



PERMANENT AND TEMPORARY PROXIMITIES: THEIR ROLE IN THE PROCESS OF TECHNOLOGICAL KNOWLEDGE DIFFUSION

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Abstract

The studies devoted to the analysis of proximity relations refuse to dissociate the economic from the geographical aspects, and all of which take into account various dimensions of proximity relations. The main objective is to bring into light the role of the different types of proximities into the process of knowledge diffusion between firms and/or other partners and organisations. Based on the theoretical debate about geographical proximity, the paper concludes that it can be activated or mobilized by the actions of economic and social actors. All the proximities contribute to the process of territorial development in helping distant or close partners to work together.

Keywords: technological knowledge diffusion; geographical proximity; social actors

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Introduction

The studies devoted to the analysis of proximity relations are based on research situated at the intersection of industrial and spatial economics (TORRE; GILLY, 1999), which found, in the 1990s, that one could not study enterprises and their strategies without taking into account the spatial and geographic dimensions of their activities. This has resulted in a large number of academic works (see TORRE; WALLET, 2014, for a review), all of which refuse to dissociate the economic from the geographical aspects, and all of which take into account various dimensions of proximity relations. To the spatial dimension of proximity – which is the most obvious – is combined the relational or organizational dimension. One may also feel close to people located great distances away, and this is true of work and personal relations.

Studies on proximity relations have, in the last 20 years, focused on a large number of topics of all sorts mostly related to questions of production organization or knowledge and innovation creation and transfer (KNOBEN; OERLEMANS, 2006). At first limited to the analysis of local relations, they then widened their focus to take into account more global relations, striving more and more towards generalizing the points of view and expanding the scope of their results, in terms of understanding the phenomena at play within contemporary economies (BOSCHMA, 2005) as well as of the integration of new variables – environmental constraints, transports or urbanisation for example – in the analysis (TORRE; ZUINDEAU, 2009).

However, the favoured theme remained, for many years, the productive and innovative relations. Indeed, the first research studies on the subject focused on production relations, and more specifically on innovation dimensions, related to the transmission of knowledge between firms and/or labs. This tendency is understandable for it has much to do with two factors that are closely linked to proximity approaches:

- The first is relative to the influence of evolutionist approaches on the work of researchers that concentrate on proximity questions, and therefore to the influence of taking into account the dimensions of technical and technological change in contemporary economies. Thus, technological trajectories and processes are being examined along the lines of the analyses conducted by Dosi (2000), Nelson and Winter (1982), or Rosenberg (1994), for example;

- The second is the development, since the 1980s, of local innovation systems and of local or decentralized policies promoting them. We are referring in particular to techno poles and scientific parks; and to the cluster-based approach, which since it was introduced by Porter (1990) has enjoyed much success and has been developed extensively. These forms of spatial concentration of innovation have turned out to be fertile fields of investigation in terms of proximity approaches, in that the processes of interaction prove to be at the heart of the functioning of systems, that the local dimension plays an important role in those interactions, whether it manifests itself in the rooting of firms and or in the political discourse

Thus, the industrial and productive dominant have remained strong, and there has been a marked interest in issues related to innovation and knowledge based economy. A large part of the research on the different types of proximity is devoted to two topics related, primarily, to questions of entrepreneurship, with the idea that a firm must take into account, in its strategies, the two categories of proximity relations. Some studies focus on the analysis of firms' strategies and the relations they form with their partners, competitors, and more generally with the economic and social environments, from the perspective of local or long distant collaboration. But many other research studies have examined innovation questions related to innovative firms and their productive and scientific environments or to firms that wish to acquire or transfer technologies or knowledge.

In order to bring into light the role of the different types of proximities into the process of knowledge diffusion between firms and/or other partners and organisations, we have proceeded in four stages. The paper starts with a presentation of the tool box provided by the proximity approach, namely geographical and organised proximities (I). It, then, analyses the role played by Geographical and Organised Proximity in the circulation of knowledge within clusters and localised innovation systems (II), before concentrating on temporary geographical proximity and its role in cooperative knowledge behaviours (III). The last part of the article (IV) is devoted to a summary about the role of the different proximities in the strategic behaviours of innovative firms.

The grammar of proximity

The notions of proximity refer, above all, to potentialities given to individuals, groups, human actions in general, in their technical and institutional dimensions. This potential may, or may not exist at a time t , and therefore may or may not be usable or actionable through the action and representations of the actors (human or non-human). These types of proximity have no moral value and their existence constitutes neither an advantage nor a disadvantage. It is activation through human action that gives this potential its significance and value (“positive” or “negative”) in relation to the economic and social criteria that are relevant in the societies where it is found. The following definitions of the proximity-based approach are based on a division according to two main dimensions – spatial and non-spatial - which include more refined and detailed categories (Torre & Rallet, 2005). Other types of typologies can be found in the literature (see BOSCHMA, 2005).

