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Between cooperation and competition : the benefits of collective strategies within business ecosystems. The example of the software industry

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Authors:

Gaël **GUEGUEN**
Université Montpellier III
ERFI-CEROM
France
gael.gueguen@univ-montp3.fr

Estelle **PELLEGRIN-BOUCHER**
Université Montpellier I
ERFI – CEROM
France
estelle_pellegrin@hotmail.com

Olivier **TORRES**
Université Montpellier III
ERFI - EM Lyon
France
oliviertorres@free.fr

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Abstract

The emerging notion of business ecosystems can be linked to several older theoretical notions : firms networks, alliances, collective strategies etc...Indeed, business ecosystems are based on the idea that several companies will collaborate to improve their offer. However, this concept is distinguishable from previous notions according to its specific dynamics : leadership emphasi*s*, keystone organizations role, co-evolution, co-opetition, change in competitive rules, capacity of development for an open-source community, diversity of players, convergence of industry, role of information technologies, and common fate.

These several characteristics lead to a paradigmatic change in the interfirm relationships' understanding. Thereby, it is necessary to renew the available theoretical tools. An analysis of these relationships in terms of business ecosystems seems more apropriate. In order to understand the interest of a reflection in terms of business ecosystems, we will study the examples of Linux, Microsoft and SAP. These cases will illustrate the different dynamics and emphasize the importance of business ecosystems in the success of companies from the software industry.

Between cooperation and competition : the benefits of collective strategies within business ecosystems. The example of the software industry

The concept of "collective strategy" (Astley and Fombrun, 1983) is essential in strategic management, particularly when there is a desire to use an analysis framework that identifies the collaborative strategies that a company can develop with other partners (including competitors). It is a concept that has been unjustly disregarded (Astley, 1984), despite that fact that it makes it possible to both describe heterogeneous situations of cooperation and understand the complex underlying logic (Bresser and Harl, 1986). Today's economic situation frequently includes reports of alliances forged between competitors, or the development of networks common to companies with very disparate activities. By nature, companies collaborate with a varied group of key players when they develop their strategies.

The initial framework proposed by Astely and Fombrun (1983), however, seems insufficient with regard to the complexity of corporate strategy. In particular, **their theory dissociates the various collective strategies from each other and does not sufficiently take into account the global dynamics of all the relationships a company has in terms of resources and competencies**. Following an initial modification of the parameters used by Astley and Fombrun (form of interdependence and form of association), we propose the theory that **reflection in terms of business ecosystem** (Moore, 1993; 1996) **makes it possible to breathe life and movement into understanding of collective strategies**. The theory is based on the example of corporate strategies from the software industry sector (Microsoft, Linux and SAP), used to illustrate the characteristics of business ecosystems.

The emerging concept of business ecosystem (Moore, 1993; Iansiti and Levien, 2004) can effectively be based on different, and older, theoretical concepts, such as corporate networks, "organisational field", alliance, collaboration, "collective strategies" and so on. Business ecosystems are indeed founded on the idea that different companies can join forces to improve their offer. This concept is nevertheless different from the previous concepts in that its dynamics are particular: there is the importance of leadership, the role of "keystone organisations", the principle of co-evolution, the "coopetition" dynamics and evolution in the rules of competitiveness, the ability to develop in accordance with an open-source community, the diversity of the key players (companies, lobbies, associations, clients and so

on), industrial convergence, the role of information technology, sharing a common strategic destiny and more.

In order to demonstrate the interest of reflection in terms of business ecosystem as a substitute for the "collective strategies" theory, we will first envisage the concept of collective strategy in terms of its origins and its logic. This will lead to observation of the insufficiency of this theory, despite being of major interest. Secondly, we will discuss the hypothesis that the concept of business ecosystem can fill in certain gaps.

1. What is a collective strategy?

According to Astley (1984), until the 1980s strategic management theories considered perspectives in terms of choice, constraint or competition as essential. The importance of collaboration was neglected. Starting from the theory that companies must, as a priority, be envisaged in an interorganisational perspective in order to envisage their ability to act on their environment, Astley and Fombrun (1983) considered that the collective strategy corresponded to "**the joint mobilization of resources and formulations of actions within collectivities of organizations**". The perspective envisaged here differs from that of "strategic choice" (Child, 1972) as the action is not seen as coming from a single company, but instead from a group of companies.

1.1. Collective strategies and their operating logic

As the foundations for their concept of collective strategy, Astley and Fombrun (1983) distinguish four types of collective strategy:

- "**Collective agglomerate**": similar organisations form a single category because of their dependence on common resources, but they are not directly associated for performing their actions. This is thus an indirect association between rival companies.
- "**Collective confederate**": similar organisations associate directly with one another. These are thus rival companies that develop partnership agreements.
- "**Collective conjugate collective**": different types of organisation that have direct interaction with one another as they are complementary for obtaining the performance they

want. This is direct vertical partnership, for example within a branch, such as subcontracting or certain types of network.

