly with those of virtually embedded ties: the speed and efficiency of virtual connections have important implications for the kinds of ties that are likely to form as a result of electronically facilitated interaction. We argue that a critical difference is that virtually embedded ties are more likely to be single-purpose largely because of the economics of forming such ties. The marginal costs associated with adding virtual connections are very low because existing networks and protocols make it possible for organizational actors to easily and rapidly access a vast range of individuals, organizations and communities with specialized information, skills and experience. Although virtually embedded ties can, of course, evolve over time to include more than one purpose (including social bonds which may emerge simply through repeated interactions), there will be much less incentive for virtually embedded actors to rely on existing ties for purposes other than that for which they were formed. The low cost and high speed of searching for and initiating new virtual connections will lessen the motivation for organizational actors to rely on existing ties as new needs arise. This contrasts with socially embedded ties which have traditionally been characterized as multiplex relationships (Burt, 2000; Granovetter, 1973; Kapferer, 1969; Uzzi, 1997).

Another important characteristic of virtually embedded ties is their reach. Whereas face-to-face interaction and personal referrals tend to favor relations within a geographic community, or at least relations that can include occasional physical proximity (Granovetter, 1992; Putnam, 1995), virtual connections are not constrained by physical space; ties can be formed as easily with someone halfway around the world as with someone next door. Although these differences may be mitigated somewhat by the use of electronic technologies to facilitate socially embedded ties, we argue that the extensive, repeated, and personal contact (whether face-to-face, over the telephone, or via e-mail) necessary to maintain socially embedded ties will continue to preserve much of the difference in character between socially embedded ties and virtually embedded ties.

These characteristics also differentiate virtually embedded ties from historically prior means of achieving transparency, widespread information sharing, and community-based problem solving. Historically important structural forms (such as standards setting committees, networks of creditors and securities owners, industry associations, and professional groups) have at times responded to exchange-related problems in ways similar to the components of virtually embedded ties. However, prior to the advent of contemporary communication and information technologies, such forms shared many of the characteristics of
socially embedded ties – most critically face-to-face interaction and multiplexed relationships. Virtually embedded ties are significantly different from their historical precursors in their reach, accessibility, speed and focus. These characteristics differentiate both historical forms of connection and socially embedded ties from virtually embedded ties and lead to the context-dependent performance advantages of virtually embedded ties that we discuss in the remainder of this section.

**Contexts that Favor the Use of Virtually Embedded Ties**

Uzzi (1997) identifies a paradox of social embeddedness – although socially embedded ties can provide significant economic benefits, reliance on socially embedded ties can also lead to potential problems. In this section, we consider three potential weaknesses of socially embedded ties: their dependence on relatively stable networks, their susceptibility to failure in the face of market rationalization or institutional change, and their potential for overembeddedness that isolates the network from outside information (Uzzi, 1997). We propose that virtually embedded ties will be associated with higher organizational performance in industries where the weaknesses of socially embedded ties are likely to be exacerbated and where some form of structural embeddedness is beneficial due to the limitations of arm’s-length ties.

The first potential weakness of socially embedded ties is their dependence on relatively stable networks, and especially their vulnerability to the exit of key actors in the network. Uzzi (1997) argues that the resources required to establish and maintain socially embedded ties may preclude the development of ties outside of an organization’s primary network. Enduring commitments to specific relationships may put an organization at risk if those relationships are severed since the organization may lack the resources necessary to find and establish replacement relationships. This weakness will be particularly significant in industries characterized by high amounts of organizational turnover, in which the average lifespan of existing firms is relatively low and large numbers of new firms are continuously entering the industry. Due to the high cost of establishing socially embedded ties, firms that focus exclusively on establishing socially embedded ties within these types of industries may find themselves at a competitive disadvantage.

We argue that the nature of virtually embedded ties makes their use especially valuable under these conditions (see Figure 2 for a summary of our argument regarding the appropriateness of different forms of interorganizational linkage under different conditions). Most critically, virtually embedded ties tend to be associated with much lower formation and exit costs than are socially embedded ties. Whereas the formation of socially embedded ties occurs gradually and is generally associated with significant personal interaction and third-party referrals (Andersson, Forsgren & Holm, 2001; Honig & Lampel, 2000; Rowley, Behrens & Krackhardt, 2000; Uzzi, 1996, 1997), the marginal costs and time associated with forming virtually embedded ties are very low. In order to generate new virtually embedded ties, organizations primarily rely on existing networks and protocols that facilitate the rapid creation of interorganizational relationships. Moreover, while the exit costs associated with abandoning a socially embedded tie can be very high because of the high level of economic and social resources invested in these ties, this is not the case with virtually embedded ties: the low costs of forming virtually embedded ties means that leaving such a tie tends not
Figure 2. Contexts that favor different forms of ties.

