The boundaries of the firm and the relevance of their permeability

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Abstract

In the context of industrial networks, firms are seen as actors inserted or embedded in networks of relationships, directly and indirectly connected. In a recent paper, some authors suggested that networks, or parts thereof, might be usefully classified according to the degree of (in)determinacy of the value systems in which participating firms deliberately involve themselves and the degree of innovation strategically sought, from current to renewal to emerging business nets (Möller and Svahn, 2006; Möller and Rajala, 2007). By revisiting the permeability of firms' boundaries from a capabilities perspective, the paper suggest that generative relationships, as particular combinations of capabilities with the potential to create new artifacts, capabilities, perspectives or even actors (Lane *et al*, 1996; Eneroth and Malm, 2001), may operate, despite their low visibility, even in the so called current nets. It is also suggested that parts of networks, or nets, may differ in their prevalence of generative relationships thus suggesting the presence of different degrees of indeterminacy.

Keywords: generative relationships - innovation in networks - business interfaces - value nets

INTRODUCTION

In the context of industrial networks, firms are seen as actors inserted or embedded in networks of relationships, which are directly and indirectly connected. The research about the nature of firms' insertion in networks has produced various typologies, some of which centered on the characteristics of the relationships (e.g. close vs. distant relationships) while others focused on the networks themselves (e.g. vertical vs. horizontal networks). Of recently, some authors suggested that networks or parts thereof might be usefully classified from current to renewal to emerging business nets, according to the degree of (in)determinacy of the value systems in which the participating firms deliberately involve themselves, and the degree of innovation strategically sought by participants (Möller and Svahn, 2006; Möller and Rajala, 2007). Differently from other classifications of networks, the typology suggested by Möller, Svahn and Rajala to differentiate intentionally created 'business nets' gives centrality to both the degree of determination of the value system and the nature of the knowledge that supports it.

For those authors, a value system is the set of specific activities carried out by the actors making up the net. Value systems will differ in their degrees of determination, i.e. in "how well known are the value activities of the net and the capabilities of the (resources) actors to carry them out, and [in] to what extent can these value activities be explicitly specified?" (Möller and Svahn, 2006, p. 988). The degree of determination of a system, in turn, is posited to be positively correlated with its degree of knowledge codification. A higher degree of determination should be found in those nets with high levels of codification of the knowledge/capabilities that support their value systems, whilst those nets with lower levels of codification of the knowledge/capabilities would, accordingly, have value systems with a low degree of determination. Thus, in the currents value systems, "knowledge is primarily codifiable and firmly held, whereas in the [emerging or new business nets] the role of tacit knowledge, widely dispersed, vague and uncertain, is more pronounced. The incremental knowledge creation, the middle position, shares aspects of both extremes, the key issue is the invention of new modifications out of existing, partly codified and partly tacit, knowledge bases" (Möller and Svahn, 2006, p. 991).

For Möller, Svahn and Rajala the different degrees of determination of business systems or nets also suggested differences in their degrees of stability and change thereby affecting the nature of the demands posed on the actors. Thus, the business nets could be characterized from stable ('current business nets') to dynamic ('emerging new business nets'), with an intermediate kind characterized as displaying incremental and local changes ('business renewal nets'). It followed that the capabilities and learning abilities deemed necessary from the companies involved would differ for each type of business net. Those requirements would be lowest in the current business nets, since activities, actors, technologies and business processes are well known / coded. In contrast, at the other extreme, none of these elements should be taken as a given. It should be noted that the business nets can co-exist with each

other both at the level of the wider network and at the level of the focal actor, in this case, within the set of direct relationships of a focal firm.

In this context, one can infer that relationships between actors will differ according to the type of net. Relational interfaces will be relatively more stable and specified (codified knowledge) in current business nets than in new business nets, where tacit knowledge and high levels of uncertainty prevail. Codified knowledge (information) will flow with little or no friction between players in the current business nets. In the new business nets knowledge and information will be naturally mostly tacit, so that can relationships with greater involvement are to be expected, due to complex interactive processes.

In this paper, we abandon the assumption that current business nets are based on structures of coded capabilities where change is practically absent. In line with the rediscovery of the theme of capability (e.g. Penrose, 1959, Nelson and Winter, 1982, Kogut and Zander, 1992) we argue that stability in the current business nets may be more apparent than real. From the capabilities perspective, it is not at all obvious that we may clearly tell apart vibrant networks, dominated by the concern to promote radical changes, from networks dominated by coded routines and clear information about who does what to whom, how and when. One of the implications of this perspective is that little gain should be expected from forcing on reality a clear distinction between networks that aim to develop new capabilities in exploration processes and networks dominated by exploitation (March, 1991). Less so if the distinction is to be solely based upon the actors' ability to encode and disseminate knowledge[1].