- "**Collective organic collective**": different organisations that do not interact directly, but which are interdependent because the system in which they evolve has a patent degree of unity. It can thus be considered that companies that are different but which share a same resource will find themselves together simply on the basis of their mutual interest in promoting this resource.

With regard to these precisions, Astley and Fombrun (1983) developed the following matrix[1] using an axis to correspond to the different forms of interdependence (commensalistic or concurrent or symbiotic or non concurrent) and types of association (direct or indirect):

Table 1: Typology of collective strategies (Astley and Fombrun, 1983)

		Forms of interdependence	
		Commensalistic	Symbiotic
Types of association	Direct	**Confederate**	**Conjugate**
	Indirect	**Agglomerate**	**Organic**

The commensalistic nature comes from the interdependence between similar species (competitiveness), whilst the symbiotic nature comes from the interdependence between non similar species (non competitiveness). In both cases, this interdependence has an ultimate aim, obtaining resources.

The concept of commensalism makes it possible to return to the concept of horizontal relationships (which concern competition between companies in a situation of substitutability in terms of offer), whilst in the concept of symbiosis, it is the concept of vertical relationships (the different stages within a subsidiary, for example, thus bringing together companies that are associated by their essential complementarity) as well as transversal relationships (which concern companies that have neither substitutability nor essential complementarity, but rather annexed additivity). Fombrun and Astley (1982) differentiated the horizontal, vertical and symbiotic interdependences. The result is that using the terms commensalism and symbiosis is insufficient.

[1] Dollinger (1990) proposes an exhaustive list of examples of associations for each of these cases.

Table 2: Correspondence between the forms of interdependence

Direction of the relationship	Forms of interdependence Astley and Fombrun (1983)	Situation in terms of offer	Point of analysis	Typeical situation
Horizontal	Commensalism	Substituability	Sector	Competition
Vertical	Symbiotic	Essential complementarity	Subsidiary	Subcontracting
Transversal	Symbiotic	Annexed additivity	Environment	Interest group

Commensalism concerns cooperative relationships between rivals. Hamel, Doz and Prahalad (1989) also observed the advantage for a company to collaborate with its competitors in terms of learning within formal partnerships. But the perspectives mentioned here are more in terms of a direct association, highlighting an advanced formalism in the relationship (confederated strategy). From this viewpoint, it is also interesting to note the existence of a new competitivity model, *coopetition*, which is characterised by the presence of a network of key players who cooperate and compete with each other to create maximum profitability.

Nalebuff and Branderburger, in their work *Co-opetition* (1996), affirm that the world of business is a mixture of cooperation and competition. These phenomena give rise to a highly competitive environment in which new rivals can appear very quickly from traditionally non competitive sectors. Evolution in the dynamics of business thus renders the collaborative value inherent to coopetition all the more important. Within such networks, it is effectively necessary to go beyond purely competitive strategies in order to integrate the advantages of collective strategies, with the success of one depending on that of the other. Nevertheless, companies must continue to maintain their competitive strategies in order to make the most of the value thus created and protect their own interests. In this context, coopetition is thus a way to identify new market opportunities and to implement effective development strategies. To do so, coopetition is based on three concepts:

- the concept of “complementors”: companies must look for complementary companies, even if they are competitors, as a way of promoting their own resources;
- the concept of arbitration between competition strategies and collective strategies: companies must identify opportunities in terms of partnerships with certain competitors, without losing sight of the defence of their own interests;

- the concept of the multiple roles played by companies: coopetition is based on the fact that companies can play highly diversified roles over time.

It can also be noticed that the concept of the **formalisation of the relationship** is not approached in sufficient detail by Astley and Fombrun (1983), whereas Bresser (1988) considers that it is an important element for understanding collective strategies. Effectively, and as an example, an indirect association between competitors ("agglomerated strategy") can be either formal (a professional syndicate) by means of the creation of a "meta-organisation" or informal (a cartel) without the creation of the "meta-organisation". Naturally, the management and performance of each of these strategies can be considered to be different.

1.2. Proposal for an analysis framework for collective strategies

The theories mentioned above have made it possible to highlight a certain number of insufficiencies in Astley and Fombrun's typology (1983):

- The **formalisation dimension** is not integrated sufficiently into the conceptual diagram, or **can be confused** with the perspective of the "type of association", which in turn creates an **ambiguous dimension** that is thus insufficiently relevant.

