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**Institutions and Coordination:
What Is the Contribution of A Proximity-Based Analysis?
The Case of Airbus and Its Relations with the Subcontracting Network**

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ABSTRACT

In this paper, we propose to expound the various dimensions of proximity with a view to emphasizing the institutional and organizational dimensions of inter-firm relations. To that end, we set out to define, in a first part, the various forms of geographic, institutional and organizational proximity, and to put them into perspective. The dual role of geographic proximity as a source of conflicts and resource for collective action is underlined. We then intend to show that the institution generates a so-called form of institutional proximity which, for the actors, refers to common meanings they have to share, as well as to the setting of complementary roles they have to play in collective action. As for organizational proximity, it is understood as a particular form of institutional proximity combining cognitive coordination with political coordination. In a second part, we propose to apply the theoretical framework so conceived to analyse the vertical relations between Airbus and its subcontracting network.

KEYWORDS: proximities, institution, organization, coordination, subcontracting, aeronautics, Airbus.

Introduction

Mobilized to explain the success of local production systems (Becattini, 1992) or for the analysis of innovative milieus (Crevoisier, 2001; Boschma, 2005a), the notion of proximity is used more and more to deal with the questions related to the forms of intra- or inter-firm coordination. It is thus at the centre of the analyses on Industrial Supplier Parks (Adam-Ledunois and Renault, 2006) or on the location of distribution networks (Baum and Haveman, 1997; Liarte, 2004). The geographic dimension of proximity often constitutes an entry key to these approaches. Proximity is rarely envisaged in connection with interactions which are localized *and* impregnated with the institutional and organizational frameworks of action.

In this paper, we propose to expound the various dimensions of proximity in order to integrate the institutional and organizational dimensions of inter-firm relations. We shall then mobilize the framework so formed with a view to analysing subcontracting relations in the aeronautics sector. For two reasons, we think it pertinent to start our analysis with the notion of proximity. On the one hand, this notion has given rise to a pluridisciplinary current which means to tackle the role of space in coordination by giving it a major strategic dimension. This dimension permits to comprehend space more as an active construction of relations than as a neutral and uniform receptacle of the actors' strategies. Space thus becomes one of the factors of the modes of organization and of the dynamics of economic phenomena. On the other hand, the notion of proximity becomes an interesting analytical perspective when looked at from the point of view of its three components – institutional, organizational, and geographic¹. For us, the interest lies in the endogenization of institutions, which is essential to think out coordination relations when these take place within action universes, whether localized or not.

In the first place, we intend to define the various forms of proximity. Our analysis will more particularly reveal that geographic proximity does not always bring about positive externalities, and that organizational proximity may be interpreted as a particular form of institutional proximity (Part 1). In the second place, we intend to validate this argumentation through the analysis of an organizational proximity which is sometimes associated with a

1 If the definition of geographic proximity is the subject of a wide consensus within the “Proximity Dynamics” group (Gilly and Torre, 2000), such is not the case for the concept’s relational aspect. A first so-called interactionist current confines itself to two forms of proximity (geographic and organized), while a second institutionalist-inspired current analyses proximity on the basis of three components (geographic, institutional, organizational). In this article, we place ourselves within an institutionalist perspective. For a presentation of our arguments concerning that choice, see Talbot (2007).

geographic proximity, that which exists between Airbus and its subcontractors (Part 2).

1- THE FORMS OF PROXIMITY AND THE COORDINATION ISSUE

In this first part, we set out to define successively the three forms of proximity – geographic, institutional and organizational. If we take up the consensual definition of geographic proximity (Gilly and Torre, 2000), we intend to define the two forms of non-spatial proximity in an original way. In an institutionalist perspective, we shall endeavour to show the relevance of this notion to deal with the coordination issue.

