

“The co-development of solutions: a communities perspective”

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Abstract

In a context of increased market globalization leading firms to focus on their core competences, the trend towards integrated solutions is clearly established both in industrial markets and in project business. Providing integrated solutions requires suppliers to identify complementary capabilities in the business network so as to complement their own. This research aims at understanding the dynamics leading firms which actually compete in the same supply chain to develop solutions in common and hence, transfer their knowledge and know-how to a competing firm. It explores in particular the role that communities of practice can play in this process of learning in networks. Based on an exploratory case study, the paper concludes on the key roles of two types of communities: communities of practice (role of knowledge formalization and sharing) but also epistemic communities (partner access & development of relational congruence between firms).

1. Introduction – the trend for the co-development of solution

In a context of increased market globalization and competitive pressure leading firms to focus on their core competences and to rely on outsourcing (Prahalad & Hamel, 1990; Womack et al., 1990), the trend towards integrated solutions is clearly established both in industrial markets (especially among equipment manufacturers) and in project business (Jalkala et al., 2009; Cova & Salle, 2007; Azimont et al., 1998). One of the main objectives for project firms is then to overcome the demand-related discontinuity (Hadjikhani, 1996) considered as a major strategic problem in project marketing (Skaates & Cova, 2004).

Solutions are more than a simple bundle of products & services. They are customized or adapted to the specific needs of a given customer, and involve the careful integration of each of their components: *“they consist in part of products & services, but they also consist of the knowledge, experience & thinking it takes to make the components work together”* (Booz Allen, & Hamilton, 1999:2). As a consequence, project suppliers tend to rely more heavily on external resources to be able to satisfy demanding customers requesting ever more complex and extensive offerings (Ulaga & Eggert, 2006). On the one hand, they need to invest on narrower core competencies to keep their

competitive advantage, and on the other hand, they need to provide more integrated offers requiring a large array of resources and capabilities. This has been referred to as “the inherent paradox in the global business environment” (Möller, 2006 quoted by Jalkala et al., 2009).

As important sources of knowledge are network relations (Lundberg, 2002), providing integrated solutions requires from project suppliers to identify complementary capabilities in the business network so as to complement their own (Tikkanen et al., 2007). It calls for more partnerships between the actors of the supply-chain so as to complete their offer and increase their capacity to meet customer’s expectations (Dubois & Gadde, 2000; Holmen & Pedersen, 2001; Crespín-Mazet, 2007). Under this perspective, value is co-constructed between the project suppliers and the customers and greater focus is placed on the exchange of intangible elements such as knowledge and skills as well as on the social and economic processes between the parties (Bosworth, 1995; Lusch & Vargo, 2006). This cooperative mode of coordination is an alternative to the dominant mode of coordination based on market mechanisms and arms-length relationships (Dubois & Gadde, 2000).

It requires the development of trust and commitment between the parties to favor the open exchange of data, information sharing and learning from the partner (Morgan & Hunt, 1994). This can only be achieved with a limited number of suppliers sharing the same objectives (Barlow & Jashapara, 1998; Saad, Jones & James, 2002). The ability to cope in the network of actors and integrate external resources in order to co-create value with customer network actors is therefore becoming an essential success factor of project-based firm (Jalkala et al., 2009).

2. Research objectives

The implementation of a co-development strategy with other suppliers in the supply-chain may however raise some operational difficulties as some of the partners may have different goals and interests, and may even compete with each other on certain market segments or key customer accounts.

This research is originally based on the willingness to better understand the dynamics leading firms which actually compete in the same supply chain to develop solutions in common and hence, transfer their knowledge and know-how to a competing firm. According to the resource-based view, a firm’s sustainable competitive advantage is reached by virtue of unique resources such as knowledge -these resources having the characteristics of being rare, valuable, inimitable, non-tradable, non-substitutable as well as firm specific- (Makadok 2001: 94). The transfer of resources from one firm to a competitor may therefore threaten this competitive advantage in the case of opportunistic behaviors from the partner.

This research aims at analyzing the roles that communities can play in facilitating this transfer of knowledge and developing the required trust atmosphere between competing firms trying to co-develop solutions to satisfy their customer needs for integrated offers. Indeed, the recent literature on communities of practice (CoPs - Wenger, 1998, 2000) emphasizes that communities are assets that facilitate intra- and inter-organizational learning. In particular, a recent rush of interest seems to develop in the academic community for the contribution that the communities of practice can provide to learning, as it focuses on people and on the social structures that enable them to learn with and from each other. This is linked to several characteristics:

- Communities of practice enable practitioners to take collective responsibility for managing the knowledge they need, recognizing that, given the proper structure, they are in the best position to do this.
- Communities among practitioners create a direct link between learning and performance, because the same people participate in communities of practice and in teams and business units.
- Practitioners can address the tacit and dynamic aspects of knowledge creation and sharing, as well as the more explicit aspects.
- Communities are not limited by formal structures: they create connections among people across organizational and geographic boundaries.

Our objective is to analyze the co-development of integrated solutions between competing firms in the supply chain. We would like in particular to explore the role that communities of practice can play in this process. Our research questions relate to the following: can communities of practice play a role in this co-development process? If yes, how and which role do they play?

