Social context and social capital as enablers of knowledge integration

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Abstract This paper argues that social contexts and social capital enable knowledge integration; that different social contexts combined with different types of social capital enable different types of knowledge integration. Four types of social contexts are distinguished based on the extent of social embeddedness and closeness of interorganizational coupling; four types of social capital are also described. Based on the diversity of knowledge streams, the extent of tacitness of knowledge to be exchanged, and value created through such exchanges, four modes of knowledge integration are identified, namely frontier, incremental, combinative, and instrumental. This paper provides new insights about the processes of interorganizational transfer of knowledge: the unique combination of a specific social context with a specific type of social capital means firms can achieve equally effective yet highly differentiated approaches to different modes of knowledge integration.

Keywords Knowledge management, Human capital, Economic integration, Information exchange

Organizations can continually deepen their existing competencies with the capabilities of other organizations by developing existing relationships and exploring new ones (Powell, 1998). In the 1990s, many forms of interfirm collaborations came into being, ranging from licensing arrangements and research contracts to joint development agreements, joint ventures, collaborative manufacturing and complex co-marketing arrangements. These partnerships spanned different stages of value chains from discovery to distribution to recycling (Hagedoorn and Schakenraad, 1992; Gulati, 1995). Generally, failures outnumbered successes, and dissatisfaction with such arrangements was more prevalent than satisfaction (Hagedoorn and Narula, 1996; Ariño et al., 2001).

While such inter-organizational arrangements provided for formal information exchange, whether knowledge was also exchanged was quite another matter. In the knowledge-based view of competition, competitive advantage depends on the capacity of a firm to recombine organizational and individual knowledge continuously in flexible ways (e.g. Kogut and Zander, 1992; Grant, 1996b). However, knowledge is more than information, and knowledge flow is not friction-free as may be the case for information but is, instead, dependent on suitable social contexts. Answers cannot be found solely in information technologies and managers of interfirm collaborations should pay attention to the multiple, overlapping and ongoing social relationships within which knowledge exchange in their collaboration is embedded.

Interfirm collaborations have been known to be unstable, difficult to manage, and likely to fail especially where intensive knowledge sharing such as joint R&D or joint product development is
involved. Much of the literature lays the blame for such problems at the doorstep of inappropriate governance structures which are said to fail to handle the problems of task structure or organizational complexity adequately (e.g. Osborne and Baughn, 1990). So research has focused largely on what new organizational forms or management structures may improve a firm’s ability to combine and integrate specialized knowledge (e.g. Daft and Lewin, 1993; Iliåtoå et al., 1996). The assumption has been that specific structural arrangements to organize knowledge integration may improve an organization’s ability to adapt to changing environments. Thus, for example, Sanchez and Mahoney (1996) proposed “modularity” while Davidow and Malone (1992) proposed “virtuality”, as exemplars of such structures.

This paper argues instead that social context and social capital enable knowledge integration; that different social contexts combined with different types of social capital enable different types of knowledge integration. Four types of social contexts are distinguished based on the extent of social embeddedness and closeness of interorganizational coupling; four types of social capital are also described. Based on the diversity of knowledge streams, the extent of tacitness of knowledge to be exchanged, and valued created through such exchanges, four modes of knowledge integration are identified, namely frontier, incremental, combinative, and instrumental. This paper provides new insights about the processes of interorganizational transfer of knowledge: the unique combination of a specific social context with a specific type of social capital means firms can achieve equally effective yet highly differentiated approaches to different modes of knowledge integration.

Social contexts and knowledge integration

Knowledge consists of both explicit and tacit elements. Explicit knowledge is that which can be articulated and codified which, therefore, transmits easily. Tacit knowledge is widely dispersed, residing in patterns of heedful interactions between individuals within a shared area of competence (Weick and Roberts, 1993).

Much of knowledge is sticky and to be found within complex social interactions such as team relationships within organizations (Badaracco, 1991). What makes this dispersed knowledge difficult to track down is the difficulty in identifying its parts since much of it resides in social interactions themselves. That is, much of human knowledge is grounded in daily life experiences, which are elusive and refuse obstinately to be trapped in a verbal matrix. For example, though emotions may be somewhat communicated through words, they cannot be reduced to words alone.

Since much of knowledge is tacit residing in social interactions, different social contexts facilitate different modes of knowledge integration. Social contexts in turn depend on individual and organizational levels, viz.: the nature of interpersonal ties, whether they are embedded or not; and the nature of inter-organizational linkages, whether organizations are loosely or tightly coupled.