1-1 GEOGRAPHIC PROXIMITY: A RELATIONAL AVAILABILITY

Geographic proximity is the most immediate form of proximity. It broaches the question of business location objective conditions (Pecqueur and Zimmerman, 2004). It refers to space and translates the geographic distance between two entities. However, it is not simply a matter of physical proximity, a notion which rests on a natural conception of space. On the contrary, geographic proximity is based on a constructivist vision of space. It is a representation individuals have of the distance separating objects and/or individuals in space. As a judgment passed on a distance, it is relative for two prime reasons (Torre and Rallet, 2005):

- Firstly, because distance is viewed in terms of time and transport costs. This takes us back to the classic idea according to which physical space is structured by transport and communication infrastructures. That space constitutes a material framework favouring the movement of information, physical goods and individuals;
- Secondly, because the distance between individuals, organizations or cities is also a representation, a judgment that leads individuals to place themselves in a binary way, *i.e.* “close to” or “far from”. Co-located actors share a certain common sense on account of their identical location. Likewise, individuals who act in a same place have *de facto* a same reference. That reference relates to the physical limits of space, its history, its heritage, the customs and ways of life taking place in it, the past successful or unsuccessful coordination stories, *etc.* Geographic space then becomes a particular place and link. It constitutes a cognitive referent.

The feeling of “closeness” should not be interpreted as the assurance of a relation being established. Common references may easily be communicated, but here, the relation with others is only a possibility of relation between two individuals who are still independent for

the moment. The same remark may also apply to material space structuring: a road does not necessarily imply an interaction. This simply means that the existence of a strong geographic proximity between several actors is not neutral: it provides a relational availability. It is a resource which is still latent.

Furthermore, this possibility of relation, if formed, prejudices neither its content, nor the positive or negative effects it may have. Let us note that the geographic proximity which unites certain actors is undergone and may turn into a constraint for collective action. The members of an association, of a professional union, or even elected representatives are not supposed to “relocate” with a view to escaping from an undesirable neighbourhood. Geographic proximity enhances the individuals’ knowledge of others insofar as they all share a minimal identity. That knowledge may prompt the actors as much to show confidence as to be on their guard. Thus, there may be latent conflicts resulting from past relations. Such is more particularly the case when the goal of collective action consists in permitting the reasoned consumption of a resource jointly consumed by the users of a same place. In this connection, the literature on space use conflicts (*cf.* especially Caron and Torre, 2005; Jeanneaux and Kirat, 2005; Cornes and Sandler, 1996) gives numerous examples of inequalities linked to the actors’ topographic situation. This demonstrates that geographic proximity, when undergone, may create inequalities provoking conflicts and power struggles among the various actors concerned.

However, at this stage, there is still no real localized connection established. As shown by the works on virtual communities (Coris and Lung, 2005; Loilier and Tellier, 2001), geographic proximity is not a *sine qua non* of proximity effects (Lublinski, 2003; Adam-Ledunois, Guedon, and Renault, 2006). Geographic proximity only produces effects when it is accompanied by a non-spatial proximity, which we define by giving it two dimensions – institutional and organizational.

1-2 INSTITUTIONAL PROXIMITY: SHARING AND CONFORMING TO INSTITUTIONS

The notion of institutional proximity which we intend to develop here follows in the wake of the approach to institutions as proposed by the American institutionalists, like J. R. Commons, and intentionalists, like V. Descombes². The notion of institution is based on two central ideas:

2 A feature that these two currents have in common is that they both refer to the pragmatic philosophy developed by Pierce and Dewey.

- Not separating the cognitive and conative dimensions of behaviours. In C. S. Pierce's pragmatism, ideas are no longer timeless preconceptions, but significations that are produced and re-produced in a process of constant interaction between the thinking and experience of facts. The idea here is to connect the mental and external worlds, and to recognize, in line with Descombes (1996), that it is not possible to overlook the context when specifying thought;
- Considering that there is a purpose behind any social artefact. Institutions are not only pre-established by individuals for themselves, but they are also socially pre-established. In other words, they exist before us and impose themselves upon us. In that sense, they constitute normative expectations which are defined prior to any action. They are to be regarded as "ready-to-think" and "ready-to-act" institutions of which the individuals are not *a priori* the authors.

In this double perspective, the institution is at once the rule *and* behaviour, the representation *and* practices, habits in terms of thought *and* action, without them being reducible to each other. In a way, it is a question of "making" collective ideas with a view to reaching a goal. The institution then becomes a common idea in actuality, in the service of a purpose.