After a literature review focusing on the main factors affecting the co-development process and the exchange of knowledge between firms, as well as the role that communities of practice can play in this process, this paper will present the results of an exploratory case study where two competing firms successfully managed to develop a solution in common. It highlights the influence of the two types of communities on the solution development process: communities of practice (Wenger, 1998, 2002) but also epistemic communities (Haas, 1992). The analysis concludes on the role of the communities and the potential contribution of this new conceptual stream to cooperation and learning in network theory and in particular, on project marketing research.

3. Research method

Our research is based on an exploratory case study based on the in-depth analysis of the development of the relationship between two competing firms of a same cluster (Yin, 2003) located in south of France (Sophia Antipolis). These firms have been selected as they have managed at developing a commercial solution in common in spite of their competition on the same market segment. This helped them reinforce customer relationships and reduce the impact of project discontinuity in their respective business.

The first firm -A- is a service provider specialized in computer engineering (systems integrator) while the second firm -B- is a software editor. Both companies are structured around independent Business Units and a network of various local offices in France. Both companies sell and market software solutions to a very wide range of both public and private business (automotive, distribution, energy, healthcare, telecom, media, retail, life science, and manufacturing).

The study is based on in-depth interviews with both of these firms and with some of their customers. A total of 50 face-to-face interviews have been carried out including:

- 20 software engineers (8 from firm A and 12 from Firm B).
- 2 e-business managers and 8 sales engineers (3 from A & 5 from B)
- the system administrator in charge of supervising the common solution development

- interviews with 5 strategic customers including 11 interviews with the lead-user customer (5 design engineers, 4 sales engineers, 2 e-business managers supervising the relationship between A & B).
- The President of the cluster association (Sophia Antipolis) and the person in charge of supervising the cluster works on innovation

It starts with a detailed description of the case showing the various stages of the relationship evolution between the two firms leading to the development of a common solution. The data collected highlights the various factors that supported or inhibited the development of relational congruence (trust, development of common goals, commitment; creation of a community of practice) between the partner firms at each stage of the process. It also describes the impact of this cooperation on the management of project discontinuity and on the two firms' performance.

4. Literature review

4.1. Factors affecting the co-development process: relational congruence in the project network

Three groups of relational variables are identified as factors influencing the co-development process between firms: trust, commitment, as well as commonality of goals and values. The combination of these three factors generate a lower or higher level of relational congruence between the two parties (Ring & Van de Ven, 1994; Crespin-Mazet & Ghauri, 2007) which constitutes a key factor in the creation of a cooperative relationship. It can be related to the concept of atmosphere of the Interaction Model (Hakansson, 1982).

Co-development may be jeopardized in case of opportunistic behaviors of the parties (Williamson, 1985), distrust and lack of sufficient commitment to support the project (Crespin-Mazet, 2007). A lack of relational congruence between parties generates confusion and negatively influences the creation of knowledge in common. It generates a high level of relational risks for the parties involved (Cova, Ghauri & Salle, 2002; Crespin-Mazet & Ghauri, 2007).

4.1.1. *Mutual trust*

Trust is a key ingredient to the development of co-operation mechanisms in business exchanges (Morgan & Hunt, 1994; Boersma, Buckley & Ghauri, 2003; Ring & Van de Ven, 1994.). Trust acts as a reducer of transaction costs (Dyer, 1997; Nooteboom, 1996) and as a lever for the common creation of value (Zajac & Olsen, 1993). It is central to the issue of co-development.

4.1.2. *Commitment*

Commitment can be measured by the investments made by the parties to co-develop the project or solution (Cunningham, 1986; Zaheer & Venkatraman, 1995). The more specific the actor's investments, the higher its loss in case of partner opportunism (Stump & Heide, 1996) and vice versa. The decision to co-develop a solution with a partner may depend on the assessment of the investments (volume and specificity) that it requires as compared to those involved in working alone. These investments concern human investments (number of people involved, specificity of staff knowledge mobilized), procedural investments (customization of structure and procedures) or technical investments. The level of investments enables to assess the level of dependence or autonomy of each company in relation to the other (power in the relationship). According to Hakansson (1982), a situation of power interdependence is more favorable to co-operation.

4.1.3. Commonality of goals and values

The creation of a cooperative relationship between two parties (leading to their commitment) relies on their preliminary agreement on a minimum level of shared goals and expectations on their cooperation. They require that the choices be congruent (Ring & van de Ven, 1994). This variable encompasses the notions of commonality of objectives and expectations, goal alignment (Barlow & Jashapara, 1998; Bennet & Jayes, 1995), or common language (Hakansson, 1982) that are often quoted in the literature on co-operation.

4.2. The role of communities of practice in the development of inter- and intra-organizational learning

4.2.1. Communities of Practice (CoPs)

CoPs are defined as groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly (Wenger, 1998, 2002). According to Wenger, communities of practice are formed by people who engage in a process of collective learning in a shared domain of human endeavor: a tribe learning to survive, a band of artists seeking new forms of expression, a group of engineers working on similar problems, a network of surgeons exploring novel techniques, a gathering of first-time managers helping each other cope¹. In a community's perspective, firms are not just composed of individuals but of a multitude of overlapping «communities» such as functional work groups, project teams, tech clubs, thematic groups or learning networks. Learning can be the reason the community comes together or an incidental outcome of member's interactions.