- there is an **obvious separation** between companies that are complementary in a permanent manner (subsidiary) and companies that find a temporary advantage in working together (inter-sectorial partnerships). The "form of interdependence" proposed is thus imperfect. In both cases, it uses the "symbiotic" concept. It is nevertheless possible to refine this typology in order to better envisage the strategies based on collaboration in their entirety.

Understanding of collective strategies can thus be envisaged in a more precise manner by identifying three axes:

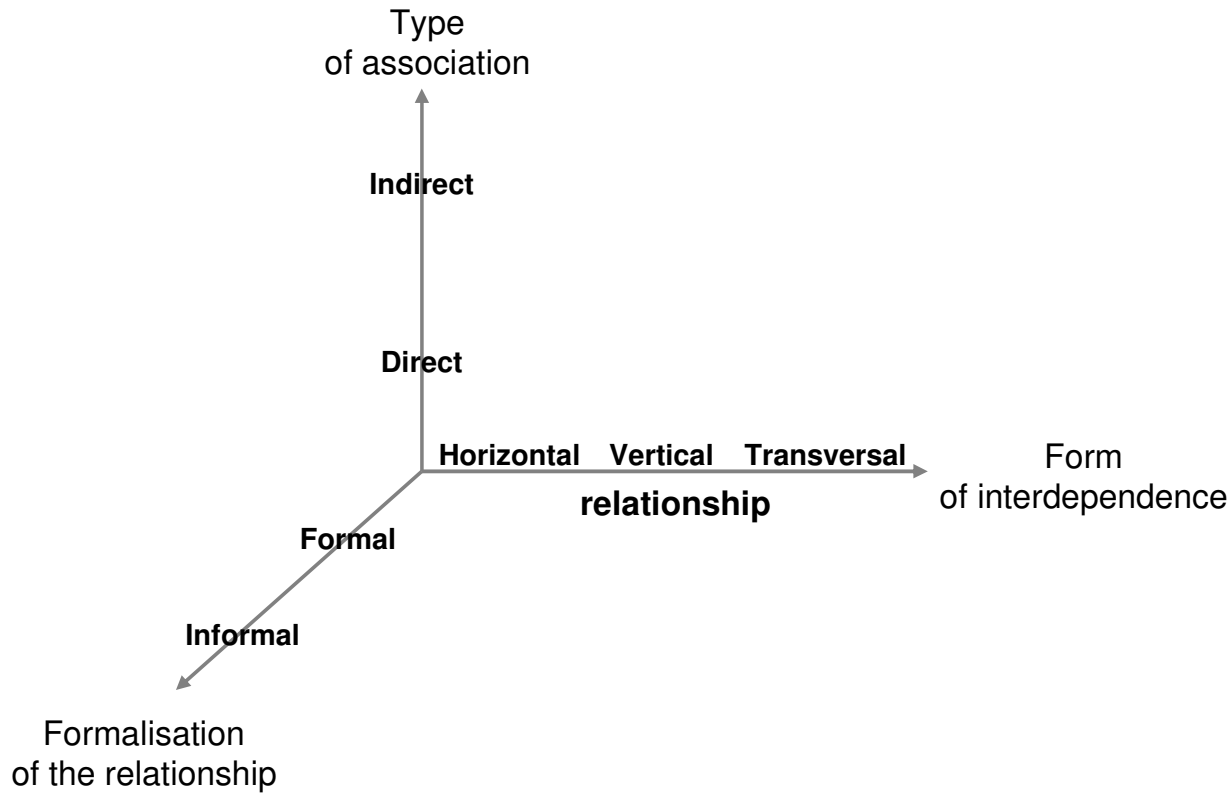
- **The form of interdependence**: when it comes to what they offer, companies are substitutable (horizontal relationship), have essential complementarity (vertical relationship) or annexed additivity (transversal relationship).

- **The type of association**: either the association is direct, as it makes it possible to obtain resources immediately, or it is indirect, allowing only management of resources.

- **Formalisation of the relationship**: either the relationship is formal and there is thus a clearly identificable "meta-organisation", or it is informal, with no detectable "meta-organisation".

The **world of collective strategies**, that is, all the relevant possibilities at the company's disposal for developing collaborative strategies, can be identified with Figure 1. Naturally, the degree of detail given in this presentation is not totally complete. It would be possible to add the synchrone or asynchrone nature of the collaboration, the permanent or temporary nature of the association or even the degree to which competencies and resources are shared, for example. It nevertheless appears that this representation, which uses three axes, is in harmony with Astley and Fombrun's proposals (1983).

Figure 1: The world of collective strategies



This representation can be completed by specific illustrations that make it possible to better understand its content (Table 3).