When emphasizing the nets of capabilities (including routines) in an industrial system, time does matter because the generation of abilities, their trial against criteria perceived as relevant, and their possible retention in use takes place over time and in particular contexts / places. Networks, be they intentional or not, are better viewed as incomplete and imperfect bodies, i.e. impermanent structures (Håkansson et al, 2009). Upon this background, what for some players may well be a given and relatively predictable structure may also, at other times or for other players will appear as conspicuously variable and, accordingly, they may intentionally choose to engage in contexts characterized as having a low degree of determination (Möller and Svahn, 2006).

Relationships in networks, from the simplest to the most complex, are consistently found to combine a mix of novelty with routine, in varying degrees. To that extent, the emergent structures can hardly be taken as strictly designed to reflect the intentions of a single dominant player with unambiguous abilities and identity (Anderson et al, 1994). Actors do not have a "fixed or interaction-free existence" (Håkansson et al, 2009, p. 139). One implication of this perspective, in terms of acting context for businesses, is that more often than not it will likely be wider than it is assumed for the current business nets and more restricted than it is assumed for the new business nets (cf. Möller and Svahn, 2006).

[1] It may be worth noting that the distinction between tacit and codified knowledge may be an inadequate means to bound industrial systems.(Malerba and Orsenigo, 2000). For these authors even when some tacit knowledge gets codified changes can be expected in its nature and content and consequently "…the comparison between tacit and codified knowledge in terms of ease of transmission might be profoundly misleading and sometimes unwarranted, because one is comparing two totally different things (op. cit. p. 293)".

Finally, within any arbitrarily defined value system, the presence of substantial relationships with changeable states of persistence and transformation tends to be an inescapable situation for companies, as we shall see ahead when considering the notion of relational interfaces (Araujo et al, 1999). More specifically, it is suggested that the variety of relational interfaces and the potential for changing them can underlie the manifestation of generative relationships (Lane at al, 1996; Eneroth and Malm, 2001). To some extent, it can be argued that the very notion of network only makes sense for its inherently generative nature. Systemic changes albeit infrequent or even rare can and do occur in parts of notoriously highly structured and strictly coded knowledge networks, where and when least expected, and this possibility should remind us that all decomposition of an organizational system is a conjecture, both in theory and in practice (Loasby, 1976, pp.3-5).

The rest of this paper takes the following sequence. First, we shall recall some notions, central to networks, regarding stability and change. For example, the assumption that actors have limited knowledge is a key stone for the idea that the boundaries of a firm can be varied, once we change the focus of analysis from the products and services (artifacts and events) to the capabilities (powers) that support them. Then, we will recover a relational typology that emphasizes various ways of combining the resources of two companies and suggest that the generating potential of relationships is essential both to explain and to seek improvements in efficiency and innovation. Finally, we shall use a somewhat 'mundane' case to illustrate the presence of this potential in contexts that at first glance could be characterized as rather transparent and routine, in the guise of current business nets.

(IMPERFECT) NETWORKS OF CAPABILITIES

Key aspects in the industrial network approach have been the finding that long-term and sometimes deep relationships exist between firms and the quest for the reasons for this empirical observation (Axelsson and Easton, 1992, Håkansson and Snehota, 1995). The actors in networks are seen as involved in activating economic resources that are converted into goods and services for other actors. It has been observed that the persistence and long duration of such interactions and the connectivity between them provide stability (occasionally punctuated by strife) and therefore structure, which is the raison d'être for the network approach (Axelsson and Easton, 1992).

It is assumed that at each moment, the network is a product of past investments in a system of connections, involving the generation, testing and retention of solutions, and a basis for action for the future. Thus, "stability, source loyalty and inertia are logical consequences of the learning process of both buyers and sellers in relation to the technical, commercial and social dimensions of the relationship (Håkansson, 1982, p. 4, emphasis added)". Stability, however, does not translate into lack of change. Stability in some dimensions is needed for there to be change in other dimensions. In this respect, ending some connections, creating new connections and changing the nature of some existing connections all show that the network is an open system that combines change with the simultaneous preservation of cumulative investment in actor bonds, resource ties and activity links (Håkansson and Snehota, 1995).

This may beg the question of what is meant by 'radical change' in the network. Halinen et al (1999) suggest that changes in the nature of relationships, and incremental changes that

together amount to breaking existing relationships or establishment of new ones, would be radical change. But these authors also suggest that what is a critical event in the network depends at least in part on the perceptions and intentions of the actors. This allows us to admit that, in the same industry, actors can differ in their network horizons, in what they consider relevant within these horizons (i.e. in their network contexts), and in their form of integrating the network, both objectively and subjectively (Anderson et al, 1994).