For Wenger, a CoP is characterized by 3 key elements (Wenger, 1998; Chanal, 2000):

- *The mutual commitment* of its members. A community of practice is not merely a network of connections between people. It has an identity defined by a shared domain of interest. Membership therefore implies a commitment to the domain, and therefore a *shared competence* that distinguishes members from other people. They value their collective competence and learn from each other, even though few people outside the group may value or even recognize their expertise. The concept of mutual commitment is operationalized by several characteristics (Wenger, 1998: 125): 1) developed mutual relationships (be they conflicting or harmonious); 2) common ways to commit to actions; 3) the absence of introductory phases (social) in conversations – interactions are like a continuous process; 4) the use of jargon, private jokes; and 5) a shared vocabulary reflecting a common vision about their environment.
- *A common objective* (mutual enterprise). In pursuing their interest in their domain, members engage in joint activities and discussions, help each other, and share information. They negotiate common actions which creates mutual responsibility ties between actors. They build relationships that enable them to learn from each other. Wenger refers to this process as a “*participation process*”.

- *A shared repertoire* (practice): members of a community of practice are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, and ways of addressing recurring problems. In short a shared practice. This takes time and sustained interaction. The development of a shared practice may be more or less self-conscious. Wenger refers to this process as a “*reification process*”.

It is the combination of these three elements that constitutes a community of practice. And it is by developing these three elements in parallel that one cultivates such a community.

4.2.2. In what respect do communities of practice favor intra and inter-organization learning?

For Wenger (1998), social learning develops on a daily basis as the actors develop their practice through various activities such as problem solving, request for information, coordination, seeking to learn about other’s experience (e.g. working for a given customer), exchange of information, mapping their knowledge and identifying gaps. This learning contributes to shaping and transforming the social structures.

Learning through practices includes the following processes (Chanal, 2000):

- Develop various forms of mutual commitment which evolve over time
- understand and harmonize the mutual enterprise in particular, conciliating conflicting interpretations on the nature and objectives of the activity
- develop a shared repertoire, vocabulary, tools, words

CoPs inside firms facilitate organisational learning because they consolidate the existence of inter-individual transversal relationships. The reification process produces persistent elements, enabling to develop a collective memory and also to modify it through process of renegotiation. It therefore enables to develop organisational knowledge (Cohendet and al., 2001)

Empirical research has shown (Goglio-Primard, 2004) that CoPs facilitate the creation and sharing of tacit knowledge existing in the firm on customers (socialisation process) and helps transform this information into explicit knowledge thus contributing to improved customer portfolio management systems (reification). Concerning the inter-organizational learning, CoPs have been shown to favour the connexion with other communities and hence, increase inter-firm learning. The combination of tacit knowledge into explicit practices (reification process) helps communicate with external actors and transfer information and knowledge that have been ‘codified’.

5. A preliminary model for solutions co-development

The literature review has highlighted several common factors influencing the process of co-development and the exchange of knowledge between firms. This has enabled us to design a preliminary model for solutions co-development between firms competing in the same supply chain. As illustrated in exhibit 1, two variables are identified as antecedents in this model: the relational congruence between the competing firms and the development of a shared repertoire. These two variables influence the creation of a community of practice including individuals from the two firms (boundary practice) which forms the moderating variable in this model. The CoP then constitutes the platform or vector to favour the development of common integrated solutions between the competing firms.

Our central proposition thus states as follows: “the co-development of integrated solutions between competing firms requires the preliminary development of relational congruence between the two firms so as to reduce the risks associated to cooperation, as well as the development of a shared repertoire to enable the exchange of tacit & explicit knowledge between the individuals involved on both sides (developers). In sum, it requires the preliminary development of a community of practice integrating individuals from both parties”.