The initial concept of "collective strategy" was taken up again by Bresser and Harl (1986). They observed that it could lead to considerable dysfunction, such as reduced strategic flexibility, organisational adaptation, tubulence with increased impact, uncertainty and the

arrival of new competitors, regardless of the degree of formalisation. Dollinger (1990) observed for his part that this concept is essentially used in concentrated industries, even though it has also shown its advantages in fragmented or dispersed industries.

Using this concept in strategic management research can also lead to confusion. For example, Barnett, Mischke and Ocasio (2000) studied "the evolution of collective strategies among organisations" (the title of their article). The aim was to study the general or specialised nature of research and development consortia. To do so, they used the population ecology theory which is, in principle, the opposite[2] of the theory of collective strategies in terms of room for strategic freedom (Astley, 1984). In addition, Astley and Fombrun (1983) were not cited anywhere in this work, which perfectly illustrates the fact that the concept of collective strategy has been integrated into strategic management research in an idiosyncratic manner (Buchko, 1994).

Table 3: Illustration of the world of collective strategies

Form of interdependence	Type of association	Formalisation of the relationship	Examples
Horizontal relationship	Direct	Formal	R&D consortium, complementary alliances
Horizontal relationship	Indirect	Formal	Professional syndicate, professional order
Horizontal relationship	Direct	Informal	*Entente*
Horizontal relationship	Indirect	Informal	Cartel
Vertical relationship	Direct	Formal	Subcontracting, vertical network, vertical partnerships
Vertical relationship	Indirect	Formal	Standardisation organisation
Vertical relationship	Direct	Informal	Discriminatory preference, *entente* to obtain a market
Vertical relationship	Indirect	Informal	Lobby for a sector
Transversal relationship	Direct	Formal	Intersectorial agreements, development of shareable technology
Transversal relationship	Indirect	Formal	Japanese *keiretsu*, Korean *chaebol*
Transversal relationship	Direct	Informal	Interest group to obtain shareable technology
Transversal relationship	Indirect	Informal	Inter-industry common interests group

Whatever the case, and even if it is reworked, **the initial logic of Astley and Fombrun's collective strategies seems insufficient for understanding current mutations in strategy** in companies. We are thus able to raise a certain number of questions: What opinion should we have of companies that develop simultaneously a variety of collective strategies? What

[2] Oliver (1988) also used population ecology and collective strategy simultaneously. His theory was that within any given collective strategy (agglomerated strategy) it would be possible to find the logic of population ecology. Here, the concept of collective strategy is used as a relatively general methodological framework.

advantage is there for a company to encourage the efficacy of another company? What common logic binds the various collective strategies? What dynamics make it possible to obtain coherent regulation of a group of companies which can be rivals? Why is developping a standard so important in certain sectors? The collective strategies theory does not make it possible to answer these questions.

Although modified, the typology thus still leaves two key points hanging in mid-air:

- **The separation between collective strategies examined individually poses a problem**. Oliver (1988) partitioned each of the four parts of Astley and Fombrun's initial typology in order to identify populations of companies and conduct tests on the different theories, making it possible to explain organisational isomorphism. Bresser and Harl (1986) nevertheless observed that the fact of deploying different collective strategies (intra-industry, inter-industry, international) makes it possible to limit the dysfunction that results from such strategies. Companies must therefore envisage their "portfolio of collective strategies" in a global manner;

- **The group dynamics of all collective strategies has been insufficiently envisaged**. In other words, it would be important to understand the complementarity both within and without the "portfolio of collective strategies". Bresser and Harl (1986) also underlined the dialectic nature in the relationship between collective strategies and competitive strategies.

This theory isolates the various collective strategies from one another and does not take sufficiently into account the global dynamics that govern all relationships in a company in terms of resources and competencies. The scientific approach used is too reductive. The concept of **business ecosystems can make it possible to provide elements of an answer**.

2. Business ecosystems as the dynamics for collective strategies

In adopting Moore's line of thought (1993, 1996), Torrès-Blay (2000) defines a business ecosystem as "a heterogeneous coalition of organisations from different industries forming a strategic community of interests or values, structured as a network, around a leader that manages to impose or share its business vision or its technological standard". In other words, a shareable central competence (a standard, know-how, norm and so on) will lead to the development of collective strategies, in turn leading to a **strategic community of destiny**:

companies will find themselves united (on the basis of formal or informal cooperation) in order to promote a specific standard, for example. Lengnick-Hall and Wolff (1999), Stanley (1999) or Gueguen and Torrès (2004) consider this concept to be important in strategic management.

Three ecosystems have been studied in accordance with a qualitative methodology[3]: the business ecosystem for Microsoft and Linux in the operating systems market, and that of SAP in the ERP market (Enterprise Resource Planning, or integrated management software package). These three cases will be used as an illustration in the understanding of business ecosystems. This paper will thus be essentially conceptual in nature.