<table>
<thead>
<tr>
<th>Industry Dynamism (Organizational turnover; Frequency of institutional change; Frequency of technological and environmental change)</th>
<th>Severity of Exchange Conditions (Uncertainty; Complexity; Risk of opportunism)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Arm’s-length ties</td>
<td>Socially Embedded Ties</td>
</tr>
<tr>
<td>High</td>
<td>Virtually embedded ties</td>
</tr>
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to upset other actors, and indeed relatively short lifespans are not unexpected for such ties. Together, the low costs of formation and of exit lead to a situation in which organizations relying on virtually embedded ties are much less dependent on any specific actor or even the general stability of the networks in which they are involved. These dynamics lead to our first proposition.

**Proposition 1:** In industries characterized by high levels of organizational turnover and under exchange conditions characterized by high uncertainty, high complexity, and/or high risk of opportunism, greater use of virtually embedded ties will be positively associated with higher organizational performance.

A second potential weakness of socially embedded ties is their susceptibility to failure in the face of market rationalization or other institutional change that leads to the disruption of those ties (Uzzi, 1997). This weakness again suggests a set of conditions under which we argue the use of virtually embedded ties is likely to lead to increased organizational performance. While some industries are relatively protected by comparatively stable technologies, or geographic, economic or political barriers to institutional change; other industries are likely to experience rapid and repeated instances of rationalization and change, as new, disruptive technologies break down the value of old relationships and mandate new ones (Christensen, 1997; Leblebici, Salancik, Copay & King, 1991) or as institutional rules and practices are frequently transformed and existing interorganizational ties made irrelevant (Hoffman, 1999). We argue that virtually embedded ties will be particularly important for companies in these sorts of industries: virtually embedded ties are highly adaptive to changes in institutional conditions because actors are able to shift connections relatively easily and quickly to whatever virtual networks have become strategically important. This leads to our next proposition:

**Proposition 2:** In industries that are subject to frequent rationalization or institutional change and under exchange conditions characterized by high uncertainty, high complexity,
and/or high risk of opportunism, greater use of virtually embedded ties will be positively associated with higher organizational performance.

The third potential weakness of socially embedded ties is that they may lead to a state of overembeddedness in which firms are cut off from important outside information, such as novel ideas and changes in market demand (Uzzi, 1997). Firms in overembedded networks tend to become isolated from everything outside the network. This type of overembeddedness is likely to be most problematic in industries that are characterized by frequent environmental disturbances and the resultant need for exploration to discover novel information and innovations (Lant, Milliken & Batra, 1992). Significant empirical evidence (e.g., Rowley et al., 2000; Yli-Renko et al., 2001) suggests that the benefits of socially embedded ties may be diminished significantly in highly dynamic, hypercompetitive environments.

One of the main reasons for the emergence of overembedded networks is the multiplex nature of socially embedded ties; such ties are multi-purpose by definition, with both social and economic dimensions (Granovetter, 1985; Putnam, 1995; Uzzi, 1996, 1997). The interaction of high costs of formation and exit and the multiplex nature of socially embedded ties can lead to relatively dense networks in which actors form intensive relationships with other network members and avoid relationships outside those networks (Uzzi, 1997). In contrast, we have argued that virtually embedded ties will tend to be single-purpose ties structured within relatively sparse network structures. Moreover, the nature of virtually embedded ties means that they largely eliminate the need for ‘local’ search when organizations are seeking new relationships or new information: whereas socially embedded ties foster the exchange of proprietary information within established networks, virtually embedded ties allow a firm to conduct broad searches that access many sources and identify a wide variety of alternatives. More simply, while market-based transactions typically involve only minimal information exchange socially embedded ties often involve an unwieldy and unfocused stream of information that is susceptible to going stale due to the long-term nature of the ties. This makes virtually embedded ties extremely valuable when it is critical that organizations access novel information from a variety of sources. This aspect of virtually embedded ties leads to our last proposition.