So, for a group of actors to be able to mobilize a same institution, it is essential that all participants have the same representation of what they are doing, and that they share established public and social meanings. According to Descombes (1996), there are two communities of ideas besides personal idiosyncratic significations. On the one hand, inter-subjective significations correspond to the consensus between independent individuals. This is the case, for example, of similarities between varying judgements of tastes. In principle, inter-subjective significations that are the subject of a consensus can easily be shared. This conception of the community of ideas does not therefore exhaust completely social life as a topic. V. Descombes provides further thoughts in this connection: how is it possible to explain the existence of collective actions (like negotiations or elections) that bring together actors with divergent and dissimilar opinions? In the case of an election, for instance, individuals vote for multiple candidates without their having the same political opinions as all other voters. This means that individuals with different inter-subjective significations participate in the same collective action. To resolve these questions, it is necessary to introduce, on the other hand, another community of thought, based on shared significations. If divergent opinions are to be expressed, it is indispensable that participants have the same representation of what they are about to do (voting in the case in point). Since the election

does occur, it should then be assumed that this practice is endowed with an impersonal and general shared meaning that has been defined prior to the voters' acquiring it and regardless of everyone's opinions. Voters can express their political disagreement in an election insofar as they share whatever public and social significations that have been instituted. These partly constitute a form of proximity that is called institutional. Shared significations condition the realization of collective action.

These shared meanings present a structural aspect. They do not bring unconnected actors together, but they structure their interactions. For instance, ownership presupposes a system of social relations which grants particular statuses to property right holders and organizes the relations with the other parties involved (other owners, tenants, employees...). Consequently, institutional proximity cannot refer to the only existence of meanings shared by the actors. The institution generates another element of institutional proximity insofar as it determines complementary roles to be played by actors with asymmetric social positions.

The individuals taking part in the interaction play a role whose intrinsic complementary nature generates inequalities. An asymmetry in terms of cognitive and/or material resources can make the exchange more or less favourable to one or the other party. In other words, institutional proximity is not equitable and fair *a priori*. On the contrary, it is a matter of power struggle *a priori*. This explains why this relation is confrontational by nature. This means that the conflicts inherent in social hierarchies always have to be regulated, and even pacified. It is a requirement for collective action. Institutional proximity as the *fulfilment of requirements* for collective action must not be reduced to its only cognitive dimension. It must also be associated with a regulating political dimension which assigns roles to heterogeneous actors and "handles" conflicts.

In the end, individuals who mobilize an institution get potentially or actually in unequal contact with others, who are henceforth close to them. This institutional proximity designates the fact, for a group of individuals, of sharing and conforming to common ideas and determined roles. By adopting complementary roles, these individuals "make" common ideas. So, institutional proximity refers both to shared ideas *and* practices.

On the basis of this institutional proximity, complex relations become possible between multiple actors. Such is the case of customs, collective habits, prejudices, legal or moral rules, but also parliaments, companies, associations, *etc.*, which constitute concrete manifestations of the institutions. All of these phenomena are of a fundamentally similar nature, coming within the scope of a social action whose distinctive feature is that any individual will no

longer behave socially if others do not act in a complementary manner. This does not mean that these phenomena are perfectly identical yet, as underlined by the American institutionalists who consider that these differ in their degree of organization. For Hodgson (2006), “*organizations are a special kind of institution, with additional features*” (p. 8). Within this conceptual framework, the term “organization” refers to the institutions which present an organized character, that is to say the institutions which have a more or less strong structure of action spaces directed towards the fulfilment of a common purpose, like a productive project for instance.

1-3 ORGANIZATIONAL PROXIMITY: A PARTICULAR FORM OF INSTITUTIONAL PROXIMITY

Organizational proximity “*links agents participating in a finalized activity under the aegis of a particular structure. (...) [It] is deployed within organizations (firms, entities, etc.) and if need be, between organizations connected by a relationship of economic or financial dependency or interdependency (companies that all belong to an industrial or financial group, within a network, etc.)*” (Kirat and Lung, 1995, p. 213). Thus, the individual who joins an organization automatically shares an organizational proximity with his/her fellow members³. Following Commons’ distinction (1934) between institution and organization, we understand organizational proximity as a form of institutional proximity which is also about sharing a social space, but which, this time, takes a concrete form observable by all (unlike a custom for instance).