The theme of stability and change has been linked, sometimes implicitly, to the basic assumption of the ARA model that actors have limited knowledge about resources (including relationships) and activities (Håkansson and Johanson, 1992). Through the relationship, "the actor acquires some, but never complete, knowledge of resources, activities and intent of its counterparts (Håkansson et al, 2009)". Thus the network accommodates a great diversity of (incomplete) knowledge about resources, activities, and interests. The presence of specific interdependencies between relationships, essential to the notion of network, and the idiosyncratic and path-dependent nature of the capabilities and interests of each player also means that the generation and sharing or dissemination of knowledge and, in general, the spread of change (Halinen et al, 1999), is largely selective, tending to occur through relationships, directly and indirectly connected. Additionally, it is impossible for any actor to fully control the process of diffusion and absorption of knowledge over the network, be it tacit and / or codified.

Even in those systems where visibly tight routines predominate, be they organizational or inter-organizational (e.g. JIT), reveal at closer scrutiny the presence of mechanisms both to preserve the routines and to make purposeful changes and disseminate new knowledge (Araujo and Mota, 2005). Let it be remembered that routines are important sources of efficiency and their presence is often noted when, for whatever reason, they fail to deliver. One only unexpected or unwarranted event, e.g. an accident or incident, may trigger new learning and possible actions to correct / change previous practices in order to preserve / stabilize / improve the operation of the focal system or sub-system, or to assure the survival of its essential aspects (March et al, 1991). In other words, what may be defined as a system of low degree of indeterminacy is a conjecture (see Möller and Svahn, 2006) that events may disprove when certain conditions, often unwarranted by the actors, do change sharply. Of course it should be conceded that at a certain moment or during a certain period of time (sometimes a long one) the actors can share and invest in the maintenance of certain assumptions and routines, but both conjectures and routines may fail to reveal their limits, particularly in systems in which the actors interests and capabilities are very differentiated, inconspicuously reducing the actual effectiveness of communication or accuracy of the system theories (sense making) by the actors. Thus, the current form of the network "... is a workable compromise for today that is bound to change tomorrow" (Hakansson and Snehota, 1995, p. 274), despite the likelihood of not all actors being equally aware of that.

In this context, the dynamics on the network is due, at least in part, to some players not taking it for granted (Håkansson and Persson, 2007; Dubois, 2003). In fact, the assumption of diversity of conjectures and capabilities that we pointed out above has been of help to explain the coexistence, and even the collocation, in the same industry, of diverse (provisional) organizational and inter-organizational solutions for connecting dissimilar but closely complementary capabilities (Mota and Castro, 2004, Dyer et Hatch, 2006). Thus, for some actors, sections of the network can be a given and relatively predictable structure, while the same sections may appear, at other times or for other players as a transient compromise that should be changed and, as such, as a variable (Håkansson et al, 2009). In general, this

suggests that the actors try to artificially create quasi-closed systems (Sayer, 1992), but may also deliberately or not reconfigure parts of these systems by introducing ambiguity and uncertainty where others can see an optimal solution (and endeavor to preserve, expand or even replicate it).

In short, no organizational or technological solution is optimal and unchanging. Knowledge (knowing) about how to implement and coordinate activities, is limited and scattered, evolves over time and is tested and selected within companies and with / against other companies and organizations. In other words, "the network is constantly evolving through interaction, even though that evolution can be difficult to register" (Håkansson et al, 2009, p. 144). The notion that the network is imperfect, that stability and change co-exist, should be preserved, especially when one admits the possibility that actors can and do learn, and create new knowledge, and that the actors are diverse in their (incomplete) knowledge about resources and activities, and also in their interests. The presence of this variety is essential for processes to occur of 'joint learning' (Hakansson, 1993) and 'interactive learning' (Lundvall, 1993). These are interaction processes by which each party in the relationship learns how to use the resources held by its counterpart, develops technical knowledge, communication codes, and not least, processes that foster a better understanding of the economic and social expectations of the parties, essential for creating a 'stable' framework.

This conceptual framework is consistent with some evolutionary approaches to the dynamics of business and systems to which they belong. Based on the notion that capabilities are mainly tacit in nature, Langlois and Foss (1999, p. 201) note that "[the] knowledge about how to produce is imperfect [and] knowledge about how to link together one person's (or organization's) productive knowledge with that of another is also imperfect". Both types of knowledge, productive and relational, are present when we look at firms as structures of direct and indirect capabilities (Loasby, 1998), in the sense that the interactions of a firm with other firms require the development of capabilities not directly deployed(able) for productive purposes. And, as Araujo *et al* (2003, pp. 1267-68) noted, "Some of these capabilities are generic and multi-purpose, but others are counterpart-specific and idiosyncratic" (see also, Mota and deCastro, 2004). Such a framework allows us to accommodate still other relevant issues.