2.1. The global nature of relationships within a business ecosystem

Moore (1993) highlighted the importance of business ecosystems. These ecosystems do not have fixed boundaries and are in perpetual motion in relation to the co-evolution of the members of which it is formed. Business ecosystems are, by nature, dynamic, but are also regulated by one or more leader companies that succeed in identifying the path that is both the most collaborative possible and the most compatible with the interests of a large number of other companies. All this is based on the idea of shareable resources. Alliances, groups of interest, commercial and R&D agreements, lobbies, partnerships, co-contracts and pressure groups all play a part in the emergence of relational entities that correspond to neither the concept of industry nor that of sector. Horizontal, vertical and transversal relationships are thus envisaged in a dynamic manner. Business ecosystems can thus be imagined initially as a grouping together of a set of collective strategies **without partitioning**.

Table 4: The business ecosystem englobes Astley and Fombrun's typology (1983)

		Forms of interdependance	
		Commensalism	Symbiotic
Types of association	Direct	**Confederated**	**Conjugated**
	Indirect	**Agglomerated**	**Organic**

SAP succeeded quickly in developing cooperation logic at several levels.

[3] Secondary data collection for Microsoft and Linux, and a series of interviews and secondary data collection for SAP.

For agglomerated strategies: because of the importance of its software packages (R/2 and R/3), from the end of the 1980s SAP's solutions were offered to most of the largest consultancy firms, such as the Big Five and large software engineering companies like Cap Gemini. These companies, however, are SAP's rivals both in terms of the services offered to companies and because they offer competitive software packages to SAP (Oracle, People Soft, JD Edwards, Baan).
For confederated strategies: SAP made an alliance with IBM (its rival in the field of computer engineering) by jointly developing a new, integrated e-business solution.
For conjugated strategies: the launch of an e-procurement solution in 1998 was made possible thanks to SAP's partnership with Avisium and Hewlett Packard (vertical relationship).
For organic strategies: since its creation, SAP has asked its clients to write testimonials for general public magasines and has organised discussion groups on installing an ERP.
Although a certain chronology can be identified in the relationships developed, SAP has nevertheless developed its business ecosystem in a global manner by developing a range of collective strategies.

The logic for collective strategies as presented by Astley and Fombrun, however, conforms to methodological reductionism which does not give a global analysis sufficient substance: the reductionism denatures the object (Morin, 1977). The relationship system in which companies function cannot be broken down into distinct entities if there is to be any chance of understanding all its logic. Companies must be analysed with regard to all their horizontal, vertical and transversal relationships, be they direct or indirect, formal or informal. It is from this viewpoint that the concept of business ecosystem can be envisaged: a global and dynamic concept of corporate relationships. This principle is common to the systemic perspectives in the "Gestal" put forward by Von Bertalanfly: **not everything can be reduced to the sum of its parts**. Synergic effects will make it possible to increase the "area" of the business ecosystem and thus increase its importance.

Furthermore, the relationships envisaged by Astley and Fombrun, even when modified, **do not sufficiently illustrate the interdependence that forms the seed from which companies develop**. More emergent dimensions must be taken into consideration. It is thus important to observe that business ecosystems sometimes depend on a standard, the promotion of which can be based on a norm, culture or **ideology**. This promotion leads to a "diffuse" relationship between the different members of the business ecosystem. This corresponds to global relationships (not solely transversal, horizontal or vertical, but a mixture of all these forms of logic simultaneously). The ideology in the organisational sense was defined by Mintzberg

(1989: 320) as "a rich system developed, and profoundly rooted, in the values and beliefs that distinguish one particular organisation from all the others". In borrowing this definition from the field of organisation, our desire is to create a parallel between an organisation and an organised system, such as a business ecosystem.

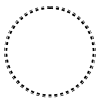
This conception is close to that of culture. It allows us to catch a glimpse of what, at the strategic level, organisations will find within a business ecosystem, not on the simple basis of direct, formal, economic or technological relationships but also on principles that are both harder to pin down and tacit, making it possible to share a common belief regarding what should be done within the business ecosystem. The strategic community of destiny that the business ecosystem represents is thus distinct from any other community. Moore (1996: 26) effectively suggests concepts such as shared vision, leadership[4], values or mutual support in his definition of business ecosystems. This introduces an implicit conception regarding the relationships that are present and important within business ecosystems.