Organizations have authority to permit a complex collective action by coordinating individual actions. They translate common ideas into actions with a view to reaching a goal. Reaching this goal presupposes the resolution of numerous coordination problems. The organization is thus endowed with rules and functioning routines, as well as with specific governance structures (Dosi, Teece, and Winter, 1990; Bazzoli and Dutraive, 2002; Rojot, 2005). The organization becomes a place where rules and routines are produced and activated to ensure a cognitive *and* a political coordination. On the one hand, cognitive coordination answers the problem of action effectiveness; on the other hand, political coordination answers the problem of conformity and legitimacy of identical actions carried out by heterogeneous actors. Here, we mean to go back over these two dimensions of coordination by distinguishing each time

3 According to new economic sociology, inter-organizational relations may result from former direct or indirect interpersonal relations. For example, any player who seeks a partner in another organization in order to solve a productive problem will activate his/her current or past social network. Social networks are thus used to influence economic exchanges and inter-organizational coordination (Grossetti, 2008).

the general role of institutions from that, more specific, of organizations. In the first case, the organization is viewed as a social technology that enables the production of meaning; in the second case, and in a complementary way, it is viewed as a space of choices carried out by the actors.

1-3-1 Organizational Proximity and Cognitive Coordination

On a cognitive plane, organizations distinguish themselves from other institutions⁴ insofar as they produce rules and routines which are meant to ensure cognitive coordination with a view to a collection action. The purpose is to reduce uncertainty and to secure anticipations through rules, the organization giving its members schemas favouring an adequate prognostication of others' behaviour. The notion of routine as developed by the evolutionary approaches to firms illustrates clearly the necessity for this cognitive coordination. Within this theoretical framework, organizations (such as firms) appear like producers of routines that are aimed at action effectiveness (especially resource production action effectiveness). These routines are "*models of interactions which constitute effective solutions to specific problems*" (Dosi *et al.*, 1990, p. 243). They consist of coded sequences which determine a chain of decisions and behaviours describing what the practices must be (Ménard, 1994). These routines are directed towards reducing uncertainty and securing anticipations. Owing to their mechanical and automatic nature, they suspend the uncertainty related to others' action, and appear like a stabilization of the rules interpretation. Routines and rules are so many cognitive resources which all organization members have to learn. Then there is a process of accumulation of such resources with a view to carrying out tasks effectively, which corresponds to the construction of an organizational memory (Moormax and Miner, 1998). Organizational memory feeds the competent actors' cognitive resources, that is to say "*all the actors know, in a tacit or discursive way, about the circumstances of their action and that of others, which they use in the production and reproduction of action*" (Giddens, 1987, p. 440).

1-3-2 Organizational Proximity and Political Coordination

The institutionalist approach we mobilize here distinguishes itself from the evolutionary or conventionalist understandings of organizations. For us, organizations, as particular institutional forms, should not be reduced to the only cognitive coordination function. It is

4 As a general rule, institutions permit cognitive coordination by reducing the uncertainty associated with action, through the establishment of patterns of thought and action. By confining behaviours, institutions make them more compatible and therefore more predictable, even if problems of interpretation may arouse.

also necessary to introduce a notion of political coordination which implies taking inherently partial decisions, while lending coherence to conflicting aspirations. Action certainly expresses choices in connection with phenomena of meaning and assessment, but also of power (Théret, 2001). By emphasizing the artificiality of action and the importance of power struggles and ensuing conflicts, we mean to underline that the fact of belonging to a same action universe and of sharing common values does not exclude power and influence relations. Institutional proximity therefore carries as much an idea of sharing as of authority (Talbot and Kirat, 2005).