Embeddedness of interpersonal ties

The Embeddedness of interpersonal ties may be viewed as a continuum ranging from one extreme of high social embeddedness to the other extreme of low embeddedness or arm’s length in nature. For Granovetter (1985), embeddedness refers to the notion that behaviors and institutions are constrained by ongoing social relations. Embedded relationships involve repeated interactions over long-term horizons and are characterized by mutual cooperation and trust.

People are most strongly influenced by members with whom they have frequent interactions (Epstein, 1961; Kadushin, 1968). In fact, social information processing theory argues that individual perceptions are likely to be influenced by the opinions, information, and behaviors of
sallet others. Individuals may be influenced by cues from others about what to attend to, how salient dimensions of a certain phenomenon are to be valued, and how others may evaluate the same phenomenon (Salancik and Pfeffer, 1978; Hurdin and Higgins, 1996). People are especially prone to be influenced by others who are more proximate in attitudes, perceptions and behavior patterns as well as social and cultural contexts (Salancik and Pfeffer, 1978; Dean and Brass, 1985; Burt, 1987; Contractor and Eisenberg, 1990; Messick and Mackie, 1989; Axelrod, 1997; Chatman et al., 1998).

In embedded relationships, people tend to influence those with whom they have direct interaction and are influenced in turn by them (Burt, 1987; Erickson, 1988). Through such interactions, people glean insights and, in turn, share their own insights. This may lead to the development of shared beliefs and world-views that impact social values beyond their instrumental utility in communication or exchange (Solznick, 1957). These relationships are therefore value-laden within which members develop esoteric languages and interpretive schemas that become linked to one’s sense of identity. Such relationships and linkages between individuals may augment the transfer of fine-grain knowledge and joint problem-solving arrangements between firms (Uzzi, 1997).

Fine-grain knowledge, which is detailed, proprietary and holistic, can be communicated effectively with the use of “local language” that grows out of repeated complex transactions (Romo and Schwartz, 1993). Local language is an indigenous “dielectric” consisting of locally understood words idiosyncratic meanings and makes sense only to people with a history of common experiences in a shared social environment. Uzzi (1997) illustrates such relationships in the New York apparel cluster where embedded ties have built-in coordination mechanisms that help people solve their problems flexibly by using quick trouble-shooting arrangements and mutual adjustments. Also to be stressed here is the importance of work practices and training cultures that are shared by collaborators as well as the broader regulatory and institutional frameworks (Gertler, 1995).

By contrast, where relationships are arm’s length in nature and affected mainly by their direct relevance to parties involved, self-interested actors sustain cooperation through “calculated trust” (Swanson, 1965; Williamson, 1993). The attitude is one where “I trust you because I calculate that your short-run benefit from an opportunistic defection is outweighed by your long-run benefit from continued cooperation” (Montgomery, 1998, p. 93). In such relationships, the incentive not to cheat comes from the cost of losing one’s reputation which is a generalized commodity.

Arm’s length relationships are suitable for the transfer of codified knowledge where uncertainty is low. Advances in information and communication technologies (ICT) that facilitate the rapid collection, collation, analysis, storage and retrieval of data, information, images, video clips, or audio clips may aid the transfer of explicit knowledge. By contrast, such technologically mediated communication is ineffective for transferring tacit knowledge and thus cannot replace face-to-face social interaction.

Tightness of interorganizational coupling

The tightness of inter-organizational linkages or coupling of two or more organizations impacts the exchange of knowledge between them to varying degrees (Steenma and Corley, 2000). Loose interdependence obtains where organizations either have few variables in common or if the variables they do have in common are only weakly important to them (Glassman, 1973). There is the retention of distinctiveness of collaborative elements in a loosely coupled collaboration despite the responsiveness of these elements to one another. Tight interdependence, on the other hand, is about the lack of distinctiveness of collaborative elements.

Like Steenma and Corley (2000) and others, we refer to interorganizational linkages in terms of tight or loose “coupling”, borrowing Weick’s (1976, 1982) terminology used originally in the context of the activities of one part of an organization as being more or less independent of the activities of other parts of that organization. Weick demonstrated that substantive
independence among organizational subunits renders an organization a loosely coupled system which confers flexibility to the system. Subsequently, Orton and Weick (1990), Contractor and Lorange (1988) and Leonard-Barton (1995) have also used the term "coupling" to refer to organizational interdependence, the level of mutual commitment between partners, and intensity of alliances ties. In joint development agreements for example, organizations were said to be tightly coupled. Here, the firm sourcing a technology can exert hierarchical control over individuals with the desired know-how in the supplier firm rather than rely on market exchanges (Folta, 1998; Oeborn and Baugh, 1990; Robertson and Gatignon, 1998).

