# Innovation, Collective Action and Network Positioning: A Case from the Automotive Industry

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**Abstract**

Cooperation in industrial networks is a key issue within the conceptual framework developed by the IMP Group. Despite the existence of some studies, little attention has been paid to collective action phenomena, i.e., cooperative movements involving a significant number of actors. In this regard, the concept of issue-based net is likely to open new avenues in this front. This paper takes one-step further and aims to achieve three objectives. Firstly, to understand the emergence of issue-based nets created to co-innovate in order solve a positioning problem of the actors involved. Secondly, to shed light in the role that capabilities are likely to assume in the collective action process. Thirdly, to expose how networking capabilities may hinder the possibility of turning innovative products into effective business value.

## INTRODUCTION

Firms are looking for new ways to enhance their competitive positioning in increasingly globalized and competitive markets. To do so, firms are reformulating their business models and competitive bases (Harland et al., 1999), developing virtual enterprises and interfirm collaborative strategies, such as R&D joint-ventures (Dilk et al., 2008), strategic alliances or strategic networks (Dyer and Nobeoka, 2000; Möller and Rajala, 2007). Innovation is consensually considered a key factor to firms' success in current competitive settings. At the same time, innovation processes are becoming more complex, expensive and time-compressed (Dilk et al., 2008). In order to cope with these new challenges, firms are relying more in interfirm collaboration mechanisms to innovate, combining complementary activities and resources, developing new knowledge and sharing risks and costs.

The links between innovation, interfirm collaboration and networks have been studied in several contexts, such as the automotive (Dyer, 2000; Dilk et al., 2008), biotechnology (Powell, 1998), agriculture (Vanhaverbeke and Cloodt; 2006), banking (Swan et al. 1999) or software (Ojasalo, 2008) industries, clusters (Bell, 2005), SMEs (Dickson and Hadjimanolis, 1998; Mohannak, 2007; Ojasalo, 2008), large firms (Weck, 2006) or virtual communities, like Mozilla and Linux (Chesbrough, 2006). Despite their differences in context and approaches, these studies share a common trait with consequences for this paper: networks are built around a focal firm or network coordinator, manager or orchestrator (Vanhaverbeke and Cloodt, 2006).

This paper explores a different type of innovation networks, whose members decide to cooperate with each other in order to collectively enhance their competitive positioning. These types of networks may miss a formal centrality and aim at leveraging the innovation capabilities and competitive positioning of the set of participant actors. These types of networks can be seen as issue-based nets, i.e. sets of cooperative relationships involving actors that collectively confront a common issue (Brito, 1996). Brito (1996, 2001) combined collective action (Olson, 1965; Oliver et al., 1988; Wassenberg, 1982; Waarden, 1992) and industrial network concepts (Håkansson, 1987; Håkansson and Johanson, 1992; Håkansson and Snehota, 1995) to build a model aimed at understanding the collective action phenomenon in industrial networks. He suggests that a group of individual actors sharing a common issue (or set of issues) may consider the possibility of adopting a collective action. The issue-based net can be considered an example of intentional business net (Möller and Rajala, 2007).

Any issue-based net relies on sharing, coordinating or even transferring to the collective actor some of the participant actors' interests and power resulting in an increased capacity to control activities and resources compared to its members. To further our understanding on the issue of coordinating, combining and developing resources, capabilities or even business models required in innovation processes, this paper recurs to concepts developed within the capabilities approach (Richardson, 1972; Teece et al, 1997; Loasby 1998). Also, as in IBNs as the one studied in this paper, participants are required to hold or develop specific sets of capabilities, the capabilities approach may also help us understand this process.

The ideas presented so far are furthered in the next six sections. The next section summarizes the papers' theoretical background. Based on some industrial networks and collective action's

concepts, it discusses the role of collective actors in the networks dynamics. Due to our focus on innovation-base nets, it also reviews the capabilities approach to further the knowledge on the nature of capabilities needed to create and manage this type of actors. The third section presents the research questions and framework for analysis and the fourth section reviews the methodology used in the empirical research. The fifth section describes the empirical case and is followed by the presentation and discussion of its findings. Finally, the paper presents its main conclusions and contributions.

## THEORETICAL BACKGROUND

### The Industrial Network Approach

Building on Häkansson's (1987) ARA model, Häkansson and Johanson (1992) claim that industrial networks consist in connected systems of actors, resources and activities. Actors perform activities using their resources. As no firm owns all it needs to perform its own activities, it has to repeatedly interact with other actors to access the resources and activities they control. The specific forms of connections at each at level of the ARA model and their relative importance is contingent to several factors as the functional interdependence of activities and resources, the balance of power between the actors, their past experience, network knowledge and perceptions (Häkansson and Snehota, 1995).

Interaction processes lead to stability or change in actors' bonds, activity links and resource ties. Häkansson and Senhota (1995) argue that the combination of these levels may follow six different paths. Actors may improve their performance by (1) *structuring* existing links between their activities and/ or resources more efficiently; but they may also decide to find new ways of combining activities and resources through (2) *heterogenizing* processes. Actors may also develop (3) *specialization* processes, by narrowing their activities and resources to the needs of their specific counterparts; but they can also take the (4) *generalization* path by performing different activities within relationships with new counterparts. Finally, firms may try to increase their control over resources as a way to develop some kind of advantage over other actors. To do so, they may develop a (5) *hierarchization* process by strengthening the existing combination of resources within existing actors bonds that will lead to the reinforcement of pattern activities; or, actors may prefer the (6) *heterarchization* course, finding new combinations of existing or new resources to perform different activities with new partners, thereby weakening their current network connections. The mix of these evolution paths impacts network dynamics (Häkansson and Henders, 1995). When *structuring*, *specialization* and *hierarchization* coexist, the stability of the network is preserved, as only incremental and evolutionary change occurs within the current network structure. When *heterogenizing*, *generalization* and *heterarchization* coexist, change is much deeper and may assume a revolutionary nature leading to its dissemination throughout the network (Häkansson and Lundgren, 1995)