The CCIA (Computer and Communication Industry Association) grouped together companies such as Sun, Oracle, Red Hat, Aol, Yahoo or Nokia. The aim was to promote open systems. Similarly, the Free Software Foundation played a role in developping the "open source" movement[5]. Theorists for this movement such as Richard Stallman or Eric Raymond also favoured the diffusion of a "free" conception of computing. The success of various free software packages such as Apache, Perl or Sendmail favoured the development of Netscape in this form and provided permanent bases for the evolution in the Linux operating system, just as decisions made by different governments favoured the use of open software. It is thus a way of perceiving the software world that has been modified. The business ecosystem does not correspond only to activities, but also to shareable norms and ideologies.

It is possible to identify the operating logic of a business ecosystem with regard to its globality and not as a reducible sum of its different components. Effectively, an ecosystem is composed of different types of relationship, but also of all the synergy that they generate. The following simple relationships make it possible to describe the individual interdependence of companies.

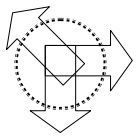
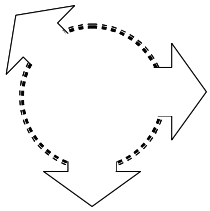
[4] Leadership can be of coercitive or non coercitive origin. In the case of non coercion, that supposes that the members of the community that accept this leadership share a set of beliefs that thus justify the leader's function.
[5] According to Von Hippel (2001), this means that a user can obtain a free copy of software and, in all legality, study its source code, modify it and then redistribute it to others, also free of charge.

Table 5: Simple relationships

Vertical relationship Subsidiary	**Horizontal relationship** Sector	**Transversal relationship** Links with indirect partners	**"Diffuse" relationship** Standard, ideology, culture
			
Originally, Microsoft was IBM's supplier for operating systems for PCs. The co-development of its software and Intel's microchips was also significant.	*Microsoft has always had "problems" with its direct competitors, which has led to these competitors' progressive disappearance thanks to predatory strategies. Nevertheless, in 1997, Microsoft bought into Apple's capital.*	*Microsoft developed its own business ecosystem by developping many relationships with companies from completely different sectors: NBC (1995), Sony (1995), Read Elsevier (1997), Arthur Andersen (2000) or even e-bay (2001).*	*The BSA is an international association that groups together the main software and Internet companies. Its mission is to campaign in favour of the intellectual proprietary laws applicable to software. It would appear that Microsoft managed to get into its good books[6].*

Given what we have said above, it is possible to imagine an association of these simple relationships within the new, more complex forms of traditional relationships. The second of these forms corresponds to the concept of business ecosystem, which combines a variety of different relationships and which, depending on the synergy obtained, will result in increased importance.

Table 6: Complex relationships

The association of simple relationships Insufficient reductionism	**The business ecosystem** A dynamic combination
	
Microsoft's influence in the computer industry (and beyond) is not based on the simple fact that it has managed to make useful relationships with a variety of key players in the industry. Taken separately, these relationships represent only one advantage for the companies that make them.	*Because Microsoft's relationships have succeeded in combining between themselves by developping synergy, the importance of the different key players has done nothing but increase and, beyond the importance of the business ecosystem, Microsoft has found itself amplified. For example, Intel took advantage of Microsoft's "efforts" with the American State Department of Education as it provided the company with new markets. Similarly, Microsoft took*

[6] According to Di Cosmo and Nora (1998: 91), "the BSA is so bound to Microsoft that some of its competitors left the group to join the Software Publisher Association". In addition, the BSA acts as the spokesman for the software sector with the public authorities.

	advantage of technological cooperation agreements signed between Intel and certain universities as it allowed it to develop new software capable of operating on more powerful machines.

Nevertheless, this conceptualisation can still put up its own limitations. For example, it can be esteemed that a broad conception of business ecosystems would suggest that all the formal and informal relationships that a company works on are to be taken into consideration. This perspective would introduce major similarities with the concept of "organisational environment" (Crozier and Frieberg, 1977). In other words, the idea underlying the concept of business ecosystem is not to retain all the relationships that a company can establish, but to select only those that **encourage the development of a common resource** (for example, a technological standard) **in the field of competencies**.

Once we have put forward the systemic nature, which makes it possible to answer the problem of partitioning relationships, it is useful to understand the operating logic of a business ecosystem as a means of understanding the way it is regulated. By thus providing elements of response for the second limitation evoked (that is, that the group dynamics of all the collective strategies is insufficiently imagined in Astley and Fombrun's work (1983)), it will be possible to move towards an identification of the important logic of business ecosystems and towards a more precise definition of this concept.

2.2. How a business ecosystem works: the search for ecosystemic competencies

In order to imagine the complementarity of the different types of logic present in business ecosystems, it can seem relevant to first identify their main characteristics. Gueguen and Torrès (2004) thus identified the following characteristics as being predominant in business ecosytems. These characteristics can be understood as propositions for research. Illustrations taken from case studies are given throughout.