Interorganizational relationships have to do with exchange – voluntary not coerced – of material goods as well as intangibles often beyond gratifications in the immediate present (Levin and White, 1961). As individuals interact, organizational domains get clarified and the development of greater domain consensus leads to solving the problem of who gets what for which purpose. The tightness of coupling has implications for the intensity of interaction and the richness of exchange between collaborating firms (Steenstra and Corley, 2000). As organizational interdependence gets tighter, richer knowledge exchange may occur well but governance costs and managerial overheads also tend to increase (Jones and Hill, 1998).

While loosely coupled collaborations have limited interactions and constrained communication, tightly coupled collaborations are associated with regular group meetings, formalized reporting and feedback sessions, and interdependent parts such as linked information systems and databases. In short, frequent formal monitoring and control. Tight coupling is associated with a higher degree of similarity in behavioral norms and expectations, compatibility of decision-making styles, and convergence of worldviews among exchange parties. Shared routines may include shared administrative authority, joint ownership of operating policies, and interlinked agendas on content, process, control, and learning. Such similarities in the norms and values of collaborating firms may permit better know-how assimilation (Lane and Lubatkin, 1998). This comes from the ability to economize on communication through a shared coding scheme and routines which make for more efficient coordination (Arrow, 1974; Ghoshal and Moran, 1996). The opposite holds true where interorganization partnerships are more loosely coupled such as research contracts.

Social capital and knowledge integration

Knowledge integration also depends on social capital. The transfer of information and knowledge at micro- and macro-levels between individuals and between organizations depends on people initiating and facilitating those transfers (Charles and Howells, 1992; Roberts, 2000). Consequently, all those things that encourage or inhibit inter-personal communication affect knowledge transfer. Of these, the importance of trust has long been noted (Golembiewski and McConkie, 1975; Kramer, 1999).

Trust is a belief that an exchange partner will not act in self-interest at one’s expense or expectation, that her future actions will be favorable to one’s interests such that one is willing to be vulnerable to those actions (Mayer et al., 1995; Robinson, 1996; Uzzi, 1997). It is the warranted belief that someone else will honor her obligations, not merely because of material incentives, but out of moral commitment too. It assumes that moral commitment is rational because it generates emotional rewards (Casson, 1991). Thus, trust is “the conscious regulation of one’s dependence on another that will vary with the task, the situation, and the other person” (Zand, 1972, p. 230).

Trust is especially important whenever the complexity of relationships or whenever unanticipated contingencies preclude recourse to completely contingent contracts with third party enforcement. Thus trust is critical to knowledge sharing (Lazier and Lorenz, 1998), which means that trust is essential for the efficient operation of a knowledge economy since the

66 Different social contexts facilitate different modes of knowledge integration. 99
exchange of knowledge involves risks and uncertainties which can only be minimized by a high level of trust.

Although it is a valuable commodity, trust cannot be purchased in the market. As Arrow (1974, p. 23) notes, "If you have to buy it, you already have some doubts about what you’ve bought". Instead, trust depends on the sharing of a set of social values, cultural institutions and common expectations. Through a common culture, expectations and perceptions about the behavioral patterns of others may develop, setting the foundations upon which a network of trusting relationships may be built. Because trust is influenced by social contexts, the levels of trust present in a market may vary across firms, cultures and nations (Casson, 1991, 1997). In cross-border exchanges of knowledge between people from different cultural or national backgrounds, developing trust will require greater investment in time and effort to build up shared expectations.

It is trust that enables social capital to be created between people which, therefore, inheres in the structure of relations among actors. A group where there is extensive trust can accomplish much more than a comparable group with less trust. Still, all social relations facilitate some form of social capital which are those aspects of the social structure that facilitate actions within those structures (Coleman, 1988). Social capital inheres in the structures of relations within which purposive action takes place and consists of "those expectations for action within collectivity that affect the economic goals and goal-seeking behavior of its members, even if these expectations are not oriented toward the economic sphere" (Portes and Sensenbrenner, 1993, p. 1323).

Social capital comprises those resources that actors may access through social ties that may affect an individual’s action directed toward another based on the social structure in which the action is embedded and the history of transactions between the actors (Bourdieu, 1986; Coleman, 1988; Putnam, 1993). It is "the sum of the resources, actual or virtual, that accure to an individual or group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (Bourdieu and Wacquant, 1992, p. 119). It is not lodged either in the actors themselves (that is, it is not human capital), or in physical implements of production (that is, it is not physical capital). But like other forms of capital, social capital is productive, making possible the achievements of certain ends that, in its absence, would not be possible.