The way relationships are formed and developed following any of these six paths is strongly affected by actors' network position, theories and strategies (Johansson and Mattsson, 1992). Network theories reflect actors' vision and intentions that allow them to understand and act in the network, and to set network boundaries by including/excluding actors. The actors' vision depends on their positioning, e.g. their set of exchange relationships, the role they play in the

network (Wilkinson and Young, 2002) and their conjectures about those roles (Araújo and Easton, 2001). Positioning is a cumulative process and constitutes the base for actors' strategic actions, also holding a strong influence on their strategic identity (Häkansson and Johansson, 1988). For instance, a firm's network of relationships influences its capacity to innovate (Mohannak, 2007). Strategic actions, e.g. networking, evolve as firms interact, explore and adapt to new circumstances in their efforts to change or preserve their network positioning. As illustrated by Häkansson and Snehota's (1995) six paths, the nature of strategic actions can contribute to preserve the network stability or to change it. As Ritter and Ford (2004) state, firms may consolidate their existing relationships, conform to the way they are managed and concede to their partners wishes, thus reinforcing the stability of the network. But a firm may also prefer to create new relationships, confront the way existing relationships are managed and coerce its counterpart to change, therefore changing its network positioning.

In networks, actors' goals may be in(ter)dependent, conflicting, compatible, aligned or shared. Actors may compete, conflict, co-exist, cooperate or have collusive behaviours, according to their views of other actors constituting a menace, having no effect or being valuable partners in the fulfilment of their own goals (Easton and Araújo, 1992). Bengtsson and Kock (2000) claim that firms may cooperate and compete simultaneously in a process of "coopetition", where actors cooperate to develop some activities and compete in others, normally those more closed to their clients. Within coopetition processes, firms may commonly develop or share some activities and resources while preserving their own idiosyncratic resources. When firms share common issues or problems, actors may chose to cooperate and to act jointly to solve them, creating a new actor: a collective actor.

**The Concept of Issue-based Net**

When a group of actors share common issues they may aggregate resources and coordinate activities to promote or defend those issues. Collective action may assume a formal or informal nature and include economic or non-economic links. Trade and industry associations, agriculture cooperatives, work unions, professional regulatory bodies, pressure groups, lobbies or Web 2.0 social communities are some examples of collective actors.

The concept of collective actors was first introduced in industrial networks by Brito (1996, 2001), as he was trying to understand the dynamics of industrial networks. Departing from previous work of collective action researchers (as Olson, 1965; Hardin, 1968; Oliver et al., 1988; Wassenberg, 1982; Waarden, 1992), Brito (1996, 2001) claims that a group of actors can act collectively to solve a common problem or issue by forming an issued-based net. This author contends that collective actors can result from translation processes, similar to Häkansson and Snehota's (1995) hierarchization concept, by which the actors' dispersed interests are aggregated and their fragmented power is concentrated. This new and empowered actor gains a higher control and mobilization power over available resources to solve the participating actors' common issues.

In order for the issue-base net to emerge, two pre-requisites must coexist (Brito, 1996, 2001). The first one is pre-existing relationships between the participant actors that set the bases for cooperative behaviour. The second one deals with the actors' network views, as actors use them to make sense of the network, decide how to act, and influence others to share their views. The

emergence of a collective actors calls for shared or, at least, compatible network theories that enable the translation of the actors' perceptions, expectations and intentions towards the new issue-based net. In the case of an innovation-base net, relationships and common understandings and attitudes on how knowledge and innovation processes are/should be managed (Swan et al. 1999) may be essential.

The creation and development of an issue-based net tend to be a long and complex process, especially when participants are numerous and heterogeneous. Actors will participate if they expect benefits to be larger than their contributions. However, as contributions are individual but benefits are collective, free-riding behaviour may arise. Larger collective actors have higher risks of attracting free-riders as their opportunistic behaviour may be less visible. However, Brito (1996, 2001) contends that free-riding effects can be diluted if enough critical mass (Oliver et al., 1988) exists within the issue-base net. This means that it is not necessary to mobilize all actors' resources to implement a collective action, if a smaller group of actors within the net is strongly connected and controls the needed resources.

An innovation-based net (IBN) relies on sharing, coordinating and transferring to the collective actor (at least) some of its members' diversified activities and resources, that, in the case of IBNs (the focus of this paper), may be specific and have consequences not only on the resources, capabilities and activity profile of the participant actors, but also on the way they are coordinated and combined. These issues will be furthered on the next section.

**Innovation and Capabilities**

Innovation is becoming a growingly complex and costly process calling for the mastering of specialized knowledge areas (Pyka, 2002; Dilk et al. 2008) increasingly distributed across organizations (Swan et al., 1999). As such, Loasby's (1998) statement that most part of the knowledge a firm needs to be successful resides outside of it, seems particularly true in innovation processes. Araújo et al. (2003) argue that proprietary control of capabilities and resources is unnecessary if a firm is able to access them effectively through its counterparts. Particularly important for innovation, firms must also consider that control reduces the possibility of creating new knowledge, as this arises from the diversity of conjectures held by different firms (Foss and Loasby, 1998). This might explain why innovation is conducted less within individual companies and more in knowledge-creating networks integrating individuals, firms, universities and other institutions (Calia et al., 2006; Mohannak, 2007). Innovation processes, either oriented for product/service, process or even business model innovation, require the concurrence of dissimilar but complementary resources and capabilities that need some kind of coordination.

The issue of coordination was addressed decades ago by Richardson (1972) who claimed that in order to coordinate their closely complementary but dissimilar activities, firms needed to cooperate with each other and to develop an adequate external organization. Based on the work of Richardson (1972) and Ryle (1949), Loasby (1998) stated that an external organization entails the combination of both direct (knowing how to do things) and indirect (knowing how to get things done) capabilities. Insofar as indirect capabilities allow firms to specialize while accessing complementary and dissimilar capabilities (Araújo et al., 1999), they are an essential element of innovation processes. Araújo et al. (2003) contend that firms can use relationships to

access, exploit or develop each other's capabilities. As far as innovation is concerned, the mere access or exploitation of resources and capabilities is insufficient to produce novel outcomes and actors will need to explore new combinations of resources, calling for increasingly indirect, complex and dynamic capabilities, rather than direct and static capabilities.