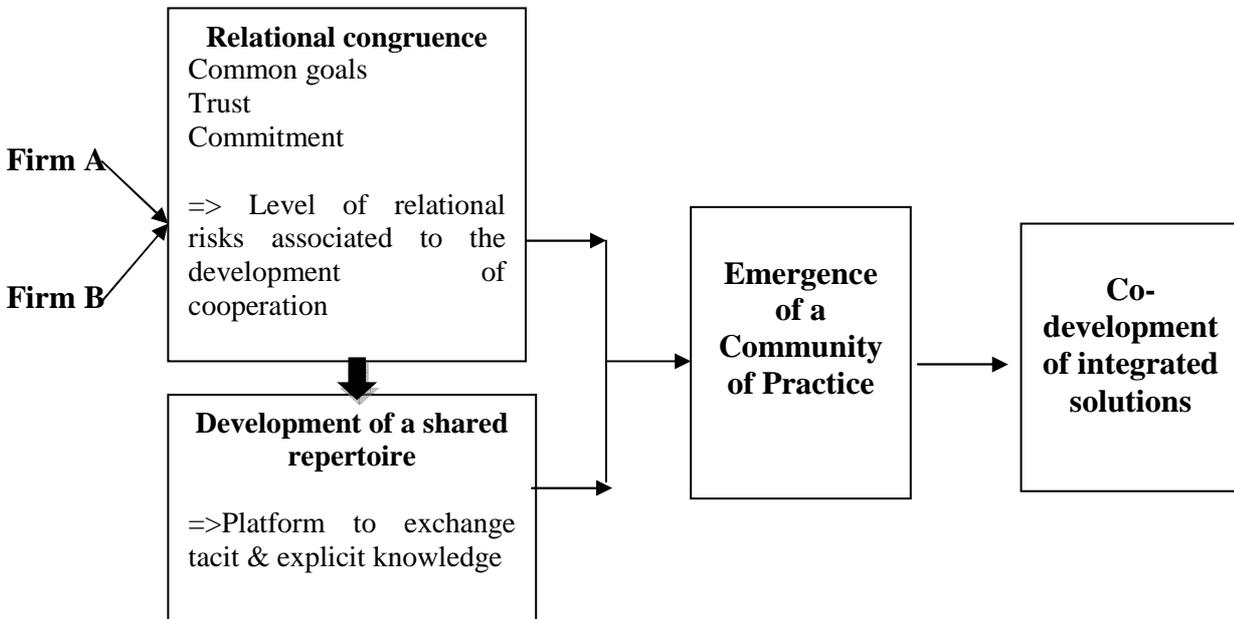


Exhibit 1 – A preliminary model for co-development of integrated solutions between competing firms

6. The case study

6.1. The various stages of the relationship evolution between A & B

Step 1- September 2003- Firm A acknowledges a lack of efficiency of its offer development system and searches for external resources in the cluster network

The market manager of e-business solutions of firm A based in Sophia Antipolis, realizes that it encounters difficulties in selling its solutions due to a lack of price competitiveness. The system used by its software engineers to design new customer solutions lacks efficiency and does not sufficiently capitalize on functionalities that could be integrated in other internet websites. From there on, he looks for an improved knowledge management system and sends an e-mail to all the French e-business managers of the Sophia Antipolis Science Park association (in the cluster). This association gathers experts in e-business solutions and facilitates relations between firms in this field. Several managers answer to this e-mail among which the e-business manager of firm B whose software engineers have developed a specialized knowledge management system meeting firm A’s objectives.

This system called CMS (Content Management System) integrates for example, descriptors of a Java or Microsoft development program used for a specific customer website. It provides a set of pre-defined and well-structured categories which enable to standardize the technical functionalities developed by the software engineers and hence, to more easily track technical data development. Another interest of this system is that it enables anyone in firm B to access to all the technical knowledge developed by its engineers from anywhere in the world.

Second step. November 2003 – 1st contact between firm A and B through the cluster association

The e-business manager of firm B invites his counterpart in firm A to attend an expert seminar organized by the cluster association where firm B was programmed to present its CMS system. This first introduction through the seminar is positive and the two e-managers decide to organize another meeting to further investigate cooperation opportunities. They also have several informal contacts through telephone, e-mails and face-to-face conversations where they overtly exchange on their daily practices. The software engineers of Firm A then meet the software engineers of firm B and realize the benefits that the CMS system could bring to their firm. In particular, they are struck by the openness and the efficiency of the information flow among the community of firm B's engineers. They understand that the system enables B's engineers to codify and share their technical functionalities so as to re-use them for website creation purposes for their customers. The system provides a key benefit for B's engineers as compared to previous practices: when they need help, they can have a direct access to the national expert who developed these functionalities instead of contacting a local expert. This enables them to foster their understanding of the functionalities (faster, better).

3rd step - January 2004 - The acknowledgement of the benefits of cooperation. First knowledge transfer between the two firms.

These various interactions enable the engineers of the two firms to assess the mutual interest to cooperate. On the one hand, the software engineers in firm A want to use the technical functionalities of the CMS so as to create their customers' web sites. On the other hand, the software engineers from firm B want to improve the applications for their software, but lack the knowledge of the other domains. They realize that they could not reach their objectives alone or that it would be much longer and more costly. The managers thus accept to start transferring knowledge between the two firms as they have a favorable impression based on trust. This trust mostly comes from two factors. Firstly, the fact that both companies belong to the same cluster and have therefore signed a specific charter or code of ethics which entails specific rules regulating inter-firm cooperation (quality issues, feedback process between engineers and users during the design stage ...). Secondly, the quality and openness of the exchanges during the first meetings between the two managers and later with the project teams reinforced this priority of trust. As mentioned by an engineer of firm A, "*it's very difficult to develop trust between two competing firms because we have strategic skills that we use for the same customers*".

Firm B thus accepts to transfer its technical functionalities data base to firm A for replication purposes. Firm A's engineers start using it but they soon realize that some of these functionalities do not fully meet their customers' expectations. Firm A's engineers thus contact their counterparts at B's who developed such functionalities; and they commonly agree that A can work at boosting the initial functionalities developed by B. Firm B therefore becomes interested in benefitting from these new developments and to work with A's experts. The engineers of firm A and B develop their interactions even further and help each other.

They then realize that the duplication of their data bases can raise problems in the long run. As mentioned by one engineer: *“if we do not share a common reference base, we might end up developing the same functionalities at the same time”*. They need to cross their reference bases and synchronize them. As a consequence, they commonly decide to develop a unique reference base in common (the new CMS).