Social capital represents resources that reside in function-specific social relationships in which individuals are embedded. It is function specific in the sense that it may well be important to one outcome but irrelevant to another outcome (Teachman et al., 1997). Social capital serves three important functions. First, it represents a structure of obligations, expectations, and trustworthiness. Social systems with high trustworthiness are ones in which expect social obligations to be repaid somewhere down the line. As such, individuals in social structures with higher level of obligations outstanding have more social capital to draw on. Second, it serves as information channels. As information may be costly to acquire because it requires attention, which is scarce, social relations constitute a form of social capital that provides access to information which facilitate action. Finally, social capital serves as a system of norms and effective sanctions, that is, effective norms which constrain people from socially undesirable actions. For example, one prescriptive norm within a collectivity that constitutes an especially important form of social capital is the norm that one should forgo one’s self-interest to act in the collectivity’s interest.

In sum, social capital confers information and control advantages by brokering relations between people who may otherwise be disconnected in a social structure (Burt, 1997). Certain kinds of social structure, however, are especially important in facilitating some forms of social capital (Coleman, 1988). Studying immigrant communities, Portes and Sensenbrenner (1993) elicited four origins of social capital within four sets of economically-relevant expectations: value introjection, reciprocity transactions, bounded solidarity, and enforceable trust.

First, it is value introjection that prompts individuals to behave in ways other than naked greed. That is, value imperatives learned during the process of socialization in a culture function to
guide the moral character of economic transactions. The benefits of such behavior that transcends naked greed are appropriable by others in the collectivity.

The second origin of social capital consists of "chits" accumulated by one's good deeds done to others when they are backed by the norm of reciprocity. In reciprocity transactions, people may not be expected to behave according to some higher group morality but rather for their own selfish ends in the sense that they expect reciprocation. In contrast to market behavior, however, these transactions are not largely about money or material goods but more about social intangibles such as goodwill.

The third source of social capital, bounded solidarity, refers to those circumstances that lead to principled group-oriented behavior arising as situational reactions of a class of people facing a set of common problems. Rather than early value insertion during socialization, or even reciprocity exchanges, bounded solidarity leads to mutual support, something people in a collectivity can appropriate as a resource.

The fourth source of social capital, enforceable trust, emphasizes the monitoring capacity and sanctioning capacity of interacting parties. Individual members subordinate their present desires to collective expectations in anticipation of future "utilities". This involves substantive rationality to particularistic obligations such that one member refrains from acting against another who enforces her trust by foregoing potentially immediate gain in resources (Weber, 1947). Here it is not values or convictions that motivate but rather the anticipation of future utilities associated with having "good standing" in a particular collectivity. Unlike an actor who anticipates that a direct supportive act of his/hers will be reciprocated by another because of some group norm, the actor who enforces the trust of another through mediated social structures is assured only that the other will not act against her.

Based on the above discussion, we suggest:

P1. Knowledge integration is highly dependent on the type of social context and the kind of social capital inhering therein. Specific social contexts coupled with specific collective expectations can facilitate specific kinds of knowledge integration.

Modes of knowledge integration

To recapitulate, the social context can be one where interpersonal ties are either highly embedded or arm's length in nature, and where interorganizational linkages involved are either tightly or loosely coupled. Each type of social capital coupled with a specific social context is associated with a different type of efficiency in integrating knowledge across firm borders. Four modes of knowledge integration, namely, frontier, incremental, instrumental, and combinatorial, are identified based on the diversity of knowledge streams, tacitness of knowledge, and value created (see Figure 1).

Frontier knowledge integration

The main aim of frontier knowledge integration is to generate new knowledge, insights, and discovery, focusing on searching and exploring knowledge that is new, emergent, and leading edge with significant uncertainty regarding the quality, reliability and usability (Gertler, 1995). New knowledge is gained not only through specialized knowledge-seeking activities but also as a by-product of searching for new technologies. Thus, frontier knowledge integration emphasizes efficient search for leads and clues in a diversity of disciplines and sectors.

Efficient search involves specifically knowledge in several important aspects:

- knowledge of the linkages between technological attributes and economic attributes;
- R&D knowledge on how to prioritize the testing of candidate technologies;
- knowledge about the economic characteristics of other similar technologies or techniques that have been previously tried-out; and
- strategic knowledge of what directions to push R&D through (Nelson, 1982). 

Strong search knowledge enhances efficiency both by enabling R&D to proceed on a generally better set of candidate projects, and by enabling the set worked upon to reflect more accurately
particular demands and needs. Knowledge of similar technologies that might exist and of effective testing techniques grows through experience. What R&D strategies succeeded and failed the last time around offer clues as to what is best to try next. Thus, strong search knowledge enables a larger than expected advance to be achieved from a given outlay on R&D or, alternatively, reduces the expected cost of any R&D achievement.