Static capabilities are used to exploit and optimize the existent, e.g. exploring scope and scale economies (Loasby, 1998; Araújo et al.,1999; Foss, 1999). Dynamic capabilities allow firms to integrate, develop and re-configurate internal and external capabilities and resources in order to deal with changing environments (Teece et al., 1997). Teece et al. (1997) contend that dynamic capabilities integrate management and organisational processes such as coordination/integration and learning. Swan et al. (1999) and Powell (1998) stress how inter-organizational links are critical to knowledge and learning processes, posing new challenges for innovating firms. Knowledge must be recreated through dynamic, interactive and social networking activity, and this is mostly important for innovation processes that are interactive in nature**.** Establishing relationships with firms holding complementary resources and capabilities may potentiate learning and result in competitive advantages (Foss and Loasby 1998; Lorenzoni and Lipparini, 1999). However, for this process to be successful, firms may need to share some overlapping knowledge (Richardson, 1972) and to have some absorptive capacity (Cohen and Levinthal, 1990) that allows them to recognize the value of external knowledge, to assimilate and combine it with internal knowledge. Araújo et al. (2003) claim that absorptive capacity may go beyond technological knowledge and include other capabilities shared in inter-organizational relationships, allowing to incorporate and develop knowledge as well as to influence the development of capabilities hold by their counterparts, as Mota and de Castro (2004) suggest.

For IBNs to succeed, firms may have to create specific bundles of direct and indirect capabilities. Dynamic capabilities are of essential to enable participants to find novel combinations and solutions. This may include technical and non-technical (e.g., social) capabilities such as the identification of adequate partners (e.g. performing complementary activities or holding valuable network links), the creation or sharing of common network visions (e.g., about potential outcomes of the IBN) and mutually influencing their capabilities, activities and investments. The emergence and management of an IBN may result in restructuring of the activity patterns, creation and recombination of resources and capabilities, in finding and connecting with new valuable business partners and (hopefully) the enhancement of the collective and individual network's positioning.

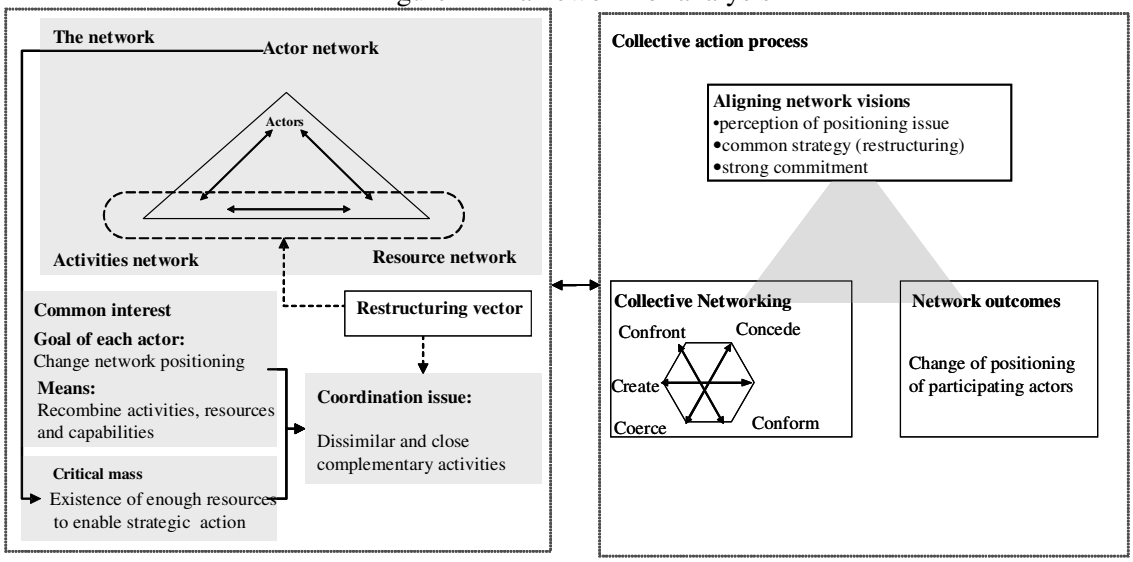
This section reviewed some theoretical concepts from three research streams (industrial networks, issue-base nets and capabilities approach) and also from extant literature on innovation so as to ground the research project. This done, it is now time to explain how those concepts were put together into the research questions and conceptual framework that follow.

## FRAMEWORK FOR ANALYSIS

Based on these theoretical considerations, Figure 1 illustrates the framework for analysis that encapsulates the papers' research questions and guides the empirical research. As discussed before, this paper deals with the emergence and development of a collective actor within a

larger network of actors that hold resources and perform activities, as proposed by Häkansson (1987). The collective actor is meant to solve a common problem or mutual interest of their participants: the need to change their positioning in the network, constituting an issue-based net. Brito (1996, 2001) claims that change is induced by a translation process that concentrates disperse power in the collective actor, in a similar way to Häkansson and Snehota's (1995) hierarchization pathway.

Figure 1– Framework for analysis




This paper argues that collective actors can follow a different pathway. An alternative can be the heterarchization or restructuration process (Häkansson and Snehota, 1995), by which resources, capabilities and activities are created or recombined in innovative ways that will hopefully result in an enhanced strategic identity and a stronger network positioning. Either in translation or heterarchization, the collective actor's goal is to preserve or change its network positioning. While actors must be mobilized to join their efforts and resources, it is not necessary that they are in large numbers so long as there is enough critical mass (resourceful actors) to sustain strategic action. Whilst in hierarchization or translation, power is gained by concentrating similar resources, in restructuring processes they must be heterogeneous, as diversity breads innovation (Foss and Loasby, 1998). As the IBNs are probably centered on actors performing dissimilar yet complementary activities, this poses a coordination problem that calls for inter-organizational cooperation (Richardson, 1972). Diversity may also reduce competing problems among participants and, thus, facilitate cooperation (Easton and Araújo, 1992; Bengtsson and Kock, 2000).