4th step – April 2004 development of a new organizational form to support the cooperation

The development of the common reference base requires creating a new organizational mode. The two companies start by identifying a system administrator in charge of managing the relationship and all the developments with the CMS technological solution. *“We appointed an engineer from firm B to this position. His specific role consisted in validating the functionalities created by our engineers and to inform us of existing functionalities”*. The system administrator is in charge of capturing all the possible expertise available in each firm and to foster the sharing of knowledge and experiences across the firms as much as possible.

5th step – From September 2004 to February 2005. The development of a common offer to meet the needs of a specific customer

The e-business managers of firms A and B decide to promote their common content management system through publishing an article in the cluster association monthly newsletter called *“Competitive intelligence in Sophia Antipolis”*. This letter is sent to the mailing list of the Sophia Antipolis Cluster which includes the cluster members but also outside partners from other clusters (local, national and international contacts).

In September 2004, a large customer account based in the Sophia Antipolis cluster receives the letter and contacts the e-business managers of B requesting a proposal for upgrading its website. The customer demand consisted in redesigning and updating an existing website and required very specific expertise and tools including network management, Java development tools, internet, services management, as well control of key organizational processes.

A & B decide to collaborate to answer to this customer’s request as it seems that the CMS could bring much added-value to this project. In fact, none of the two firms could answer to this customer request alone...but the complementarity of A & B’s resources could enable to meet the customer’s demand. On the one hand, A could develop the Java & Microsoft applications and the maintenance services while B could provide complementary applications and offer the required software. Also, the technical base provided by the system could help convince the customer by providing something more tangible enabling to assess the firm’s competences. As mentioned by one sales engineer: *« the CMS system gives a tangible support for our services offer for the customers»*.

Thanks to the common system and organization, the two firms started to develop a common offer for this first customer. Two project teams (one in each firm) with dedicated managers supervised the development process throughout its life cycle. The system administrator validated its content. The sales engineers from both firms were also involved in this process and managed the relationships with the customer. They could share and enrich their habits to analyze and answer the customer’s needs based on an end-to-end process. This method enables to co-construct the offer with the customer. It consists in starting from customer needs validated by the sales engineers (consultative selling approach), developing the technical solutions with regular feedback and validation with the customer, and delivering the customer a complete solution including various services such as technical support, maintenance, and guarantees. The end-to-end method has been well received by the customer who later expressed its complete satisfaction with the co-development

process. In particular, he appreciated the dedicated interlocutors (one system administrator, sales engineers, managers...) which greatly continued to its perception of the overall service quality.

This first common offer cements the relationships between the two firms. As mentioned by one of their managers: *«The system has fostered the development of trust; all the engineers have been involved and contributed to the proposal made for our common customer... Our geographic and technological proximity helped us understand each other and be committed to the project»*.

The two firms submit their common proposal in February 2005 and are finally selected over competing offers. Their managers are convinced that their cooperation enabled them to develop a competitive advantage. As mentioned by one manager from firm A: *«we would not have been able to meet the customer's expectations alone. Our cooperation with firm B, clearly made a difference for the customer and certainly influenced its final selection»*.

6th step: increased customer retention, less discontinuity

The cooperation provided several benefits for both firms.

- 1) Thanks to this cooperation, firm A has managed to *consolidate its relationships with a key-customer account*. The customer has expressed an interest in being involved in the knowledge management system developed by the two supplier firms. These reinforced technical relationships and proximity naturally led to *more repeat business* with this lead-user as the two companies better understood the customer's needs.
- 2) The managers of both firms acknowledged the results of co-development in terms of commercial performance and decided to capitalize on this first experience with a lead-user so as to replicate the success story with other customers. They started by better formalizing their competences and identifying the key success factors of this co-development process (technological proximity with a common system, specific services, common organization with a system administrator and dedicated developers ...). They then improved their marketing actions towards other customer targets (see the article published in the cluster's newsletter) highlighting both their competences and the uniqueness of their resources with their common system (capacity to capitalize technical knowledge). *«Our technological proximity facilitated by the CMS, community system, consolidated the process of co-development between firms and customer» (an engineer from firm B)*.
- 3) The cooperation also helped them share the costs associated to the sales development process (answering customer requests for customized solutions) and to divide tasks and responsibilities in customer web site development activities so as to increase their time and cost efficiency in answering market needs.

While firm A reinforced its position in the domain of software edition through the common solution, firm B reinforced its integration activities and the associated services.

7. Discussion

Step 1 & 2 – Problem identification and partner selection: the role of the epistemic community

Once firm A had identified and circumscribed its problem, its first objective was to identify a potential partner and then to qualify this partner. At this stage, it was important to ensure that B

would not develop opportunistic behaviours or “steal” A’s knowledge; that it was willing to work with them and exchange data openly; and that the two could share common objectives and mutually benefit from cooperation.

As seen in the case study, these first steps have been greatly facilitated by the existence of the cluster association.