When new knowledge is arising predominantly out of intense experimentation, aggressive search for new alternatives across disciplines, and intuitions about where or how to begin the process of exploration, it is often less constrained by rigid organizational rules and behavioral norms. It occurs in the interstices between firms, universities, and research laboratories where long-term relationships may emerge as exchanges occur within shared codes of learning and tends to take the form of casual conversations in informal social interactions around the coffee pot or water cooler. For example, in the biotechnology industry, its organic chemistry
knowledge base was rapidly revolutionized by competence-destroying innovations flowing into the field from the disciplines of immunology, molecular biology, and computational physics.

As the main characteristics of frontier knowledge integration are efficiency in search for, and access to, the knowledge, expertise, or skills, much of frontier knowledge is tacit and context bound, many aspects may not be amenable to articulation. March (1991, p. 95) differentiates between exploitation and exploration. While exploration can lead to returns that are predictable, exploration generates uncertain returns and is often costly because unfruitful, but it is "the only way to finish first" (Levinthal and March, 1994, p. 106). Frontier knowledge integration is exploratory in nature as how collaborations will turn out under conditions of uncertainty and dynamism is unpredictable, so there is risk of becoming locked into a technology that may not be commercially viable later on (Lieberman and Montgomery, 1988).

Here, loose coupling of collaborating organization reduces the risk of lock-in while providing a chance for partners to access, assess and appropriate promising technologies and emergent knowledge that each other may possess. Thus, loosely coupled collaborations allow partners to access and evaluate emerging expertise at reduced costs. Because the value of inter-organizational ties is highly uncertain under these conditions, the contractual terms of alliances between biotech startups and big pharmaceuticals often permit the latter to terminate their agreements without cause and at short notice (Stuart et al., 1999).

Fast paced technological developments and research breakthroughs in biotech today are distributed so widely that no single firm can gather under its roof or develop quickly all internal capabilities necessary. This is why companies with deep pockets tend to form many loose couplings to scan for new developments and to refine searches by benefitting from knowledge of others' failures (Powell, 1998). Collaborating firms generally maintain the option of increasing their resource commitments later on. For example, Amgen has extensive R&D and marketing collaborations with numerous small biotech companies, among them ARRIS, Environgen, Glycomex, Guilford, Interneuron, Regeneron, and Zynaxis. The smaller firm develops promising technology with Amgen's financial and scientific assistance, and Amgen will market the eventual product (Powell, 1998).

Frontier knowledge flows are best observed in such industries with complex knowledge bases that are growing so that the relevant sources of expertise tend to be widely dispersed. Here, the locus of creativity and innovation are to be found in networks of social relations (Powell et al., 1996). With this sort of emergent, tacit knowledge embedded in specific communities of practice, face-to-face interactions among people with embedded ties, especially friendship/professional ties, are key.

Aside from such scientific and human capital concerns, the community of life scientists is also preoccupied with various ethical issues arising out of the new bio-medical science, say, in dealing with human embryos. Through a process of socialization during their training, such researchers have internalized profession-specific/industry-related values, norms and expectations. So, members expect each other to behave according to their higher group morality. That is, because of value introjection, they have a sense of moral obligation about their professional activities (Weber [1904], 1958; Portes and Sensenbrenner, 1993). Value introjection emphasizes "the moral character of economic transactions that are guided by value imperatives learned during the process of socialization" (Portes and Sensenbrenner, 1993, p. 1323).

Hence the deluge of media coverage of ethical issues in stem cell research, for example (e.g. AP News wires, 2002). While the lay public may find the controversy over embryo research, for example, to be much ado about nothing, it is the case of the outsider having an incapacity to comprehend that culture as he has neither been socialized in the group nor participated in the experience that makes up its life, and therefore cannot have the direct, intuitive sensitivity that alone makes empathic understanding possible. Only insiders are fully aware of its symbolism, socially shared realities, fine-grained meanings of behavior, feelings, values and the unwritten
grammar of conduct or nuances of culture idiom (Merton, 1972). Here, value introjection enables but also constrains the way participants integrate streams of diverse knowledges.

P2. Frontier knowledge integration is facilitated by a social environment where there is high social embeddedness, loosely coupled interorganizational linkages, and collective expectations emphasizing value introjection.

**Incremental knowledge integration**

Incremental knowledge integration aims to achieve fast-paced exploiting, refining and extending of existing knowledge. Because of time constraints imposed by competition in certain sectors, collaborations with others may help speed up innovation by deepening current knowledge streams and exploiting those of other organizations to achieve dynamic competencies.