First, firms can have multiple and fuzzy boundaries (Araujo *et al*, 2003), and the relationships to access and develop resources and knowledge can go well beyond those between suppliers and customers (Håkansson, 1987, Araujo, 1998). Thus, the knowledge system does not have to be isomorphic with the production system (Araujo et al, 2003). Second, connections can be both direct and indirect, and the presence of a certain degree of rivalry is essential for the generation of knowledge (Loasby, 1999). To say that the rivalry ceased to be company to company and is now between networks of companies, is not particularly useful once we recognize the importance of learning, even indirectly, both with and against rival firms. Finally, both the in knowledge and production systems, a variety of interfaces and relational time profiles can co-exist, regarding of (dis)continuity and duration of association between actors i.e. firms may try to accommodate relationships that are useful in maintaining their current businesses, along with others aiming at business renewal (e.g. hiring a consulting firm) or even putting a finger, or keeping an eye on emerging business forms (e.g. by participating in trade fairs, and technology centers and conferences) (cf Möller and Svahn, 2006).

Firms may or may not nurture what some authors refer to as *generative relationships*, in the sense of deliberately keeping particular combinations of capabilities with the potential to create new artifacts, capabilities, perspectives or even actors (Lane at al, 1996; Eneroth and Malm, 2001). As we shall see in the next section, there is no reason to exclude from the outset the presence of generative relationships in contexts apparently dominated by routines. Conversely, if the relational interfaces may change (Araujo et al, 1998) there are good reasons to include this possibility in the frameworks that aim at classifying networks.

RELATIONAL INTERFACES PERMEABILITY

In an industrial system, at any point in time, we can expect to find a variety of relationships in terms of the nature of the connections between entities, for example in their strength, their continuity, and time duration. Over time, many of these are transformed, changed, adapted, replaced and created anew. Various typologies are used for the classification of such connections but there is some consensus, both in textbooks and scientific papers, about the distinction between transactional relationships and collaborative, high involvement, relationships. In some cases deep relationships can become a (un)expected burden for the companies involved. In other cases, it is found that the type of transactions and value in use (Anderson and Narus, 2004) do not justify the investments and adaptations usually associated with developing and maintaining high involvement relationships. In any case, the potential for mutual learning associated with each relationship does not exist in all relationships and, as many authors have pointed out, is not even expected or desirable that it does.

The emphasis on capabilities and abilities also suggests that such forms of firms' interaction at each point in time should not be discretionary but, instead, path dependent processes (Penrose, 1959, Håkansson and Snehota, 1995), i.e. what a firm does, can-do or even wishes to the will likely depend on the real and perceived roles and positions it has held in the network, and its actual and perceived intentions and development of capabilities. Additionally, when the focus shifts from the products and services, be they given or emergent, to the capabilities deemed necessary for their conception, production, use and maintenance, the time dimension will be particularly relevant (Richardson, 1972) and the firms' boundaries will become somewhat blurred and multiple (Håkansson et al, 2009, Håkansson and Snehota, 1989, Araujo et al, 2003). Finally, from the capabilities and network perspective, the future is open; hence, surprises are possible when the actors' knowledge is incomplete about resources (including relationships), activities and other actors.

As part of the studies on changes in the vertical boundaries of firms, Jacobides and Billing (2006) use the term permeability to describe the possibility of exchanges to be introduced between a company and customers / suppliers in points of its value-adding process. Internal ‘customers’ and ‘suppliers’ can now transact with ‘other’ (non-owned) companies, thus opening parts of the internal value system to ‘external’ players. Thus, the production system of a company acquires a certain degree of longitudinal permeability to combine partial vertical integration with the partial opening of markets in parts of the value chain of the company. This concept is interesting because it suggests that the various links in a production system may be subject to reconfiguration in order to increase the points of insertion (direct connections) of an enterprise in a wider system. Unfortunately, little or nothing is said in these studies about the nature of interactions between the parties and to that extent, the notion of permeability reduces basically in replacing some market exchanges for previous internal

transfers. Adding in concepts like those of communities and networks of practice allow us to recognize the possibilities for greater relevance of these 'insertions' in the network, for sharing and generating knowledge and information (Brown and Duguid, 2001).