- A standard, norm or know-how is used by several companies. This will allow them to develop one or more **central competencies**.

SAP solutions require specific competencies to be able to provide user companies with services. Different companies will thus get an advantage from developping know-how in the installation and use of these solutions.

- Companies using these competencies form a **strategic community of destiny** based on the principles of co-evolution.

Intel's microchips are increasingly powerful so as to allow Microsoft's increasingly elaborate software to function. The consumer will thus be forced to change computer and thus buy new Intel microchips… In other words, the more software Microsoft sells, the more Intel microchips are sold, and inversely. It can thus be thought that Microsoft and Intel co-evolve on the basis of a strategic community of destiny.

- One or more companies will play the **role of leader**.

Microsoft and Intel form what has been known as the "Wintel" couple (contraction of Windows and Intel) as a testimonial to their domination of the computer market. Today, Microsoft seems to be the main leader in its business ecosystem.

- The leader company will have to develop a **shared vision** for the other members of the business ecosystem.

Initially, Linus Torvalds (the "father" of Linux) could be seen as the leader of an incipient ecosystem. Because he chose a mode of development for his operating system based on the GPL licence from FSF (Free Software Fundation), that is, based on the principles of free software, he was able to take with him along the path the efforts of several independent computing engineers spread all over the world and without any direct financial incentive.

- Founded on the basis of critical, built-in contributions, the **leader's power** will make it possible to orient evolution in the central competencies. It can be imagined that it is the importance of these contributions that will make it possible to build up the importance of the leader and, in extension, his power.

Intel did not succeed in making its offer sufficiently specific (competition from AMD in particular, unlike Microsoft which developed by suffocating its direct competition).

- The position of leader is **evolutive and its behaviour is primordial** in the evolution of the business ecosystem.

Microsoft's aggressive behaviour led to a growing interest on the part of other companies to promote an alternative (in this case, Linux).

- The key players that make up business ecosystems are **heterogeneous** (companies, institutions, unions, pressure groups, and so on).

The Linux business ecosystem is based on a very open organisation, encouraging occasional cooperation. Individuals (as independent developers, but nevertheless predominant), SMEs from the field of edition, computing multinationals, professional unions, communities of practices, governments, associations, pressure groups and so on, all found themselves part of the Linux business ecosystem.

- The key players in the business ecosystem come from **different industries** and tend to have a specific activity. There is thus a convergence of industries.

Within its business ecosystem, Linux focused on software distributors, editors, developers of peripheral drivers, associated services, leaders from the film industry, franchisers, computer constructors, consultancies… It was thus not their profession that was important, rather their contribution to the development of Linux.

- There is not necessarily exclusive membership of a single business ecosystem.

IBM belongs to Microsoft's business ecosystem, but increasingly tends to promote that of Linux. Microsoft is the leader of its own business ecosystem but also supports Apple's.

- Business ecosystems are driven by significant **competitive dynamics** at the **intra-ecosystem** level (in order to obtain the leader's position).

Microsoft's business ecosystem was originally that of the PC. IBM was the leader until Microsoft took over after an aggressive relationship.

- The competitive logic that exists at the **inter-ecosystem** level (competition between several business ecosystems).

The rivalry between the Microsoft and Linux business ecosystems is obvious as it is a conception of the world of computers (owned software versus free software) that is at stake.

- A business ecosystem associates cooperation and competition, and thus corresponds to the **logic of coopetition**.

SAP developed partnership relationships with several of its competitors, be they software editors such as Oracle, or consultancy firms such as the Big Five, or even companies which, like SAP itself, specialise in computer engineering, such as IBM.

Armed with these different characteristics, it is possible to consider that regulation is achieved by the intermediary of the leader, who will encourage the sharing of central competencies. At the individual level, it will be a question of resources, and at the collective level competencies, as they are the result of the association of the various resources of the

different members. The leader's position is associated with the specificity and transmissible dimension of the resources it has. Thus, by forming a strategic community of destiny, companies share a vision and a common ideology, but will also be in a competitive logic (coopetition, for example, Pellegrin-Boucher and Gueguen, 2004).

In other words, **the business ecosystem could be seen as a set of relationships** (vertical, horizontal and transversal; direct or indirect; formalised or not) **between heterogeneous key players guided by the promotion of a common resource (standare, know-how and so on) and an ideology that leads to the development of shared competencies (ecosystemic competencies).**

By using the theory of resources (Wernerfelt, 1984), we can consider that a compnay is more effective than another if it shows a superior capacity for developping, using and protecting a set of competencies and resources that will allow it to preserve a lasting advantage. Strategic formulation will not use as its starting point the market, but rather the company (Teece *et al*., 1997). This theory of resources seems transposable into a collective context by means of the operating mechanisms of business ecosystems: **a business ecosystem will be more effective than another if it shows a superior capacity for developping, using and protecting a set of competencies and common, shareable resources within ecosystemic competencies that will allow it to preserve a lasting advantage**.