If collective action is produce the desired outcomes, participant actors (or at least those in the critical mass subgroup) must align their network visions, particularly on the nature and importance of the common issue, on the way to tackle it and on the adequate level of individual commitment. Then, they must act with each other and collectively towards external counterparts to induce change and reinforce their positioning. According to the outcomes that are actually produced by the IBN, actors' visions and willingness to reinforce the collective actor may be revaluated.

Within this framework, this paper addresses two basic research questions:

- Are Innovation-based nets adequate solutions to change their members' individual and collective positioning? If so, how?

- How do Innovation-based nets emerge and evolve?

The next section briefly reviews the methodology used to investigate these questions.

## RESEARCH METHODOLOGY

This paper adopts a case study design. The industrial network approach adopted as the main conceptual framework of this paper relies on the existence of interdependencies between actors (Axelsson and Easton, 1992). The specific nature of the IBNs requires the existence of dynamic capabilities that are seldom created within the boundaries of a single company, but rather in the context of relationships between different actors. The complexity of the industrial networks (Easton, 1998) and the difficulty to set clear frontiers between context and the phenomenon also calls for an intensive research based on case studies (Yin, 2003). Finally, the exploratory and explanatory nature of the research goals also advices the case study design (Yin, 2003) giving further support for this methodological choice.

When studying networks, the existence of connectivity between actors makes the setting of appropriate boundaries a difficult issue (Johanson and Mattson, 1992) that has sampling consequences. In this research project, the sampling process was facilitated by the use of the issue-based net as a qualitative research tool (Brito, 1996). The issue-based net is an intermediate solution between studying the actors and their relationships and analysing the networks as a whole. The issue-base net respects the connectivity between the participant actors and facilitates the process of setting the boundaries of the network. As such, the unit of analysis of this research project is an issued-based net, comprising all its participant members.

The case studied in this research project was selected according to its relevance to the investigation goals (George and Benett, 2005) and learning potential (Dubois and Gadde, 2002). The main goal was to investigate the emergence and development of an issue-based net aiming at reinforcing its participants' network positioning by strengthening their innovation capabilities. Keeping this in mind, we selected ACECIA, a formal organisational arrangement involving companies and research centres mainly operating in the automotive industry.

Data was collected mainly through unstructured interviews to representatives of all ACECIA members to maximize the gathering of relevant information impossible to get through standardized questionnaires. Rubin and Rubin (1995) state that qualitative interviewing is specially useful when one aims at developing deep knowledge of the phenomena and needs to obtain rich data in order to describe the context of and explain that same phenomena. The selection of the specific interviewees was done according to their ability to inform on the topics under study, (Yin, 2003; Rubin and Rubin, 1995) as they were directly involved in the creation

and management of the issue-based net. All interviews were taped and transcribed for analysis. Other sources of information as sites, firms' documentation and press articles were also used.

## THE ACECIA CASE

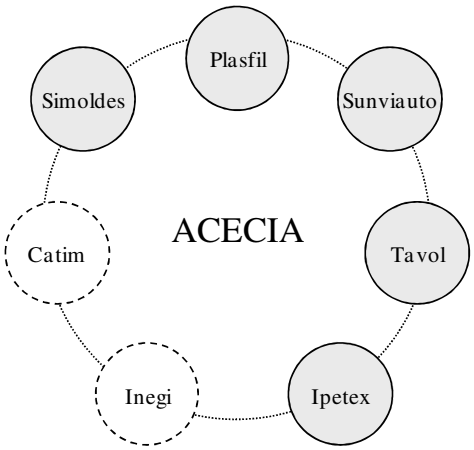
In Portugal, five OEM assembly plants (VW, Mitsubishi Trucks, Opel, Toyota Motor Europe and PSA Peugeot Citroen) accounted for the production of 227,325 motor vehicles of units and represented 7% of the country's GDP in 2006 (ACEA, www.acea.be). The industry is suffering severe threats, particularly important to the national suppliers. Since the 90's, seven of the twelve OEMs operating in Portugal decided to delocalize their production sites to other countries, specially in Eastern Europe. The decision of Opel/GM to leave Portugal at the end of 2006, represented a major blow to the national industry, contributing to the drop in the production of vehicles to 175,155 in 2008 (ACEA), a 23% reduction compared to 2006. Following the departure of Opel/GM, major 1st tier international suppliers also abandoned the country, impacting 2nd and 3rd tier suppliers. The automobile industry employs more than 40,000 workers in about 180 companies, 90% of which are SMEs (up to 500 hundred workers). Suppliers are highly dependent from the industry that is the exclusive source of revenues for almost 2/3 of them. Suppliers have very different profiles, ranging from resourceful 1st suppliers, to 2nd tier suppliers producing simple components, to small 3rd tier suppliers, which manufacture standardized components (AFIA, www.afia-afia.pt). Directly or indirectly, they all face worldwide competitive pressure and the same industry trends.

In Portugal, OEMs are manufacturing and assembly units with no participation in the R&D processes of the vehicles. As such, Portuguese firms are not close to the innovation centres of OEMs. At the 90's, Portuguese suppliers were focusing on low-value activities of producing components designed and specified by OEMs or first-tier suppliers. OEMs' trend to reduce their supplier bases and keep those that are able to deliver complete modules is shifting value added to suppliers that are gaining more development tasks and capabilities (Dilk et al. 2008). However, this poses a major threat to national component producers that are unable to create those modules and, consequently, may be moving far back on the supplier chains.