To overcome the difficulties involved in transferring tacit knowledge is to co-locate individuals involved in the collaboration. This would clearly enhance recombinant opportunities and possibilities that may eventuate in innovation and new products. This method of moving people around so that the tacit knowledge in their heads may be transferred to others elsewhere requires the socialization of that knowledge-bearing in the new environment and learn to become a part of what Weick and Roberts (1993) called the “group mind” or tight coordination seen among aircraft-carrier flight-deck crew. Such highly-customized, highly-contextualized forms of tacit knowledge operate through the development of shared organizational routines that accumulate over time in ways that zero-in on what actions are necessary with relatively little conscious attention to details (Nelson and Winter, 1962).

Collaborators develop an idiosyncratic body of language and symbols with very specific association and meanings, shared verbal categories and explanations (Sproul, 1981), and mental models as a common interpretative system (Daft and Weick, 1984). These features facilitate knowledge exchange without the need to translate everything into a higher level language (Kogut and Zander, 1992). Such “communities of practice” have their own institutionalized practices, which coordinate beliefs and shared world views that make possible certain paths and certain veto points (Allen et al., 1979). The fact that knowledge bearers are also linkage bearers, moving them around in an attempt to redeploy tacit knowledge will also enhance the benefit from their whole network of heedful interactions, or linkages.

Here, tight coupling will make for the development of common organizational routines and behavior norms, collective learning processes and decision-making styles as well as building up those commonalities that are crucial for achieving effective knowledge exchange across organizations. Embedded relationships facilitate the development of a unique language or code among individuals wishing to jointly exploit current know-how and complex technical knowledge. Many technological developments or process improvements relevant in industry cannot be completely protected by patents (Once a patent application is filed, the innovation sits out there virtually unprotected for one and one half or two years before a patent is issued, if ever). Close interaction enables both parties to build up knowledge about each other’s reliability and trustworthiness, which can ensure success of technology implementation.

Incremental knowledge integration is crucial when dealing with the purchases or sales of complex electronic technologies. Extensive system integration and intensive exchange of knowledge between buyers and technology producers are called for. Close interaction between purchaser and producer allows the purchaser to clarify her technological needs to the producer who can customize the technology to better match the purchaser’s needs. Effective customization of technology necessitates the revelation to the producer, an outside firm, confidential and proprietary details of one’s products and production processes. For technology producers, close interaction is also beneficial as purchasers represent a vital

The importance of trust has long been noted.
source of creative ideas to develop incremental innovations when producers are compelled to modify their technologies to meet the needs of customers (von Hippel, 1988).

What we see in this context is institutionalized reciprocity residing within complex sets of social relations among individuals (Polanyi, 1958, 1959, 1967). This source of social capital, reciprocity transactions, is built upon the accumulation of “chits” backed by the norm of reciprocity. Chits are “IOUs” accrued over time based on the giving and receiving of good deeds performed in multiple economic transactions, including preferential treatment, information exchange, approvals of requests, and other valuable acts. Here, interacting parties pursue their selfish ends in terms of social intangibles rather than money and materials (Gouldner, 1960; Blau, 1964; Hechter, 1987).

P3: Incremental knowledge integration is facilitated by a social environment where there is high social embeddedness, tight interorganization linkages and collective expectations of reciprocity.

Instrumental knowledge integration

Instrumental knowledge integration aims to fulfill the promise of an economic transaction based largely on explicitly coded knowledge and available capabilities. The market exchange of knowledge is constrained by its low appropriability in the sense that the supply and demand of knowledge in the market is put at risk by the fact that when sellers make their knowledge explicit, potential buyers will not pay for what in fact becomes a public good. Yet, without that revelation, buyers would be unwilling to buy knowledge without details. Thus organizations have come up with ways such as licensing to solve this intrinsic risk so they can benefit from the circulation of such knowledge without harming the incentives for production.

Loose coupling is appropriate where knowledge is already prevalent among competitors so it can be acquired from skilled people who may be available within the firm or externally within consultancy firms. In such cases, it is not worth investing time and effort to foster deeper interpersonal relations or the administrative overheads incurred in tight coupling (Steensma and Corley, 2000). Here, weaker asymmetric ties that link people who differ in personal characteristics such as education, past experience, tenure positions in the vertical and horizontal divisions of labor, and ability to access scarce resources (Laumann et al., 1978; Lin, 1982) serve to connect disparate parts of social systems in ways critical to instrumental action. Chains of asymmetric relationships can be extremely useful for accessing resources (Lin, 1982).