An organized relation involves two types of actors: i) those who have the power to elaborate rules and procedures, and to enforce them; ii) those who apply these rules and procedures, whose action is determined, and who, for this reason, do not have control over the contexts within which these rules and procedures are “activated”. The relation is asymmetric between these two types of actors: the former actors' power is a power of organization over the latter actors' action, marked by a prescriptive dimension. This relation may, for instance, take the form of a strict authority relation (between managers and employees for example), or more simply, of an influence relation (between shareholders and managers for example). This takes us back to a classic definition of power viewed as an asymmetric relation which expresses one's ability to exert deliberately an influence over others' behaviour.

So, in comparison with other institutions, Bazzoli and Dutraive (2002) characterize organizations as follows: an organization exists through a legal constitution which refers to its goals and expresses the power and authority relations among its members. It rests on external rules, rules of law which delegate a normative and resource-mobilizing power to its representatives. It also rests on internal rules which organize the exercise of power, define the organization's terms of membership, and permit the realization of collective choices. Moreover, an organization is an institution which endures over time, despite the renewal of its members.

These developments lead us to define organizations as specific institutions endowed, on the one hand, with a memory made up of rules and routines which ensure cognitive coordination, and, on the other hand, of power structures (those of political coordination) which are in charge of the legitimation and harmonization of organizational behaviours. Therefore, for *a priori* heterogeneous actors, organizational proximity consists in i) joining the cognitive community, that is to say having access to the organization's memory composed of cognitive

resources, and ii) joining the political community, that is to say integrating into the power structure. Organizational proximity definitely is a particular form of institutional proximity which, let us remind it, consists in sharing ideas and assuming complementary roles.

We shall now try to find, so far as we can, the above-outlined conceptual framework in our analysis of the vertical relations between Airbus and its subcontracting network.

2- AN ORGANIZATIONAL PROXIMITY: AIRBUS' SUBCONTRACTING NETWORK⁵

The present configuration of Airbus' subcontracting network⁶ may be analysed through a distinction between two phases (Kechidi, 2006; Frigant, Kechidi, and Talbot, 2006), which encompass more or less clearly different combinations of cognitive and political coordination.

The first phase started in 1987 with the launching of the A330-340 Programme, and ended in the middle of the 1990s. Over that period, the European aircraft manufacturer conducted a systemic rationalization based on a decomposition logic, which consisted in splitting up the aircraft into various subunits. This technology decomposition permitted to define a subcontracting network structure based on blocks of knowledge and expertise. Taking into account the specificity of the technological processes implemented in aeronautics, as well as the growing importance of information and knowledge in the design and making of ever more complex products, this organization of subcontracting marked a switch from a technical division of labour to a cognitive division of labour. That phase saw the finalization of subcontracting contracts, accompanied by systems to integrate the subcontractors' behaviour into the contractor's organizational proximity. At that stage, coordination was first meant to be cognitive, even if, as we shall see below, concerns of a more political nature are not to be excluded either.

The second and present phase is characterized by deep relations with a limited number of large companies, or subsidiaries of large companies, with which Airbus shares the industrial

5 Part of the data which follow stem from a field survey conducted in 2005, within the framework of an Interreg IIIb Sudoe European research contract, entitled "EADS and the Territorial Strategies in the European Southwest". The project was aimed at identifying and analysing the impact of the transfers that have affected the EADS Group over the past few years, especially the sites of Madrid and Seville in Spain, as well as Toulouse and Bordeaux in France. On the French sites, the qualitative data were collected through semi-directive interviews carried out among managers of Airbus or of partner companies. The whole research has been published under the title "European Aeronautics. The South Western Axis", Javier Alfonso-Gil Editor, Springer 2006.

6 The Power 8 Programme, announced at the beginning of the year 2007, will most certainly have a marked impact on this configuration. But, in our opinion, the modular production logic and the hierarchization of the subcontracting chain are not called into question.

and financial risks. In order to face ever-growing R&D expenditure, the aircraft manufacturer strives towards cost and time savings from the product development phase up to the after-sales service (Haas, Larré, and Ourtau, 2001). *Risk-sharing* practices are thus becoming widespread. To have direct access to the aircraft manufacturer, subcontractors must now take part in the financing of R&D investments, and assume their responsibilities until the aircraft certification. During that phase, Airbus has adopted partner selection procedures leading more particularly to a hierarchization of the subcontracting network. Following the first phase, Airbus has conducted an intense work of political coordination directed towards the diffusion of a prescriptive power. This coordination has especially materialized in the form of a pyramidal organization of the main subcontractors and cascade relations with the rest of the partner network.