### The Emergence of ACECIA

In 1997, in order to contradict these negative impact trends, five supplier firms of distinct areas (plastic, metal and textiles) and two Technological Centres (TC) decided to create ACECIA, ACE (www.acecia.com) - an European Economic Interest Grouping (EEIG). The creation of the EEIG also resulted from the efforts of an external mobilizer: a former member of IAPMEI (a public body that supports SMEs), who was involved in the negotiations of Ford/Volkswagen investment in Portugal and had a profound knowledge of the national automotive industry. ACECIA received some public funding when it was constituted, but its operational expenses are covered by annual contributions from its members. Members hold equal shares of the EEIG. Top management team integrated a CEO (the external mobilizer) and one representative of each member. ACECIA's "main goal is to supply complete industrial services to the OEMS and its main 1st and 2nd tier suppliers".

Figure 2 – Founding members of ACECIA in 1997

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|---|---|
| Plasfil | Plastic components |
| Sunviauto | Producution of seats |
| Tavol | Metalomecanics |
| Ipetex | Tecnical textiles |
| Simoldes | Plastic moulds |
| Catim | Tecnological Center - metalomecanics |
| Inegi | Tecnological Center – Inovation |

Industrial unit  Technological center

ACECIA aimed at producing innovative modules that would make possible for its associates to move up in the value network. Joint promotional activities and exchange of information and tacit knowledge (capabilities, experience) were also set as goals that would help improve their network positioning. The five industrial founders had different technological backgrounds but they all belonged to the auto-component industry and hold a common view of its problems. The firms were not economically related, but they knew each other (or of each other), as the Portuguese market is rather small and all of them were highly reputed. Due to their lack of experience in working together, the TCs were invited to join the association to facilitate the coordination among them and speed up the modules developing process. ACECIA's rationale was that whilst none of the associates alone was able to produce a complete module, they performed complementary activities supported by diverse resources that, if combined in novel ways, could result in innovative products.

Member firms indicate three main expected benefits: participating in the module development and production and, thus, becoming 1st tier suppliers; profiting from economies of scale in joint promotional activities; increasing their sales while keeping their autonomy. ACECIA was able to obtain considerable awareness quite rapidly. Firm members promoted the association to their clients stressing their improved capabilities. ACECIA organized a major promotional event attended by all ministers of economy since 1974 and granted their support in five international commercial missions. The missions revealed that even if the OEMs seemed to accept ACECIA's concept, they were also suspicious about its reliability, as OEMs thought that it still lacked adequate critical mass and solid technological experience and reputation.

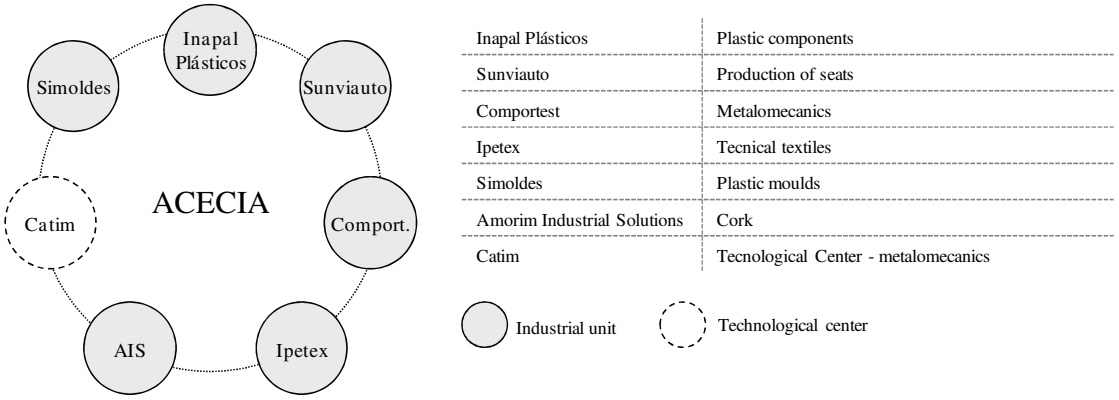
The low level of coordination and integration between firms, their lack of experience in module architectural engineering and the unexpected inability of the technological centres to facilitate and speed the module development resulted in huge delays and no relevant outcomes. ACECIA was not able to come up with a module that attracted any OEM interest and, additionally, the members had different rhythms and degrees of commitment. These first years of ACECIA were considered by many a disappointment, even if some members were able to find some individual opportunities for their firms. In 1999, the association suffered a major crisis: two of its members (Tavol and Plasfil) were acquired by Spanish companies that not were welcomed by other members, specially, the most prominent ones. One of the TCs also held divergent views on how

to tackle the association's goals. These critical incidents, together with the lack of results caused high levels of dissatisfaction among members and led to the restructuring of the association.

**The Reformulation of ACECIA**

In 2000, three new industrial members occupied the vacant seats, as illustrated in Figure 3. Two came from the same specialization areas of the ones that left; the third is owned by the world leader of cork industry and dominates the *corkrubber* technology with many applications in the automobile industry. With this reformulation, the scope of activities, resources and capabilities was widened, enabling new combinations of resources and capabilities.

Figure 3 - Members of ACECIA since 2000

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|---|---|
| Inapal Plásticos | Plastic components |
| Sunviauto | Production of seats |
| Comportest | Metalomecanics |
| Ipetex | Tecnical textiles |
| Simoldes | Plastic moulds |
| Amorim Industrial Solutions | Cork |
| Catim | Tecnological Center - metalomecanics |