The concept of **ecosystemic competencies** thus makes it possible to introduce **new dynamics** into Astley and Fombrun's collective strategies diagram (1983). The association of different companies and key players does not only occur in frontal and individually indentifiable relationships on a case by case basis. If companies develop a whole range of collective strategies, within business ecosystems, it is because they are going to try and take advantage of the promotion of the standard and to try to increase its usage value.

Similar concepts have certainly already been imagined, but from a more restrictive objective. Persais (2004) thus spoke of relational competencies defined as "a company's ability to establish and maintain a positive and lasting link with a key player from the environment". The company must therefore consider as a strategic competence its ability to establish relationships with other companies, but also with others who are actively involved. This concept comes naturally from the principle of "network resources" (Gulati, 1999) or

"relational networks" (Hall, 1992). But the focal point remains the company, whereas the sense proposed for ecosystemic competencies focuses on the competencies common to a group of companies, the driving force behind a business ecosystem.

Conclusion:

In conclusion, we would like to place our theories in the context of the terminology of the resources approach (Arrègle *et al*., 2000) which uses the concepts of input, resources, competencies and dynamic capacitie to understand a firm's strategic situation. The concept of "ecosystemic competencies" has been added to introduce the specificity of our approach in terms of business ecosystem. **Ecosystemic competencies are here seen as the collective combination of different shareable resources and competencies from different key players**.

Table 7: Identification of collective competencies within software business ecosystems

	Input	Resources	Competencies	Dynamic capacities	Ecosystemic competencies
Definitions[7]	Generic production factors	Assets specific to the company	Combination of resources	Capacity to renew and improve competencies	**Collective combinations of shareable resources and competencies**
Examples from software business ecosystems	Programmers	Development of a software package	Capacity to transform the software into a "standard"	Potentiality for R&D and all inter-firm agreements	**Promotion of the standard and increase in its usage value by means of the input of multiple key players**

Although the Resource Based View (RBV) theory can thus be extended to business ecosystems, the latter in turn introduce interesting elements into the analysis context for RBV. Effectively, the business ecosystem is defined by a multitude of key players of different natures. This diversity is based on the both formal and informal nature of the competitive game. Alliances and partnerships are just as important as professional associations, pressure groups and lobbying practices. Key competencies thus go beyond the simple realm of the company, and even cross industrial boundaries. It is in this sense that the business ecosystem

[7] Definitions of input, resources, competencies and dynamic capacities inspired by Arrègle *et al*. (2000).

theory brings new elements to the RBV theory. It sees resources and competencies as a dynamic and collective construct. The more the resources become collective, the more they are imposed as reference standards that give the initiator a competitive edge. The concepts of co-evolution and leadership are the heart of this dimension. Co-evolution effectively illustrates the importance of the dynamics of interactions that develop between companies allied to a same business ecosystem and the concept of leadership introduced the ability to build an ecosystem by constructing the most collaborative path that would allow the greatest number to join the project. The dynamics of the ecosystem and the conception of resources and competencies that come from it are based on a highly collective and partenarial strategic behaviour. This is why RBV requires the addition of a collective competence that we refer to as ecosystemic.

This work nevertheless raises a certain number of reservations. Firstly, the choice of our example is limited to the software industry. Be it in the field of operating systems or ERP, these sectors of activity are highly concentrated. This is a criticism raised by Dollinger (1990) regarding the study of collective strategies even if he showed that the collective strategies of fragmented industries may be less visible but they are still just as emergent. It would thus be interesting to develop our analysis framework in the context of a fragmented industry that is perhaps less adapted to an analysis in terms of business ecosystem.

In addition, the software industry is part of the computer industry, which is often used in analysis in terms of business ecosystem. Without any doubt, the specificities of this industry encourage the development of business ecosystems (particularly in terms of the importance of a standard and the effects of a network). For example, Moore (1993; 1996) does not hesitate to integrate regulation and introduce in this way the role of law (in competition, innovation, patents and so on) into competition dynamics. This legal dimension seems to be even more important when the field considered is one with immaterial activities where the concepts of standard and norm are key issues. This is precisely one of the burning issues in today's software sector where two legal cultures, and by extension two business modes, are opposed: "copyright" versus "copyleft", "cathedral" versus "bazar". The validity of the business ecosystem approach requires transposition of this concept into more traditional fields of activity.

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