2-1 THE “NEW INDUSTRIAL APPROACH”: CONSTRUCTION OF AN ORGANIZATIONAL PROXIMITY

Two aspects mark the coordination content of the various actors involved in the design and making of an aircraft. Firstly, each player’s technical and organizational competences play a major role in the division of labour among the various partner firms. Secondly, the requirements of coordination involve the setting-up of systems which often constitute a very strong organizational proximity. Such is the case of the “New Industrial Approach”, inaugurated in 1987, whose objective has especially been business systemic rationalization (Kechidi, 1996).

2-1-1 Cognitive Coordination: Business Rules, Routines and Systemic Rationalization

Systemic rationalization refers to the process through which a company harmonizes its external relations with its internal organization (Weiss, 1994). That harmonization, beyond the logistic supports which it implies, rests on the construction of internal and external coordination mechanisms. The aim is to build representations common to the actors involved in the same productive project.

In the case of Aerospatiale, and Airbus then, this harmonization is observed in the organizational processes of production and subcontracting relations. The main axis of this reorganization is the refocusing on the craft of aircraft manufacturing, and correlatively, the outsourcing of non-strategic and commonplace activities. The Aerospatiale Group

reorganized the activities of its Aircraft Division by basing itself on an approach to aircraft production organization which is worth describing briefly. Two logics underlie this approach:

- A decomposition logic which consists in splitting up the aircraft into various relatively independent modules linked up by more or less standardized and stable interfaces (Frigant and Talbot, 2005). The specialization criterion rests here on the products' technical homogeneity. This logic tends to gather, on a single site, all phases of a same production;
- A technology decomposition logic based on the nature of the technical processes implemented (assembly of parts, chemical etching, electricity, formatting...). The specialization criterion which is retained here is that of the craft exercised.

The decomposition of technical objects into distinctive subunits – which is the basic principle of rationalization – leads to a strong densification of the interactions necessary for the subsequent aircraft reconstruction. The more complex the products' technology is, the denser these interactions are (Sanchez and Mahoney, 1996; Gann and Salter, 2000). That system has therefore generated strong demands for the rationalization of cognitive and political coordination procedures among the various actors involved in the making of products. Systemic rationalization then rests on an organizational proximity which is more and more intense. Two arguments may be put forward here.

In reality, a good part of the internal coordination load has been integrated into the elaboration of rules and routines that are likely to reduce coordination costs, save on cognitive resources, and improve productive effectiveness. The construction of these rules is based on the principle that many problems are similar, but are the subject of different technical solutions. That being the case, by gathering similar problems together, it is possible to assign to them the same specific optimized solutions. The cognitive resources so saved can thus be allocated to the resolution of complex problems. A system of intra-organizational transfer of competences and knowledge has been set up thanks to this approach. Through the procedures it has generated, this approach participates in the construction of a real business technical and organizational memory. On that account, it is an essential support of organizational proximity, but not only.

If it first and foremost answers a goal of production management internal rationalization, this approach also contributes to organizing better the relations with the subcontracting network. Standardization and codification have actually generated a highly extensive database on

subcontracting companies (competences, workforce, prices...).

This first aspect of coordination is associated with procedures which, informal though they are, have a strong organizational integration power. According to us, it is political coordination which accompanies systemic rationalization, a central issue of the “New Industrial Approach”.