It can be argued that the issue of the porous boundaries of the firm has been acknowledged in the IMP group, from an interaction perspective, since its inception. In fact, the conceptual model associated with the Interaction Approach, conceptualizes the interaction between two entities as involving more than the count and exchange of goods and money (Håkansson, 1982). The notions of activity links, resource ties and actor bonds are ways to recognize and explore the relevance of the variety within the dyad and the network, or at least parts of the network. The relationships can thus be seen as diverse in the degree of involvement of the parts in coordinating activities, adapting resources and interacting individuals (Gadd and Snehota, 2000), suggesting the presence of different degrees of permeability. In general terms, it may be said that a high involvement relationship allows exchanges of a different nature from that of a distant, arms-length or market relation. In other words, the permeability of firms' boundaries is larger in the former than the latter, an aspect that we explore in the next section. Moreover, it can be argued that the partially specific nature of these relationships stems from the fact that they allow some types of interactions and hinder other types[2]. That there may be varying degrees of permeability for specific to the counterparts, across the boundaries of the firm, can be better appreciated by looking at the requirements for knowledge that buyers and suppliers can have from each others contexts (Allen etal , 1999). As noted by the authors, "The consequence of making a distinction between the interfaces, and the outcomes that flow from them, namely, the products being exchanged, is that a focus on interfaces provides a different way of understanding the dynamics of exchange relationships. In particular, *it shifts the managerial emphasis from the evaluation of suppliers' current offers to the evaluation of supplier capabilities and the value they add* to the customer's business" (Op. cit. p. 499, emphasis added).

The permeability is minimal in the case of *Standardized* interfaces; the customer's knowledge of use and the supplier's knowledge of production are not linked and, in this situation, the supplier needs not have any knowledge of the context of the buyer, or vice versa. The buyer knows exactly what it wants to buy and chooses from a range of products provided by vendors. The price tends to be the main mechanism of coordination between them, and the recurrent use of electronic reverse auctions shows how, in some cases, the interface will be reduced to the posting of information on specifications and collecting information on prices from different suppliers. In summary, the requirements for interaction between the parties are truly minimal such as the cost of using standardized interfaces. Making dedicated investments, specific to the counterpart, does not make sense once the firm wants to keep well open the possibility for making and remaking the mix & match of suppliers, without much friction (Axelsson and Wynstra, 2002).

The permeability increases substantially, and its nature changes, when the buyer seeks a solution that is specific for the context of use. The buyer can give detailed directions about the requirements for the outcome or final characteristics of the offer (the 'what') and specific process (the 'how') for the desired result (specified interface), or 'just' describe the functions of the supply in the context of use (interface translation). In contrast to the previous case, in

[2] Axelrod and Cohen (1999) use the term semi-permeable barriers to designate this selective permeability: "A semi-permeable barrier is anything that prevents some kinds of interactions while permitting others" (op. cit. p. 81)

the translation interface the vendor has more degrees of freedom and can determine the particular configuration of the elements of supply and/or components of the production system at its disposal, i.e. the modes that it deems adequate to produce the offer. The interactive interface is the more demanding interface in terms of communication between the parties, that in which the exchanges between the parties tend to be richer, because it is the most open in terms of problem definition, solution generation, and implementation. By working together, both parties share their knowledge of their contexts to develop solutions that neither party alone could foresee. Note that the contexts of production and use do not have to coincide with what an actor proprietarily controls or not; in either case, the capabilities to be mobilized may include other suppliers' and/or clients' of that actor.

In this framework, the company is seen as having to match a variety of interfaces in order to balance efficiency and innovation: "A narrow range of interfaces or too much emphasis on one type of interface is likely to steer firms either towards stagnant, short-term efficiency or overambitious accumulation of unrelated capabilities. Learning too much, too fast, through the pursuit of too many interactive interfaces is ultimately as likely to lead to poor performance as an unremitting concern with productivity gains". Additionally, in contrast to a static world based on immutable routines (including tacit knowledge), interfaces can change over time: "An interface is always the outcome of decisions made on both sides of the a dyad and always related to the other interfaces that each of the parties develops with third parties" (Araujo *et al* , 1999, p. 506). The very notion of 'core competences' as a category of capabilities, clearly bounded in the firm and stable throughout time, ceases to make sense.

This line of reasoning leads us to believe that, perhaps with the exception of standardized interfaces, all other relational interfaces are characterized by higher permeability than generally granted. Rather than a mere exchange of money for a product, one or both parties can share knowledge about their contexts of use and/or production, including the contexts of indirectly connected parties. Before advancing to the notion of generative relationships, we shall illustrate with a small case (Matthews, 2008) our contention that most interfaces are, or can become, a very important a source of variety for a focal network. For example, Renault acquires steel wire containers to transport axes, engines etc. on the shop floor through Electronic Reverse Auctions. Nissan, despite being part of Groupe Renault, acquires them by direct negotiation, allowing suppliers representatives to interact with its engineers. Farame is a company that produces and provides this type of containers for assembly lines of vehicles of both Renault and Nissan. By having the opportunity to visit and learn about Nissan's context of use Farame's technicians were able to introduce improvements in the design of their containers, allowing customers to reduce the costs of extracting benefits from their means of production. But, as in other cases reported in the literature (Dyer and Hacth, ????), the new solutions that Farame developed for/with Nissan to do not seem to interest Renault. Fortunately for Farame, the prominence it has gained from its successful association with Nissan improved its position in the network contexts of other firms (Anderson et al, 1994) with whom it has since established business relationships, thereby re-using the capabilities that it could meanwhile develop.