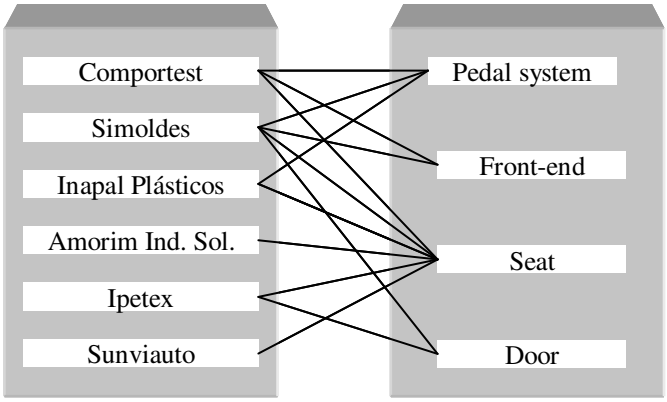
ACECIA had a major opportunity in 2001, after the Portuguese government began negotiating the purchase of two submarines from the German Submarine Consortium. This purchase was paralleled by a pre-offset and an offset program that forced the consortium to make purchases from Portuguese manufacturers (mainly from naval, automobile and software industries) to offset the value of the submarines. ACECIA received a large volume of business out of that deal. The German consortium could place the orders itself or work as a broker finding buyers to the Portuguese components. One member of the German consortium – Ferrostal - owned 100% of MAN (a major truck manufacturer) had close contacts with BMW, the Volkswagen Group and 1st tier suppliers. Ferrostal played an important role as the facilitator of contacts between ACECIA and those major OEM's and 1st tier suppliers.

The offset program had two major outcomes. Firstly, it represented a major business opportunity for ACECIA as sales had to relate to new contracts, rather than ongoing business between its members and any of the buyers. It offered the six participant firms tangible benefits for belonging to and investing in the association. It also enabled them to prove that they were reliable suppliers and capable of fulfilling large orders on a continuous basis. Secondly, and more important to ACECIA's strategic goals, was the possibility of contacting directly with major prospective clients, including OEM's, and proving them their joint technological and innovation capabilities. ACECIA's priority became the development of a module that should fulfil two conditions: quickly attracting the attention of the OEMs and involving the capabilities of all (or some) of its members. As the association was not commissioned the development of any module, it decided to do it in on its own, very much following the old saying: "if the mountain will not come to Mohammed, then Mohammed must go to the mountain". The top

management team, assisted by an external consultant, collectively discussed the future evolution of the automotive industry and what they thought would represent major opportunities for technology development in order to identify promising investment areas.

The environmental and climatic problems were identified as a major threat to the industry, pressing OEM's to find solutions for two problems: $CO^2$ emissions and recyclability of materials. ACECIA developed four modules related to those issues from 2000 to 2006 (Figure 4). The four modules share two common traits. They are lighter than usual, due to innovative combinations of materials, like mixes of metal and plastic in the forefront and pedal system modules, or mixes of those materials with cork and rubber composites in the seat module. Modules also have a high proportion of recyclable materials, e.g., the seat is almost totally recyclable.

Figure 4 – ACECIA's main projects




At the business level, the outcomes of these projects are varied. (1) The front-end module has not yet attracted the interest from any OEMs. (2) The door module produced mixed results: it was presented to several OEM's and was accepted by the Korean manufacturer Daewoo, which joined the project as a technological partner. Unluckily, Daewoo suffered a major financial crisis and went bankrupted short after, causing the suspension of the project. (3) The pedal system, where excellent results were achieved in terms of weight (50% reduction) and cost (25% reduction) was well received by some OEMs that requested ACECIA to further reduce costs. The commercialization of this module was planned to begin in 2008. (4) The seat module is the most complex and promising project, involving a multidisciplinary team of 40 persons belonging to the six participating firms (22 people), a design partner and two universities, 10'000 hours of engineering, and 130 components projected and/or developed. The seat prototype was presented at the end of 2007 and promoted in several trade fairs in 2008. ACECIA was also trying to sell it through the German facilitator.

## DISCUSSION OF FINDINGS

This section discusses the findings of the case in order to answer the research questions.

### The requisites for emergence: common issue, pre-existing bonds, critical mass and coordination mechanisms

The creation of ACECIA arose from a common problem of its founding members: their weak positioning in the automotive value network. They also shared a common vision: to enhance their positioning they had to come closer to the OEMs and 1st tier suppliers and to do that they had to invest in their R&D capabilities. They also agreed that their common problem could be better solved collectively and decided to create ACECIA. Thus, ACECIA fulfil one of the issue-base net pre-requisites (Brito, 1996, 2001) the existence of a common issue.

Pre-existing relationships is another pre-requisite. In this case, there were no pre-existing relationships between the firms, although there were sporadic social encounters and firms new of each others' existence, mainly because of the small dimension of the Portuguese automobile industry and the high reputation of all these firms. Initially, it was planned that the CEO should select potential members according to their capability profile and performance. Nonetheless, the actual constitution of ACECIA was strongly influenced by the firms that were the first to join, either because they 'imposed' other participants, either because they refused to accept others. A similar practice was followed in the reformulation process. This behaviour was probably due to the fact that sharing of tacit knowledge (as the one involved in learning and innovation) is grounded on trust, willingness to share and recognized mutually benefits over time and apparently the 'vetoed' members were not seen as trustworthy and valuable partners. In any case, it is interesting to observe how even apparently superficial knowledge of potential members can, in fact, influence the participation of firms in an issue-based net, possibly influencing its profile and future development.

Let's now consider the critical mass condition. The benefits associated with ACECIA are similar to those associated with cooperation among SMEs by Mohannak (2007): collective economies of scale (e.g. of promotional activities), benefits of dissemination of information (e.g. during the development of the module projects) and inter-firm division of labour (e.g. participants' specialized activities). The creation of ACECIA also permitted the minimization of a general problem of SMEs: the lack of essential resources for innovation (Dickson and Hadjimanolis, 1998). By making their specialized activities and resources available to the other associates, the resource endowment problem was diminished and collective innovation potential was fostered. As Araujo et al. (2003) claim, direct control was advantageously replaced by access through counterparts. A specific dimension of issue-based nets is the existence of sufficient critical mass to make action feasible. In an IBN, the critical mass is linked to the quantity of available resources, but also to their complementarity and differentiation, as diversity breads knowledge creation and innovation (Foss and Loasby, 1998). Right from the start, three of the initial participating firms (Simoldes, Sunviauto and Impetex) held adequate resources to make the project technically feasible and the CEO held a wide and valuable set of network links. As times went by and initial members were becoming increasingly dissatisfied with the lack of results, that critical mass group also played a fundamental role in keeping the collective actor cohesive and enabling its reformulation.