2-1-2 An Informal Political Coordination: the Example of PRMs

Organizational harmonization procedures take on two aspects. The first aspect turns on the provisions, essentially legal, that are found in any contractual relationship. The second aspect manifests itself mainly through the implementation of the contractual relationship. “Harmonization” expresses itself through a system of meetings – “Programme Review Meetings” (PRMs) – whose principle is set out in the subcontracting contract. These are regular meetings held between the contractor’s and the subcontractor’s managerial staff with a view to taking stock of the execution of an industrial programme. These meetings may classically be interpreted as a means to settle situations which were not explicitly anticipated in the initial contract, or as a means to reduce the inadequacy specific to contractual provisions. In reality, these meetings pursue other objectives as well. For the aircraft manufacturer, the aim is to assert, through an informal coordination, operating modes which conform to its interests. But PRMs are also used as a place of conflict regulation. The contractor and the subcontractor may thus be led to reach compromises on the understanding of productive problems, as well as on the way to solve them. Moreover, these meetings give the subcontractor an opportunity to comply with the expectations of the aircraft manufacturer.

So, more than an answer to the contractual relationship’s inadequacy, the setting-up of subcontracting network management tools has given Airbus a strategic power over subcontracting companies. The case of PRMs reflects the constitution of an organizational space over which Airbus exerts an influence capacity. In our opinion, PRMs function as a tool used to integrate subcontractors into the power structure elaborated by the contractor. Here we find the political dimension of organizational proximity. This dimension is based on a subcontracting relationship which is asymmetric by nature. The inequalities in terms of technical competences, size, financial resources, market access, are so many aspects that are favourable to the contractor. This asymmetry took a more concrete form with the new relations inaugurated by the A330-340 Programme, and the subsequent A380 Programme.

2-2 A NEW CONFIGURATION OF VERTICAL RELATIONS: RISK SHARING AND HIERARCHY

Along with the deepening of the division of labour resulting from the contractor's industrial choices, the generalization of *risk sharing* which characterizes the second phase has had a direct organizational impact on Airbus' subcontracting relations management. In the second phase, the industrial organization is in line with the decomposition logic found in the New Industrial Approach – which consists in splitting up the aircraft into various subunits or technically homogeneous units –, but strengthens through a highly hierarchized organization of relations.

2-2-1 A Reinforced Political Coordination: the Procurement Pyramid

The reconstruction of the procurement pyramid is based on the technical competences, as well as on the ability to meet financial and risk-taking requirements. Two evolutions may be observed.

Firstly, the number of direct suppliers has drastically been reduced from 650 in 1987 down to about 200 in 1993. Today, less than a hundred partners would have direct business relations with Airbus. These would mostly be “pivot firms” used to articulate the relations with the rest of the network⁷. This cut in the number of direct suppliers favours large firms with sizeable means and capacities. A same company may thus be entrusted with the complete task of seeing to the design and production of modules for which it obtains responsibility financially and productively speaking.

Secondly, the cut in the number of subcontractors has been accompanied by a highly hierarchized organization of the network. The subcontracting network thus presents itself as a four-level pyramid:⁸

- 1- Main system manufacturers or sub-system integrators are companies which participate in the design and making of a technical subunit for which they are responsible. Their relation with Airbus is an old relation based on past cooperation programmes;
- 2- Components manufacturers either supply an “autonomous” technical module (an engine for example) or a module which is to be part of a more complex technical unit (an air-conditioning system for example). This supply is carried out on the basis of precise specifications, or its study and execution are wholly confided to the

7 One of the goals of the Power 8 Plan is to bring that number down to fifty or so.

8 This typology is close to that of Wood (1996) or Araujo, Buboïs, and Gadde (1999). Wood proposes four profiles classified in ascending degree of technology complexity and in ascending degree of collaboration with the contractor: *commodity suppliers*, *collaborative specialists*, *technology specialists*, and *problem solvers*.

components manufacturer.

- 3- Specialty subcontractors are companies which have specific assets in a particular field. They are generally mechanical engineering companies or computer service delivery companies. They are level-2 or -3 subcontractors who are in direct contact with the upper-level subcontractor, but generally not with the architect;
- 4- Capacity or production subcontractors are smaller companies selected on the basis of their financial offers. They provide level-1 to -3 subcontractors with largely standardized production parts or generic services which come within highly competitive markets.