Besides showing that the diverse solutions can co-exist on the network, even in the same actor, this small case illustrates how the kinds of relational interfaces, in terms of permeability, affect not only the potential of the relationship between (and for) two interacting parties but also the actors' potential for networking, their strategic identity (Anderson et al, 1994) and, most importantly in the context of this article, the diffusion of knowledge throughout the network. In other words, in the same company that supplies clients

that operate in similar sectors, there can co-exist different types of interface, the more closed, standardized, and largely codified ones, and other more permeable and ambiguous interfaces, that display a greater generating potential, as just described. The evidence that this can happen (and did) suggests that the potential for generation of variety in a network can sometimes be traced to the 'smallest' variations in the connections between different actors and the same focal actor.

It can be said that in cases where interaction is allowed between individuals who represent firms with strictly complementary and dissimilar capabilities (Richardson, 1972) it can be expected that some kind of actor bond can emerge and evolve to a situation in which episodes of knowledge exchange occur between the parties. Possibly, the process may involve different combinations of novelty and confirmation (or exploration and exploitation, March, 1991), partial sharing of visions, and combining of the complementary capabilities of the parties aimed at generating new capabilities, products, services or even actors. This situation corresponds to what Eneroth and Malm (2001) refer to as generative relationship[3]. As noted by Lane et al (1996) relationships are generative because they can induce changes in how actors perceive and act in the world, and can also originate new artifacts, actors, institutions and other relationships. As suggested in the IMP perspective, the functions, capabilities and entities emerge from interactions and, as such, cannot be anticipated to occur only from the knowledge of the characteristics of each actor; the history of interactions does matter. In this context, the participation of actors in their interactions is based on their expectations of benefits, but without their being able to unambiguously specify the form and time for those benefits. Indeed, the identities and objectives of actors may change as a result of their participation in the relationships. Finally, the generative relationships can be connected, forming networks that combine both economic and non-economic relationships (Lane et al, 1996).

In short, by moving the focus of categorization from the structure of networks to the nature of connections, one can expect to find the presence or emergence of generative relationships even in apparently trivial contexts. These are substantial, non-contingent relationships, which can exist within and between 'value systems' because what an actor is or how it is perceived by others is inseparable from the relationships in which it is involved. From this perspective, a mere maintenance contract can become a basis for generating product innovations from which both sides win without there being any specific monetary exchange between them traceable to that innovation. Additionally, the capabilities developed by one party may be re-used to develop existing relationships or establish new relationships with other actors, i.e. causing incremental and / or radical changes, if we prefer to keep this distinction (Halinen et al, 1999). Let's illustrate our argument with a small mundane case where maintaining a seemingly routine, i.e. predictable and clearly specified relationship, can substantially be related, or depend on a greater permeability in the relational interfaces for limited, intermittent, irregular periods of time.

[3] The notion of generative relationship is built up from continued interactions between the actors. For Lane *et al* (1996, p. 59). “Economic agents do not just act, they interact. Often interactions between particular sets of agents take place in recurring patterns that persist over time. These interactions may give rise to relationships between the participants that we call *generative* relationships (GR). It is through their participation in GRs that economic agents come to understand their world and how to act in it. Moreover, GRs are the structures in and through which economic innovation takes place”.

A MUNDANE CASE

BRIEF HISTORICAL NOTE

GCM was founded in 1978. Initially it repaired vehicles but, later, it started producing chassis and cabins for Scania. The company currently has two production units, one dedicated to the production of molds for presses while the other produces components for automobiles. Sales amounted in 2008 to about 30 M Euros, providing products and services for about 15 customers, including GM (32% of sales), Delphi (15%), Faurecia (13%) Bosch-Blaupunkt (11%), Grundig (5%), VW (4.5%), and the remainder goes to smaller clients such as Mitsubishi, Benteler, Westfalia, Trellebord and Globalmotors.

The 2008 crisis caused a substantial reduction in sales and led management to take some measures: to search for new customers in new industries such as aerospace (EMBRAER), rail (Siemens) and energy; to develop projects in conjunction with a faculty of engineering and technological center of the automotive industry; to change the interface with existing customers, strengthening the technical-commercial teams to increase its presence among major customers, both in the central purchasing offices and in the engineering and development departments of these customers. Typically, the production of automotive components has been based on the specifications given by customers.