- Firstly, the cluster association has helped the engineers of A to learn about the CMS system used by firm B during the organization of a specific seminar gathering experts in the field.
- Secondly, the association clearly played a key role in fostering the development of trust and commitment between the competing firms. This trust found its roots (Boersma, Buckley & Ghauri, 2003) both in the expertise of the association members (competence-based trust) and in the integrity of its members guaranteed by its code of ethics² (goodwill-based trust). The association gave some insurance of the integrity of their members and gave a guarantee that they would not exhibit opportunistic behaviours with the partner.... As they are composed of experts, they are trusted for their trustworthiness and ability to select and qualify the competence of their members as well as to assess the quality of their contribution.

Adopting a communities’ perspective, two different types of communities played a role in these first steps:

- **An epistemic community in the form of the cluster association.** The notion of epistemic community as been introduced by P. Haas (1992: 1) as “*a network of knowledge-based experts or groups with an authoritative claim to policy-relevant knowledge within the domain of their expertise*”. In sum, epistemic communities can be defined as a group of agents sharing a common goal of knowledge creation and a common framework allowing them to understand this trend (Creplet et al., 2001). The Sophia Antipolis association exhibits all the characteristics of an epistemic community: it gathers experts and facilitates relations and knowledge sharing between cluster firm members through the organisation of seminars, and forums (such as Forum Sophia Antipolis, Forum USA, Games of Sophia Antipolis, Seminars, Newsletters, Innovation Prizes, etc..). It also has developed specific rules to facilitate the inter-firm cooperation:
 - A code of ethics between firms in the cluster,
 - Rules to validate student projects on Information and Communication Technologies sciences and to give grants.
 - Innovation and research rules to consolidate projects between the National Scientific Research Centre (CNRS) and science park firms -innovation price, best Ph-D...
 - Rules concerning relationships with external firms (outside the cluster and in particular with other countries -USA, China-).
- A Community of Practice (CoP). The engineers of firm B form an internal community of practice enabling them to share their tacit knowledge and experience (called CoP B). In order to answer their customer’s requests, these engineers regularly supported each other and exchanged their tricks and experiences through informal meetings. Over time, this mutual support contributed to the development of a collective memory, as well as the development of the CMS system which enabled B’s software engineers to efficiently carry out their job without having to master all the expertise required to answer a customer request. In fact, they could have easier and direct access to the technical forms detailing the functionalities

² The association has developed formal relationship rules and norms to facilitate the exchange of information and data between firms. These rules have been accepted and signed by all the members.

(reification) and to the national expert who wrote them (participation): it mixes direct contact and formalized practices (Vaast, 2001). The CMS system forms the community's shared repertoire. It supports the engineers' daily practice and helps them capitalize their knowledge (functionalities). It acts as an intermediary (artifact) between B's engineers.

It can also be argued that the engineers of firm A were willing to form a community of practice but had difficulties in sharing their knowledge as they lacked a system enabling them to easily transfer, codify and capitalise their knowledge (they are located in different geographical regions).

Step 3 – Knowledge transfer from B to A and A to B

Face-to-face interactions between the two community members during the seminar and the visit of firm B enabled them to share some first experiences and practices informally (Wenger, 2002), which helped them assess the interest of working together. The companies realized that they could both benefit from the cooperation and that it would be more costly and much longer to develop that knowledge alone.

This increased the desire and commitment of both firms to engage into a cooperation process and make the first preliminary investments to that end. In the first stage, B transfers its system to A and there is no true co-development, nor any shared repertoire. This stage mostly helps building the relational congruence between the two firms (common goals, a priori-based trust and commitment). It corresponds to the participation process described by Wenger (2002).

Stage 4 - Development of a new organizational form: the role of the system administrator (broker).

So far, B had transferred its database to A but A marked its willingness to enrich it and make its development available to B's engineers. In order to do so, they had to integrate new functionalities in the system. At this stage, their intent was to reciprocate and help B's engineers by transferring some of their knowledge. This participation further developed the trust and the overall relational congruence between the two firms. However, this still cannot be qualified as a common shared practice typical of a community of practice.

Soon after, the engineers from both firms realized the need to combine their knowledge and to develop a common reference base (this will form their shared repertoire). This step marks an increased commitment towards the desire to co-develop a solution as it requires more technical investments from A and to appoint a system administrator. This common reference base can be qualified as a boundary object. Maybe due to the fact that this community crosses the "borders" of the two firms and clearly shares a common commercial objective (increase their technical and sales performance), the shared repertoire consists in a formal tool (an evolution of the original CMS system) that needs to be managed to avoid replication or quality problems.

The system administrator acted as a *broker* - an intermediary - between the engineers of the two firms (Wenger, 1998). The system administrator had the ability to coordinate the activities of the actors, and had the technical legitimacy and authority to give an overall project orientation (Wenger, 1998; Chanal, 2000). He played two important roles:

- he helped the actors work together, understand the CMS functionalities and fostered the engineers' commitment to develop their knowledge base.

- he helped the actors understand and accept the knowledge creation rules of the association (the epistemic community).

The case illustrates the direct interaction between the boundary-object (CMS) and the broker. A *new Community of Practice composed of the engineers of both A & B firms progressively emerged* around the CMS and the broker. This is what Wenger (1998) refers to as a new boundary practice.