This hierarchization, which is based on the degree of mastery of technological competences, reconfigures the frontiers of the organization (Jacobides and Bilinger, 2006). The power of negotiation and the claim to the sharing of the relational quasi-rent depends on the critical and decisive nature of the resources held, as well as on the extent of the cooperation relationship (Aoki, 1991). This power of negotiation is obviously real for main system manufacturers and for components manufacturers, not only because of the specific assets they have, but also because of the sector's oligopolistic structure.

2-2-2 A Geographic Proximity Activated by Cognitive Coordination: Concurrent Engineering and Platform Teams

The above-mentioned movement of hierarchization and the ensuing decomposition of competences presuppose the continued construction of complex collective coordination systems with a view to enabling the aircraft manufacturer to keep cognitive control over the relation throughout the design and production processes. The aim is to enable European production sites to exchange data and homogenize their training, support and documentation methods through a harmonization of design tools (computer-aided design/computer-aided manufacturing equipment and software), as well as through the setting-up of concurrent engineering. In concrete terms, a vast computer network has developed under Airbus' project management (Intranet, EDI, *etc.*), which links the various sites of the aircraft manufacturer with those of its main suppliers. More than a simple exchange of data, this system works like a shared memory which constitutes an organizational proximity and provides so many points of reference for joint work.

This cognitive coordination is completed by the setting-up of platform teams during the

design phase, which implies a temporary geographic proximity between first-rank contractors and subcontractors. In other words, the face-to-face encounter, especially during common design phases, remains essential to answer new technical and productive questions. The existence of such a temporary geographic proximity between the subcontractors and the contractors is perfectly illustrated by the case of Toulouse⁹. It was on the occasion of the development of the A340-500/600 in 1997 that Airbus set up its first platform team. The A380 reinforced this organization with the construction of a platform of a thousand or so engineers and technicians in Toulouse, where the aircraft manufacturer's staff and first-rate partners are gathered. This strong need for face-to-face encounters, which the platform team is there to meet, only concerns the general aircraft design and development phases during which the technical solutions retained are perfected. The platform is then dissolved, concurrent engineering permitting its virtualization. During the next few months, concurrent engineering is used to innovate and solve any productive problem insofar as it recombines competences scattered between various actors who are physically distant. Geographic proximity, which is provisional here, and more precisely the face-to-face encounter which it allows, facilitate this recombination greatly by permitting the transfer of expertise, while reducing the uncertainty stemming from the tacit dimension inherent in any knowledge, as well as the risks of opportunism (Boschma, 2005b).

⁹ According to Zuliani and Jalabert (2005), there is a similar concentration of aircraft components manufacturers around Madrid due to the presence of EADS-Casa, around Hamburg and the A320 assembly sites, or even in Bristol-Filton where Airbus UK's production units are located.

Conclusion

Through an empirical illustration, we attempted to show the pertinence of our theoretical conception of organizational proximity, understood as a particular case of institutional proximity. It seems to us that this framework covers the realities of the Airbus organization and its relations with the subcontracting network. Thus, for instance, the A380 delivery delays may be interpreted as a political coordination failure. What seems to be the cause of this failure is not so much the existence of real wiring harness problems between the sites of Hamburg and Toulouse as the political incapability (in every sense of the word) of Airbus' governance to adopt a single technical solution for the aircraft reconstruction.

However, the distinction we make between cognitive coordination and political coordination does not necessarily imply a watertight categorization of independent phenomena. The cognitive and political levels are closely linked. The vertical relations between Airbus and its partners illustrate this articulation in which forms of coordination combining cognitive or political dominant characteristics are set up, according to the moments of history, the industrial choices, the density of cooperation, the actors' status, the competences held, *etc.* In our opinion, the three above-described forms of proximity – geographic, institutional, and organizational – constitute the space articulating these coordination processes. That space is all the denser since the production of an Airbus aircraft comes within a complex geographic division of labour and implies technical, productive and organizational constraints which increase the needs for coordination. We have seen that the face-to-face encounter, favoured by geographic proximity, is not enough to ensure the compatibility of the actors' behaviours, and that the technical and organizational transfers which affect the aeronautics sector tell about the switch from a technical division of labour to a cognitive division of labour. These transfers call for new forms of business coordination or, in any case, they increase or reduce the characteristics of previous coordination modes.

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