In these arm’s length relationships involving exchanges of determinate and largely explicit knowledge, there is a lack of reciprocity between exchange partners and no necessary commitment for future deals. Such relationships are flexible arrangements that allow the selection of partners according to their actual reliability, complementarity and value of their potential contributions. This approach reduces the risk of lock-in with collaborators who may turn out to be uncompetitive. Here, access to specific knowledge can be determined a priori and specified through a contract, there is little need to tap knowledge in eclectic fields afar. Where technological knowledge involved in transfers is non-diverse, has attained a steady state with standardized components, and is largely codified, extensive communication and interaction between the parties are not required (Mowery et al., 1996; Robertson and Gatignon, 1998). This may be observed in technology licensing agreements, say, where the knowledge that can be transferred is relatively mature and largely codified so there is little need for the close presence of a licensor to help in the development, adaptation, and commercialization of that technology (Hennart, 1988).

In the process of transacting, valuable knowledge is exchanged which may modulate future choices by reducing future search costs, increasing switching costs for one party, enhancing the reputation and goodwill for the other party, and so on. Previous transacting experiences may influence exchange partners’ perceptions of “transactional” quality, that is, the extent to which a transaction is efficiently and effectively carried out, and the willingness to rely on this emerging sense of trust in dealing with one another in the future. Because both sides have an eye on the possibility of future transactions, they may behave appropriately. Such arm’s length transactions are facilitated by enforceable trust which arises out of the ability of exchange
Frontier knowledge integration emphasizes the efficient search for leads in a diversity of disciplines and sectors.
This kind of social capital does not depend on enforceability but on the imperative felt by individuals to adhere to certain norms and to remain committed to the group in order to reap the benefits of group membership. Compared to value introjection, this kind of social capital grows out of a particular situation where parties band together to face common adversities or adversaries in the market place. Obviously, the strength of such collective sentiments will determine the pervasiveness of such norms of mutual support. Hence, the boundedness of such solidarities.

A good example is seen in auto manufacturing. A vehicle consists of components produced by thousands of different suppliers organized into four tiers based on their proximity to the manufacturer (Tier 1 firms are the main suppliers, Tier 2 suppliers deliver parts to Tier 1 companies, and so on). Production is therefore logistically a pyramid, where arm’s length relationships are routinized but involve high switching costs as suppliers may not know about opportunities presented by other suppliers. In 1999, the Big Three co-created Covisint, a virtual B2B marketplace linking all participants in auto production that allows suppliers to enter the network effortlessly, which reduces switching costs. Covisint’s benefits come not only through supply chain management but also from online collaborative product development using its 3-D visualization that permits engineers to develop and revise components wherever they are (Kachadourian, 2000).

The Big-Three’s unified B2B venture promotes modular manufacturing, now being tested out in their foreign branches due to UAW complications at home. Here, a number of alternative sub-systems, or modules, are put together by big suppliers. At General Motors’ “Blue Macaw” Brazilian plant that makes a variant of the Opel Corsa, its managers tell General Motors’ 17 suppliers nearby what modules are needed for the day. The suppliers work with each other under detailed schedules to deliver those modules, frequently within hours. When the module arrives at Blue Macaw, they are assembled into a car doubly fast (The Economist, 2000).

This kind of sharing of production and product design with suppliers (or coproduction) sees greater responsibility for design pushed onto suppliers. To succeed, it requires knowledge exchange between manufacturer and suppliers, and among suppliers themselves. Covisint’s 3-D tool allows suppliers to develop their modules together so they deliver a module consisting of say, the motor, transmission, fuel lines, rear axle, brake fluid lines and exhaust systems to install as one unit (Wheatley, 2000). Today, suppliers are becoming “module providers” so Tier 2 suppliers are beginning to integrate their production processes with Tier 1 module manufacturers. Here detailed knowledge of stable technology is shared across firm borders to enable the design, development and production of major subsystems.

P5. Combinative knowledge integration is facilitated by a social environment where there is low social embeddedness, tightly coupled interorganizational linkages, and collective expectations of bounded solidarity.

Theoretical and research implications

This paper identifies four modes of knowledge integration namely, frontier, incremental, instrumental and combinative, and argues that the realization of each type of knowledge integration is contingent upon the facilitative impact of two contextual factors, namely social embeddedness and interorganizational coupling, as well as the inhering of specific sources of social capital. Future research in knowledge management may explore the extent to which empirical findings support the propositions of this study.