Stage 5 - Development of a common offer for a strategic customer

The two e-business managers decided to promote their system through the cluster association. As members of the clusters themselves, they act as catalysts: both of them are referenced in the mailing list of the cluster association at the local and national levels. This membership enables them to have access to a specific direct marketing tool (the cluster mailing list). This clearly impacted their marketing sales performance as it enabled them to obtain a privileged access to a large customer (lead-user). The case illustrates the participation and reification process, typical of this inter-firm CoP: common goal (submit a common offer and win the deal), sharing their habits, practices and methods, involvement and commitment, and development of a shared repertoire in the form of the collaborative system.

The common offer consists in a true solution relying both on a technical and on a commercial integration:

- Technical integration independent of any project opportunity through the creation of a common collaborative working system including the functionalities developed by both firms, and through value-added services enabling to assemble all the components 'seamlessly', and to provide support & maintenance services. This co-development enabled the two firms to give form to a common offer based on a tangible system. In a services business, this tangible base helps promote and assess the value-added provided by the service-providers. In our case studies, it formed a powerful marketing tool to attract the attention of key customers and prospects. It served as a risk-reduction vector for the customer who could better understand the firm's offer and grasp its key benefits. We could say that the CMS helped the customer attach a meaning to the common offer (sense-making process).
- Commercial integration on a specific project. Instead of having to coordinate and assemble the various functionalities and services developed by each firm (A & B), the customer could access to 'one-stop-shop services' with a unique point of contact. This point of contact is played by the system administrator (broker). The case illustrates how the two supplier firms involved the customer in the offer development process through an end-to-end method. Hence, the co-development of the customer-specific solutions not only involved the two suppliers but also the customer (co-construction).

In sum, this technical and commercial integration increased the two suppliers' market legitimacy and competitive advantages (increased differentiation) by integrating key learning assets in the offer development process.

The CMS system (collaborative working system) enabled both firms to consolidate links with a key-customer account. During the last stage, this customer joined the community of practice formed

by the two supplier firms. Due to this increased proximity, the two suppliers had a unique opportunity to better understand, anticipate and even shape the customer's needs and hence to reduce the impact of project discontinuity. We can say that the integration of the customer in the community developed the suppliers' intimacy to the customer - a factor that constitutes a competitive advantage - (Wieserma, 1995).

8. Conclusion

The process of project co-development can be assimilated as a process of knowledge creation and transfer between the parties involved (Håkansson, Havila & Pedersen, 1999). Our paper has focused more specifically on the role of communities in the knowledge transfer involved in the co-development of integrated solutions. It has shown that the literature on communities can provide a fruitful and original framework to understand how supplier firms can manage to develop solutions in common and enhance learning in the supply chain.

The paper has illustrated how the two firms developed a community of practice integrating designers across the two firms. Based on their interaction, the engineers of the two firms managed to develop new knowledge. They accepted to modify their practices and organizational processes as the joint approach proved to improve their performance (Lundberg, 2002) in several ways:

- It reinforced their relationships with a key-customer account (lead-user) which joined the community of practice thus increasing the suppliers' intimacy to the customer (Wieserma, 1995).
- It increased the two suppliers' market legitimacy through a more global and integrated offer and reinforced their differentiation.
- It reduced their time to market and costs to answer customer needs (mutualisation) as the two firms' engineers could easily access to a codified knowledge and to the experts at its origin.

This kind of relationships called boundary practice by Wenger (2002) developed into a quasi-firm (Eccles, 1981) in which the activity systems linking the two firms have been more closely coordinated with each other than they were with the firms other activities (Håkansson and Johanson 2001). One of the risks of such coordination mechanism is of course the increased interdependency of the two firms.

In a community perspective, firms can be seen as constellations of communities of practices that are inter-connected (Chanal, 2000). Our paper confirmed that the creation of knowledge and the development of innovative ideas can come from the interaction between different communities. As mentioned by Brown and Duguid (1991): «*Separate community perspectives can be amplified by inter-changes among communities. Out of this friction of competing ideas can come the sort of improvisational sparks necessary for igniting organisational innovation*».

While the paper has confirmed that inter-firm CoP can facilitate the exchange of knowledge between the two firms through processes of reification and participation, a key question remains: how do such inter-organizational CoPs emerge? This question is particularly sensitive when addressing the issue of solution development with a competitor serving common customers. Our paper suggests that epistemic communities may play a catalyst role in this process. They can help the companies meet and develop the required trust atmosphere to co-develop offers. This corresponds in fact to the mission of epistemic communities (the development of knowledge inter-firms). This leads us to suggest a revised model (exhibit 2) for co-development of integrated solutions between

competing firms. In this model, the epistemic community acts as an antecedent variable influencing the identification of a partner and the development of the relational congruence between the two firms.