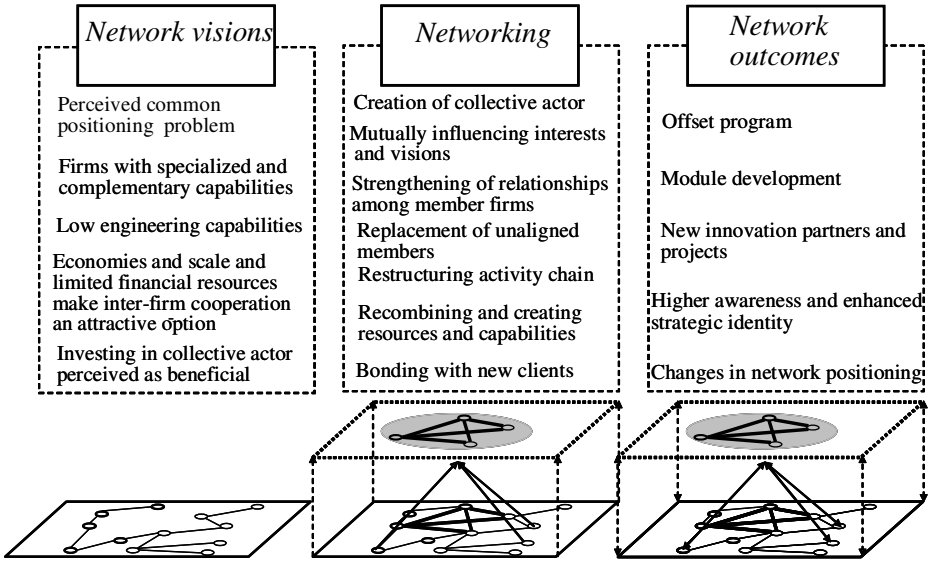
Richardson's (1972) claim that inter-firms cooperation is an adequate mechanism to coordinate dissimilar and close complementary activities seems specially true in this case. Inter-firm cooperation was needed not only to coordinate resources, but also to create new ones and to find new combinations between them, sometimes with resources that were external to ACECIA, (e.g. as in the case of the seat module). It is relevant to underline the initial difficulty that firms

felt in working together due to the lack of previous relationships and experience. This illustrates as direct capabilities (knowing how to make things), despite their quality, must be complemented with indirect capabilities (knowing how to have others make things) to enable the coordination or development of resources. It also suggests that in the absence of some degree overlapping knowledge (Richardson, 1972; Lorenzoni and Lipparini, 1999), absorptive capacity may be low (Cohen and Levinthal, 1990) hindering firms ability to build competitive advantages on available network resources.

**The collective action process**

The previous section discussed the 'requisites' for a collective actor to emerge and its importance in the case of ACECIA. This section debates to collective action process, e.g., common network visions, networking within and outside the network and perception and impact of network outcomes. Figure 5 illustrates this process.

Figure 5 – The collective action process




Previously, it was suggested that the creation, development or even survival of a collective actor required the alignment of their network visions (Johansson and Matsson, 1992). This seems particularly true in the case of an IBN where participants have to share resources (sometimes sensitive knowledge), invest time and money and interact in an intense manner. In this case, compatible visions may not be enough to sustain the net in the long run. In the case of ACECIA, participants seemed to have similar perceptions on their common problem (their positioning on the automotive industry), their capability profile, the potential benefits of cooperating and a feasible common solution: collectively coordinating or restructuring their activities to produce innovative components and thereby becoming a more valuable counterpart to the OEM's and 1st tier suppliers. This case also shows how a loss of alignment (at the end of the first phase) can cause severe conflicts and pose serious threats to the collective actor. When this happened, deviated members had to leave either by choice or coerced by other members. The fact that the "critical mass" subgroup had rather aligned visions probably had an essential effect on the survival of ACECIA.

Collective networking is present right from the birth of ACECIA. Participant members influence each other's vision and priorities. An important aspect of this networking is the choice of the module projects as they didn't offer the same type or level of potential benefits to the six firms. Balancing individual interests can be a crucial dimension of collective actors. The fact that the CEO was not connected to any of the firms may have facilitated his leadership and mediator role. Collective networking included some level of hierarquization (Häkansson and Senhota, 1995) or translation (Brito, 1996, 2001) as participants concentrated their power and interest to the collective actors. Structuring was also there as firms continuously worked together and acquired economies of experience and a more efficient use of resources. But probably more important to the ACECIA's strategic goals were the change vectors, namely heterarquization or restructuring processes that seem crucial to innovation processes and network repositioning. The restructuring process occurred as firms changed activity patterns, made innovative combinations of resources and connected with new business partners.

Finally, the network outcomes. At the moment where this paper is being written it is hard to judge if ACECIA was already able to fulfil its strategic goals. In 2008, when ACECIA expected to begin selling its new modules, the global economy and particularly the vehicle industry entered a major crisis, whose timeframe and consequences are hard to foresee. However, it is impossible to state that ACECIA's projects would be successful without the crisis. But, let us look in detail to the outcomes of its almost 15 years of existence. A first important outcome resulted from the fact that previously unbonded actors were put to work together and had the opportunity to explore each other' potential. This potential was explored within ACECIA's projects but also had spillovers to projects outside its scope with added benefits to the individual firms. The case also suggests that ACECIA was very effective in gaining public awareness and recognition as a credible actor, as its participation in the offset program seems to indicate. In fact, it was the offset program that produced the outcomes perceived as most positive by the participating members. It brought valuable contacts with the OEMs and 1st tier suppliers and made ACECIA and its member visible, brought new business and increased sales and funds to the module innovation projects. Without the offset program and the network connections provided by Ferrostal, the network outcomes would probably be much more modest, even if the participants and their innovation potential was the same.

Now, let's briefly review the research questions.