In terms of theoretical implications, good social theory should make a successful transition between micro-level behavior and macro-level phenomenon successfully (Coleman, 1990). Our arguments show clearly how organizations situated between individual and system levels help to explain how knowledge integration materialize from collective expectations and actions. The propositions are based on the assumption that we as observers can discern certain systematic similarities and differences between the various forms of knowledge integration. Yet, we also recognize that conceptual categories must be assumed to be discrete and stable even though they hardly ever are (Pepper, 1942). Recognizing these limitations, our propositions are, of course, a simplification of reality as Wittgensteinian thinking teaches that the social is less an
aggregation of individual experiences than a set of background distinctions underlying individual action (Tsoukas, 1996). Hence, these propositions merely strive to open up these backgrounds of common understandings and distinctions. Of course, empirical case studies will be needed to verify and flesh out the propositions adumbrated in this paper.

To recapitulate, this paper is a first step in identifying the different modes of knowledge integration. We present the theoretical evidence for our propositions on interorganizational knowledge integration through a consideration of the concepts of social embeddedness, interorganizational coupling, and social capital. We show how an integrated view of these concepts helps in discerning how different modes of knowledge integration are facilitated.

Managerial implications

We believe that the propositions presented here may have important implications for managers. However, we note that further elaboration and empirical inquiry are needed. With the promise of greater uncertainty and change, the need to collaborate is probably more prevalent in the near future. Knowledge integration lies at the heart of the issue of firm growth and survival. Interorganizational collaborations allow the generation of value by exploring new knowledge (frontier knowledge integration), exploiting existing knowledge (incremental knowledge integration), facilitating business transactions (instrumental knowledge integration), and recombining knowledge streams (combinative knowledge integration).

This paper presents the view that the management of knowledge sharing across organizational borders should focus on the nature of knowledge integration and key factors that facilitate it. Managers hoping to create value by bringing together diverse knowledge streams from others must understand that economic action is embedded within a social structure in which different types of social capital obtain, impacting the nature of knowledge integration. Therefore, social structures of human interaction must not be left as mere constructs to be understood. Rather, they must be managed. Conscious decisions must be made about the design of roles, responsibilities, authority, and coordination of activities to facilitate knowledge integration.

As firms embark on different forms of collaborations, the challenge is to motivate the development of the appropriate kinds of social relationships and organizational routines for cooperation and sharing of experience. Based on the argument presented in this paper, the interactional context and social capital must be matched appropriately with the mode of knowledge integration desired. For example, managers should not expect frontier knowledge integration to occur in the absence of value introjection, and value introjection is unlikely to inhere where there is low social embeddedness and tight interorganizational coupling. Frontier knowledge integration requires considerable face-to-face communication because of the high tacit content of the knowledge to be shared. The usefulness and reliability of the knowledge to be shared is highly uncertain. If the collective expectation is enforceable trust instead of value introjection, then, knowledge sharing will be highly constrained, consisting of what is certain and proven to be useful and true. Therefore, understanding the dynamics of different knowledge integration modes, allows one to assess whether the desired interactional environment is present.

This argument reminds managers that knowledge integration is not friction-free movement as the case for information. Knowledge is not information, and therefore, the solutions to overcome difficulties of knowledge integration cannot be found in, say, information technologies. Rather, managers of interorganizational collaboration should evaluate the need for formal and informal interaction and the extent to which the collaboration is embedded in multiple, overlapping ongoing relationships. This dynamic relational capability is a prerequisite for developing dynamic absorptive capacities (Mowery et al., 1996).

This is a more holistic view of knowledge management. While formal organizational ties tend to be instrumental and goal oriented, informal social ties allow the sharing of knowledge in more meaningful ways. Tight interorganizational coupling facilitates the deepening of existing knowledge streams while loose interorganizational coupling facilitates the broadening
of knowledge diversity. Since different sources of social capital lubricate different modes of knowledge integration, managers must develop the ability to differentiate among the various interactional contexts of knowledge integration, each context having a distinctive structure of relationships and social capital.

Conclusion

In this paper, we laid out the argument that effective knowledge integration must ensure the existence of the appropriate context for human interaction with the inhering of the appropriate type of social capital. In general, we argued that effective knowledge integration depends on, first, the characteristics of knowledge involved, and second, the characteristics of social contexts in which they occur, that were, in turn, described by the closeness of interpersonal links, whether socially embedded or arm’s length, and the kind of interorganizational coupling, whether loose or tight. For a more fine-grained understanding of knowledge integration, we identified four modes of knowledge integration and described the combination of social context and social capital most suited for each type. We note the need for further theory construction and empirical inquiry. Finally, some managerial and theoretical implications of this argument were sketched.

References


Roberts, J. (2003), "From know-how to show-how? Questioning the role of information and communication technologies in knowledge transfer", Technology Analysis & Strategic Management, Vol. 12 No. 4, pp. 429-43.