Over time, the company has developed capabilities for product development, along with some customers getting their receptivity to participate in Earlier Supplier Involvement (ESI) programs, helping to define the final both the product and how to take better advantage from the contexts of use and production. In fact, the design and industrialization have an inter-connection potential, therefore, in view of the GCM, participating in the design increases their chances of being invited by the customer to bid for manufacturing.

THE RELATIONSHIP WITH VOLKSWAGEN

GCM became a supplier of Ford in the early 90s. Upon creation of Auto-Europa, then a joint venture between Ford and Volkswagen in Portugal, the company was chosen by Ford as a supplier of the new unit. In 1990's when Ford quit Auto-Europa and this became solely owned by Volkswagen, GCM ceased supplying Ford, but remained a supplier of Auto-Europa for the production of the models Sharan and Allambra. In 2008, only 90% of these deliveries were direct (4.5% of GCMs turnover); 10% of sales for VW were indirect, made through three other companies: Benteler, Shnellecke and Westfalia. On its own initiative, or upon invitation from VW, GCM has contributed to several projects in order to increase its direct supply of Auto-Europa, but they all failed.

The recent turmoil surrounding the VW, which lasted some time including both ownership and decisions about which plants to maintain, close or relocate, and the fact that the models Allambra and Sharam were approaching discontinuation, led to high uncertainty regarding the maintenance of these direct and indirect businesses with the client's local plant that might even close. To somehow reduce these uncertainties, the GCM decided to directly address VW in Germany and request an audit. After the visit of VWs technicians, who detected and

corrected a number of shortcomings, GCM was included in the customer's supplier base. Through bidding, it recently won orders for the new VW minivan. Its expectations improved regarding the future development of its portfolio of relationships, because the new minivan model shares the platform of one of the models that will produced in the VW units in Spain. Quoting our informant: "The truth is this has not been a linear or simple process. [Initially] there were problems with delays and quality, especially in a component that is critical ... There are no major interpersonal relationships between employees [of the supplier and the client]... This is a recent client and there is a greater formalism and distance which is normal between organizations that do not know each other. The client knows exactly what it wants and makes it clear from start."

FROM PROJECT TO MANUFACTURING, CROSSING A ROUTINE LANDSCAPE PUNCTUATED WITH CHANGE

This industry has been in constant pressure for efficiency gains and reduction in purchase prices. Despite it being highly structured and knowledge codified, the occurrence of unexpected problems occasionally alters the interactive context between both organizations enabling new dimensions of capabilities to become visible to the client such as the establishment of new connections between the abilities of both parties. In fact, according to our informant: "The industry is very cost-based and the client's very first question is 'How much?', but they also value very highly the quality and speed of response to unanticipated problems. And here, when those unexpected problems arise, we have an opportunity to interact with the client's technicians and [thereby] enhance the relationship."

Unexpected problems can arise in both the design phase and the industrialization phases. The ensuing opportunities for interaction are associated with the recurrent changes of the interaction context between both companies; these changes are typically associated with the two main phases: the start-up phase of projects and production and delivery of the automotive components. In the project phase itself, the client, through successive approximations, seeks to freeze the specifications of the product. GCM is involved in this part of the process by designing and producing prototypes and designing tools, and reporting information about production costs and feasibility. Here, the contacts are assured by product managers and technicians from GCM's engineering department. During the design stage, "we work with no guarantee whatever of subsequently gaining the series production of components, but experience in this phase is critical for [gaining] differentiation from [our] competitors." In fact, the bidding for mass production involves providing detailed information about the price per unit, the investment to be made in tools, proposals for amendments that lead production costs reductions and lower prices of parts, and analyses about ways to implement systems that minimize quality problems.

The production phase involves a greater degree of predictability. After gaining the order, there follows the phase of producing the equipment to manufacture of parts in series. During a period of one year adjustments and validations are made until the stabilization of the production system of the GCM is achieved. Because projects last between 4 to 8 years, depending on the platform / vehicle model, contracts are established for that duration, based on an estimate of the amounts to be supplied annually, typically on a weekly basis. At the stage of manufacturing (mass production) contacts with VW are assured by the logistics department, despite there being remote monitoring by the team of client / product managers.

Therefore, in the production stage proper, the relationship is basically reduced to episodes of delivery of components between two stabilized systems (production system and use system), in accordance with a predetermined delivery schedule.

However, these shorter or longer routine periods are punctuated with interventions to make changes. In fact, over time, experience is being gained both in the production systems and in the use of components, and analyses do suggest readjustments to being made both to the product (leading to redesign and the production of new prototypes) and to the processes and resources involved in production system (originating, e.g., changes in operation's specifications, sequences, equipment and production tools). Our informant says that "when those unexpected problems arise, we have an opportunity to interact with the customer's technicians and enhance the relationship." These intermittent events of limited duration are therefore an opportunity for the technical staff of both companies to confront and combine their abilities and update and improve their knowledge about the contexts of the counterparties.