Proposition 3: In industries in which competitive advantage depends upon access to novel and varied information and under exchange conditions characterized by high uncertainty, high complexity, and/or high risk of opportunism, greater use of virtually embedded ties will be positively associated with higher organizational performance.

In summary, we argue that virtually embedded ties can provide a performance advantage in certain types of industries. While most organizations will use a combination of arm’s-length, socially embedded and virtually embedded ties, we argue that firms in different environments are likely to benefit from the use of different combinations of ties (see Figure 2). In contexts in which the severity of exchange conditions – uncertainty, complexity, and the risk of opportunism – is low, arm’s-length ties are favored because of their efficiency gains. In contrast, we argue that some form of embedded ties will be more effective when the severity of exchange conditions is high, and that the preferred combination of embedded ties will depend on the level of industry dynamism: a preponderance of so-
cially embedded ties may provide the greatest advantage in more stable industries, whereas virtually embedded ties may be associated with higher performance in industries that are particularly dynamic. Although each dimension’s individual attributes (uncertainty, complexity, opportunism; organizational turnover, frequency of institutional change; frequency of technological and environmental change), may or may not co-vary, we argue that it is the overall severity of exchange conditions and overall industry dynamism (roughly conceived of as the sum of the individual attributes) which will lead to one form of interorganizational linkage providing an advantage over the others.

Conclusion

In this paper, we have developed the concept of virtually embedded ties to describe what we believe is an important and widespread new feature of contemporary organizational life. Virtually embedded ties address the same problems of exchange as those addressed by socially embedded ties (opportunism, uncertainty, complexity) in distinctive ways that are dependent on the use of electronic technologies. We argue that virtually embedded ties offer an alternative to socially embedded ties that can provide a performance advantage in industries that are characterized by high levels of dynamism. Although this article only begins to explore the dynamics and effects of virtually embedded ties, we believe that it points to important implications for both research and practice.

Implications for Research

The first implication for research involves the theoretical language with which we describe and understand interorganizational relationships. The addition of social embeddedness to the vocabulary of organizational research was an important corrective to an under-socialized model of economic action and interorganizational relationships. Understanding the prevalence and significance of social ties has helped to explain the workings of industries and organizational fields, and allowed the development of more nuanced theories of organizational behavior and performance. The concept of virtually embedded ties makes a further contribution by illuminating a distinctive way in which contemporary organizations relate to one another. Thus, scholars interested in examining such issues as the relationship between interorganizational networks and learning, or the structures of competition and cooperation in an industry, would benefit by including in their analyses the possibility that many of the firms they are studying will be enacting a large number of virtually embedded ties. If these ties are overlooked, or misclassified as either arm’s-length ties or socially embedded ties, such research might produce erroneous theoretical conclusions and wrong-headed implications for practice. Incorrectly categorizing virtually embedded ties as arm’s-length ties might lead to the conclusion that efficient markets exist where in fact organizations are relying on this new form of structural embeddedness. If virtually embedded ties were mislabeled as socially embedded ties, researchers might reach mistaken conclusions regarding the basis of competition and performance in an industry.

A second important research implication concerns empirical work that might flow from the concept of virtually embedded ties. An important contribution of this paper is its iden-
tification of a new and powerful phenomenon in the world of contemporary business. What is now needed is for the concept of virtually embedded ties to be empirically examined and specified more thoroughly in terms of the ways in which this form of interorganizational linkage is enacted. We have provided a theoretical basis for identifying these ties—electronically based ties that provide transparency, widespread information sharing and community-based problem solving—but an empirically based taxonomy of its specific forms is needed in order to facilitate research into its dynamics and effects. In order to develop this empirical description, we suggest two research strategies. First, in-depth, qualitative case studies are needed to explore the ways in which virtually embedded ties are enacted—how they are created, managed and terminated by managers and other employees, and the social and political effects they have within the organizations that rely on them. Second, researchers should also carry out broad-based quantitative surveys that map the domain of virtually embedded ties across a range of industries and sectors. Such surveys could provide a clear picture of the range of forms of virtually embedded ties and their intensity in different contexts.