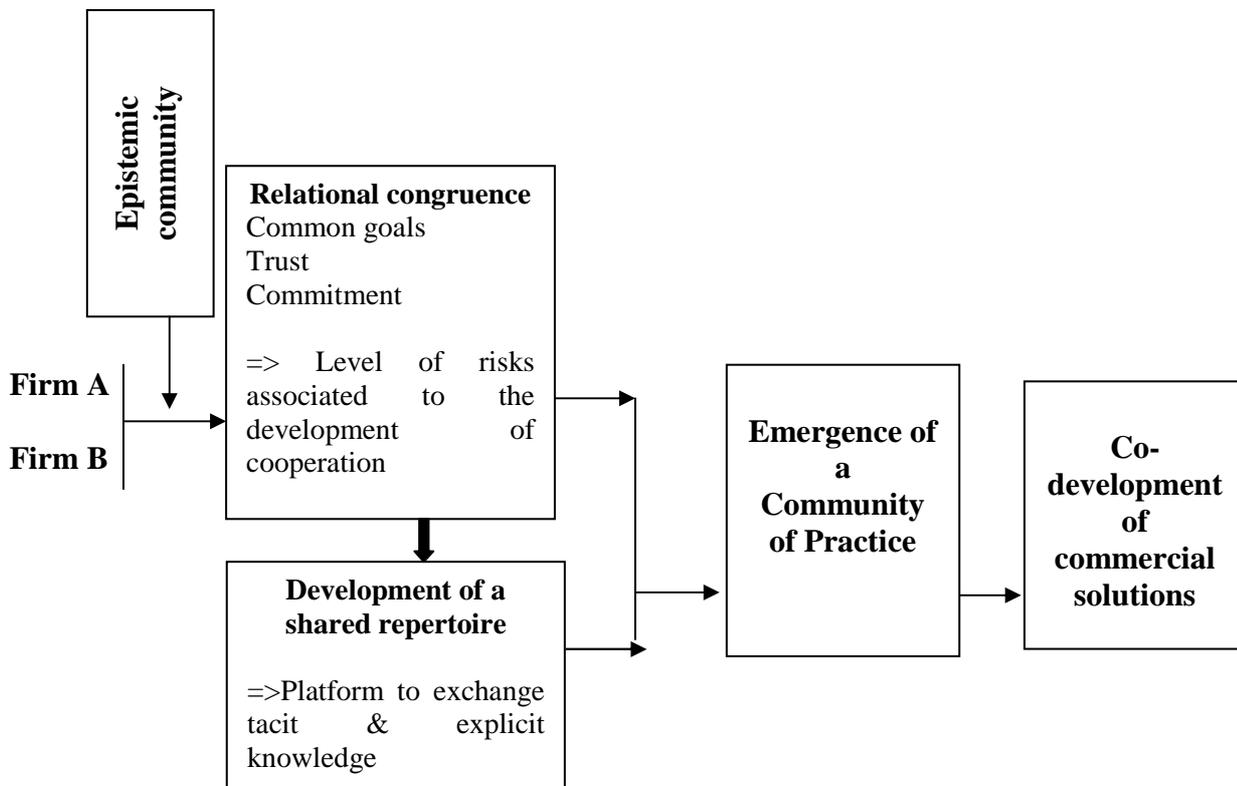


Exhibit 2 – A revised model for co-development of commercial solutions between competing firms

9. Limits and areas for further research

The concepts of community of practice and of epistemic communities are relatively new (Wenger, 2000) and generate a growing interest for their original perspective on knowing and learning. A growing number of people and organizations in various sectors are now focusing on communities (and especially on communities of practice) as a key to improving their performance. While the majority of the literature seems to focus on intra-organizational learning, little research has been done in inter-organizational learning and in exploring the role of communities in the co-development of integrated solutions between firms.

This research has suggested a preliminary model to better describe this phenomenon. However, it remains to be further tested and developed based on more cases. Further research could apply the model to the co-development of solutions with other actors in the supply chain that do not necessarily compete with each other. It would also be interesting to apply it to other industrial sectors than computer and software engineering, relying less heavily on IT tools. This could contribute to the existing literature on learning in networks and in particular, on the common creation of knowledge between firms in the supply chain.

The role of epistemic communities in the cooperation process also needs to be clarified. Is it required or does it help? Our paper did not precisely cover the role played by the cluster in the inter-firm cooperation process. In fact, the two supplier firms as well as the customer firm all belonged to the same cluster. This geographical proximity undoubtedly played a role in the initiation and development of the relationship. Clusters have precisely been promoted as an attempt at developing these close and cooperative links among suppliers so as to foster their commercial and technical development through the creation of a collective, often locally-concentrated offering. This type of network has been defined by Porter (1998) as: "*Geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions -for example, universities, standards agencies, and trade associations- in particular fields that compete but also co-operate*". By introducing the cluster model, Porter (1998) proposes that a firm's competitive advantage will not be determined chiefly by greater efficiencies in the sourcing of inputs, but rather by the ability of the firm to exploit the resources available in the "cluster" or network of local individuals and companies, in which they operate. A cluster is considered as a relevant tool when a group of companies prove to be more efficient than the consolidated activities of a single firm (network form versus hierarchy). Theoretically, one of the main benefits of a cluster is to develop the firm's economic and sales efficiency and to favor its growth & development through the exploitation of resources present in its environment.

In fact, we can argue that the epistemic community –association- was one of the levers or tools used by the cluster to reach its economic objective. The epistemic community has developed specific rules so as to facilitate links between firms in the Sophia Antipolis Science Park and to gain legitimacy, recognition in the co-development of technical solutions. The aim of the association is to build turnkey technical solutions to key account customers in the semiconductors, telecom services and infrastructure services.

Further research therefore needs to explore the respective influence of the cluster and of the communities in this inter-firm cooperation and learning process. It would therefore be interesting to investigate the role of communities outside of any cluster.

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