The phases of design and manufacturing / mass production also occur with some of GCM's other customers, not only with VW. As we saw above, the 2008 crisis has contributed to the company's decision to invest in strengthening its technical and commercial teams, thereby seeking to develop its relational interfaces with some of the clients and / or moving to establish direct relationships with some its former indirect customers. More recently, in 2010, GCM created a unit that allows rapid prototyping to better support the desired changes in the company's interfaces with its customers.

CONCLUDING REMARKS

We assume that networks, both intentional or not, are incomplete and imperfect entities. In this context, networks or parts of them are temporary solutions and the presence of stability in some albeit ample dimensions should not be confused with having achieved an overall (and final) optimal solution or even a steady state for the network. The literature suggests and presents empirical evidence that what for some actors is a "given" structure, relatively predictable, can prove, in other times and / or for other players, to be a variable. To that extent they can become involved, through joint actions or not, intentionally or not, in changing even those network contexts of high predictability and low degree of determination. In other words, energy and resources can be used to temporarily destabilize a part of the network in order to stabilize at least some dimensions of the whole. This process can be captured by observing the stability and change in relational interfaces and evaluating the extent to which the rearrangements in the ways the capabilities of the parties are changed and recombined, contributing to the generation of new artifacts, processes, capabilities, perspectives and intentions.

As seen in the GCM case, the relational interfaces vary over time, not only in project phase, but also in the manufacturing phase, but in the latter case in a more or less unexpected way. In the first phase, the company works with its client in designing a particular piece. In the process it takes into account the suitability of those choices and their impact on the design and production of equipment and systems to mass produce the parts. After a test phase and successful **stabilization** of the company's production system, a phase starts where basically it is sought to keep the alignment between the supplier's production system and use / production

system of the buyer, according to a supply contract for several years, which specifies what and when to deliver. Therefore, during the manufacturing phase and mass production is easy to get with the impression that the whole system works on a fully routine and predictable way. In contrast to the design phase, the relational interface at this stage is little demanding in energy and resources but, as shown, the system closure is a temporarily and artificial state, that keeps both the organizational interfaces and the production system interfaces temporarily stabilized. However, the actors if they will can re-activate a more complex relational interface to act on those parts of the system that they find or, in the meantime have learned, to be possible and worth improving. The occurrence of problems or perception of new requirements, unexpected or not, may imply that capabilities change and/or be combined in novel ways and, to that extent, be also tested. In particular, the supplier's performance on these tests is paramount in keeping and further developing the relationship with its client. In this process, and gradually, where once were distant and formal individual and inter team relationships closer and informal bonds may emerge, possibly less codified. The interruptions of apparently long sequences of routine and predictable deliveries by disruptions for the rearrangement of parts of the value system(s), involves different states of permeability at the interfaces between the companies, with implications for the configuration, re-utilization and occasional development of their capabilities, identities and expectations for the future. One can say that a relationship dominated by the prevalence of episodes of trivial exchange may momentarily acquire generating characteristics (or enter a transient generative phase). Additionally, the existence of direct and indirect connectivity between relationships means that the effects on various dimensions of these generative phases (e.g. capabilities and identity) may well propagate beyond the dyad (and often do, albeit unperceived by those with less context knowledgeable perceptions).

Relationships in networks, from simple to complex, can combine both novelty and routine and both may manifest themselves at different times over time or at least vary in their visibility or notoriety for the actors and more so for alien observers. As our case illustrates, when the focus of analysis is moved from the categorization of the nature of networks to the nature of connections, one can expect to better perceive the presence of emergence of generative relationships, even in the ‘obviously’ most trivial contexts.

Finally, it seems reasonable to admit that some structures or systems of value, arbitrarily bound, may have (display) more stability than others. Anyway, as we tried to emphasize the explanation of the coexistence of stability and change should not leave in the dark the modes of actors’ insertion in the network. On the one hand, the selectivity of the more or less continuous/lasting association between actors translates into processes, or relational interfaces, which allow some exchanges with specific actors, while preventing or hindering others. On the other hand, if the relationships have generative powers, this can be manifest both in its role to stabilize and/or modify apparently highly codified and predictable systems dedicated to the processing of “trivial” routine trade. This suggests that parts of networks, or nets, may differ in their prevalence of generative relationships and this may be a good indicator of the presence of different degrees of indeterminacy. Let it be noted, however, that an increase in the degree of indeterminacy may be due to the initiation of efforts by some actor(s), in a teleological guise, to improve the systems’ stability, as noted by Hakansson and Snehota (1995, p. 273) "Much of the change in business networks at aims at achieving a certain degree of stability ... the [perceived possibility of] steady state [albeit temporary] is what makes the purposeful action possible [and motivating for the parties]."

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