A third implication for research points to the need to investigate the relationships we have proposed regarding the impact of industry conditions and exchange conditions on the performance of different forms of interorganizational linkage. We have argued that specific industry conditions—organizational turnover, frequency of institutional change, frequency of technological and environmental change— influence the relative performance of virtually embedded ties and socially embedded ties. In order to test these propositions, research will be needed that compares the performance of interorganizational linkages in a range of different industries over time. Longitudinal, comparative research will be needed because the relationships we have proposed are causal ones; industry conditions, use of different forms of interorganizational linkage, and organizational performance will all need to be tracked over time in order to establish the performance impact of virtually embedded ties.

A fourth important direction for research on virtually embedded ties will be investigating their relationship over time to other forms of interorganizational connectedness. Although we have not explored this issue here, it may well be the case that the nature of interorganizational linkages changes over time such that they move between the three forms. For instance, it will be important to understand such issues as whether and how virtually embedded ties spawn socially embedded ties. Although we have argued that the low cost of forming virtually embedded ties will lead to their relative fragility with actors quickly dropping ties as their relevance wanes, social bonds may well form if the purpose for which the virtually embedded ties was created is long-lasting enough to allow the development of empathy, affection or goodwill. Research on this phenomenon might require the close observation of a large number of ties, or might involve the gathering of retrospective accounts of the process.

Finally, research on virtually embedded ties will need to consider the capabilities necessary for organizations to manage them successfully. Although we have not explored this issue here, we believe that the organizational resources and managerial skills necessary to develop and exploit virtually embedded ties are distinct from those associated with the management of either arm’s-length ties or socially embedded ties. Whereas arm’s-length ties may demand the ability to clearly specify requirements and monitor performance, and socially embedded ties may involve interpersonal skills and trust-building, the management
Implications for Practice

The concept of virtually embedded ties also has significant ramifications for managers of a wide variety of organizations. The overarching practical implication of virtually embedded ties is that computer and communications technologies have opened up a new form of interorganizational connection that can provide substantial benefits and lower the cost of managing many interorganizational relationships. A critical aspect of managing these relationships, however, involves understanding when and where they may be appropriate: virtually embedded ties can provide important performance benefits but only for certain exchange relationships in particular industries.

We have argued that virtually embedded ties will be most beneficial in situations characterized by high industry dynamism and severe exchange conditions. Such situations are often associated with the creation of new ventures, where entrepreneurs are leveraging the dynamism of markets and industries to develop new business and technological models (Shane & Venkataraman, 2000). Virtually embedded ties to suppliers, customers, complementors, alliance partners, and information sources may provide entrepreneurs with the knowledge, ability and reach that are normally associated with older, larger firms (Stinchcombe, 1965). At the same time, these virtually embedded ties may leverage the flexibility and speed that are the hallmarks of new ventures.

Established firms can also benefit greatly from virtually embedded ties. As new technologies disrupt market conditions across a range of industries (Christensen, 1997), and the complexity of many exchange relationships continues to increase, managers of existing firms will need to look beyond traditional arm’s-length ties and socially embedded ties in order to compete effectively. Indeed, virtually embedded ties may provide the potential in established firms to break free of existing networks that are based on socially embedded ties whose utility has been diminished by institutional or technological change. Virtually embedded ties may also significantly increase the ability of established firms to scan the environment and become aware of new developments: firms might, for example, rapidly test market assumptions by posting questions or scenarios to a community for feedback, quickly and efficiently gather reactions to their own or competitors new product offerings, initiate a conversation regarding the delivery of potential new services, or gather other users’ impressions of a technology they are considering adopting. The use of virtually embedded ties may therefore act as a source of strategic renewal for older firms.

Virtually embedded ties provide a powerful tool for managers and an exciting focus of research for academics. Both social embeddedness and arm’s-length ties are important forms of interorganizational connection, but in the most demanding competitive situations – where exchange conditions are severe and industry dynamism is high – virtually embedded ties offer new opportunities for firms to build and maintain valuable relationships.
ties may provide a unique advantage. Exploring the dynamics of this advantage presents to both managers and academics a potentially profitable and fascinating challenge.

Notes

1. While we recognize that many of the links we are discussing may be between individuals and organizations, or among individuals, we use the term “interorganizational” for the sake of simplicity and to avoid the abstractness of the term “inter-actor”.

2. The authors would like to thank an anonymous reviewer who pointed out the connections between virtually embedded ties and historically prior forms of interorganizational connection.

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References


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