- *Are IBNs adequate solutions to change their members' individual and collective positioning? If so, how?*

ACECIA seems to offer a positive answer to this question. An IBN may be, in fact, an effective solution to common positioning problems of SMEs in highly competitive settings. IBNs may be useful to overcome problems commonly associated with innovation processes, specially when carried out by SMEs: tackling all specialized knowledge involved in developing new products and processes, sharing of tacit knowledge, huge amounts of investments, shorter time-to-market cycles and son on. IBNs provide members with a common framework of network visions, a cooperative and trusted environment, where the broader goals of the system are designed and interactive relationships built (Swan et al., 1999). By joining their bundles of differentiated resources and capabilities and combining them in novel ways, associated members may actually

come up with different types of innovation: new products, such as the seat modules; new processes, as the process of combining textiles with injected plastics; new business models, as the ACECIA itself. It must be noticed that technical and financial resources may be not enough when changing positioning through innovation processes. Strategic identity and positioning are cumulative, path dependent, long and complex processes. This is probably one of the main reasons why ACECIA had such a hard time in convincing OEMs of their credibility and reliability. As such, network connections and networking capabilities seem crucial to leverage or hinder the potential of innovation processes.

- *How do IBN emerge and evolve?*

IBN emerge by a group of actors recognizing that they share a common problem and believing that collective again is an adequate strategy to deal with that issue. However, this is not sufficient. Prospective members must agree on the collective actors' scope of action: in ACECIA, the scope was defined as the production of car's interior components. By delimiting scope, it is possible to define what type of resources and capabilities involved in projected activities, to define the adequate capability profile of future members and to identify actual firms that match that profile. It must be stressed that in IBNs, actors' indirect and dynamic capabilities are of outmost importance as they strongly impact their ability to adapt, share and produce new knowledge and generate innovative outcomes.

Having the 'right' capability profile may also not be sufficient to allow eventual members to join the 'club'. Alignment of network visions is also crucial as they will condition the future development of collective action. Thus, prospect members and the collective actor's network theories must be aligned. A paradox seems to exist here. The existence of collective actor's visions presupposes the existence of a collective actor. But for a collective actor to exist there must be joining members. How can those joining members align their network visions with the visions of a not yet existing organization? What seems to happen is that the issue-based net's theories are heavily shaped by the theories of the first members. Their shared visions seem to constitute the initial strategic drivers and also work as a reference in relation to which other candidates are measured, accepted or refused. Later on, collective visions are the outcome of networking process where all members try to influence each other, but where prominent members may play a decisive role.

Networking or strategizing occurs inside and outside the network while participants interact with each other at an individual (.e.g. in bilateral projects) or collective level (e.g., when top management meets to decide on priorities and investments) very much in the ways proposed by Häkansson and Snehota (1995) and Ritter and Ford (2004). In the specific case of AECIA, change vectors, such as heterarchization seem to play an essential role. However, in order to assure cohesiveness and stability, hieraquization and structuring processes must also be present. Actors do sometimes conform, concede and consolidate their relationships at all levels in order to reinforce stability, while in other times they must coerce, confront and create new solutions and change. An interest aspect in collective actors is that as the same time that members avoid hierarchies, they may still want someone to play a coordinator or leading role, granted with authority to take care of coordination activities and decision-making if necessary. Finally, network outcomes are perceived as the benefits that actors gain by participating in the issue-

based net. If they are perceived as larger than their contributions, this may reinforce theirs positive perceptions and attitudes about the collective actor leading to reinforced participation. For the collective actor to survive, it is not needed that all members see the outcomes as positive, as long as members representing its critical mass are satisfied and willing to maintain their commitment.

## CONCLUSIONS

This paper reviewed how stability and change coexist in industrial networks as interaction occurs at the actors, resources and activities levels, influenced by the actors' network theories and positioning. The paper then focuses on the role of collective actors in network dynamics. Issue-based nets are presented as a specific case of collective actors emerging to solve a group of actors' common issue, as the enhancement of their network positioning through innovation. Finally, as this paper deals with IBNs, it recurred to the capabilities approach to explore how direct and indirect, static and dynamic capabilities may used by participants in novel combinations or creation of activities and resources, possibly leading to the restructuring of the activity patterns, connection to new valuable business partners and the strengthen of their network positioning.

The paper contributes to a deeper knowledge of collective action in industrial networks why combining it with some central concepts of the capabilities approach. The paper suggests that collective actors can change the 'rules of the game' by finding new ways of combining dissimilar activities, resources and capabilities. It also highlights how issue-based nets that arise from sharing processes must be firmly grounded on networking capabilities, namely the indirect and dynamic capabilities. Collective action may also be an adequate mechanism to solve SMEs difficulties in innovation processes, such as lack of adequate endowment of resources (knowledge, money, network connections…), credibility and reputation.

The paper also explain how pre-existing relationships, common interest, critical mass and avoidance of free riding identified by Brito (1996, 2001) as pre-requisites of issue-based nets also apply in the case of IBNs. Here, as innovation calls for differentiated contribution of all members, free-riding is a less probable phenomenon. The concept of critical mass gains specific contours in this context, as leverage is not achieved just by concentrating similar resources, but rather by finding, obtaining and combining differentiated resources that potentiate knowledge creation and innovation. While pre-existing relationships (namely of economic nature) may not necessarily exist, actors still need some kind of knowledge on each other to identify adequate partners and organize collective action.

The paper suggests that collective actors may follow different pathways to enhance their network position other than the translation and hierarquization processes. When the issue-base net's goals are directed to change, actors may chose the pathway of heterarquization, changing their activity patterns, creating new constellation and resources and promoting bonds with new actors. However, building new network identities and changing network positioning are ambitious goals that may be hard to achieve if the collective actor's members don't own previous and valued experience and credibility. As such, even when actors collectively hold

adequate resources to produce pioneering products, create ground-breaking processes or design original business models, their ability of networking in the larger network may probably be the critical factor that hinders or enables the translation of that potential into actual business outcomes.

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