Geographical proximity

Geographical proximity is above all about distance. In its simplest definition, it is the number of meters or kilometres that separate two entities. But it is relative in three ways: the morphological characteristics of the spaces in which activities take place, the availability of transport infrastructure, the financial resources of the individuals who use these transport infrastructures.

Geographical proximity is neutral in essence. It is the human actions and perceptions that give it a more or less positive or negative dimension, as well as certain usefulness. It is the way in which actors use it that matters. Thus, the fact that two firms are located in proximity of each other may or may not be a source of interaction: these two entities may remain indifferent to each other or they may choose to interact; in this latter case we talk of a mobilisation of the potentialities of geographical proximity. But this mobilisation can have different results depending on the actions undertaken. For example, in the case of innovating firms, it might be the diffusion of scientific or technological knowledge through geographical spillover effect (BONTE, 2008) but it might also lead to firms spying on other firms, or unduly reaping the benefits of an invention that is supposed to be protected by intellectual property rights (BOSCHMA, 2005; AREND, 2009).

Geographical proximity can be activated or mobilized by the actions of economic and social actors. More precisely, actors might seek to get closer to or further away from certain people or places, or

they might feel satisfied or dissatisfied with the geographical proximity of certain people, places or technical objects. One then talks of sought for and unwanted geographical proximity.

- *Sought for geographical proximity* refers to the quest, by some actors, for geographical proximity to other economic or social actors, to natural or artificial resources, to places or technical objects. The need for permanent geographical proximity is met by being in what is considered an appropriate location or by moving and settling in a place deemed more likely to help the actors concerned meet their needs or conduct certain activities. It is the case of sub-contracting firms that wish to settle closer to their clients, or of agribusiness firms that build silos or processing plants in proximity to places of agricultural production, so as to limit their transport costs and load losses.

- *Unwanted geographical proximity* corresponds to cases of actors finding themselves in situations of unwanted geographical proximity to people, activities, technical objects or places, without being able to move and change locations. For a long time considered, in economics, as a possible source of external economies (Marshall, 1890) and of competitiveness for firms, partaking of the emergence of industrial districts or other types of local productive systems, geographical proximity is also the source of negative externalities, which correspond to the disadvantages of being in proximity to objects of concern, such as a polluted site or a waste incineration plant for example. It is also the case when firms find themselves in proximity to competitors that seek to appropriate part of their knowledge through industrial espionage for instance, or by hiring their best engineers away from them.

Organized proximity

Organized proximity refers to the different ways of being close to other actors, regardless of the degree of geographical proximity between individuals, the qualifier “organized” referring to the arranged nature of human activities (and not to the fact that one may belong to any organization in particular²). Organized proximity rests on two main logics, which do not necessarily contradict each other, and which we shall call the “*logic of belonging*” and the “*logic of similarity*”. Both can help in the formation of trust relations, because

² One may be organized or one may organize an activity without necessarily refer to or belong to an organization, in the strict sense of the term.

they help the actors to build a set of common references, and interpersonal ties between participants to a joint project for example.

- *The logic of belonging* refers to the fact that two or several actors belong to the same relationship graph or even to the same social network whether their relation is direct or intermediated. It can depend on the sector they operate in; in this case they share a common creative or innovation capital. It can be measured in terms of degrees of connectivity, reflecting more or less high degrees of organized proximity and therefore a more or less great potential of interaction or common action (Bouba Olga & Zimmermann, 2004). The development of interaction between two actors will be facilitated by their belonging to the same tennis club, or Internet knowledge network. Similarly, cooperation will, *a priori*, develop more easily between researchers and engineers who belong to the same firm, the same technological consortium or innovation network. It includes a common organizational culture between the members of a team for example.

- *The logic of similarity* corresponds to a mental adherence to common categories; it manifests itself in small cognitive distances between some individuals. They can be people who are connected to one another through common projects, or share the same cultural, religious (etc.) values or symbols. Social norms, common languages partake of this organized proximity. It can also, however, correspond to a bond that sometimes emerges between individuals without them having had to talk in order to get to know one another. It facilitates the interactions between people who did not know one another before but share similar references. Thus, collaboration is all the easier when it involves individuals who share the same culture. Similarly, researchers who belong to the same scientific community will easily cooperate because they share, not only the same language, but also the same system of interpretation of texts, results.

Just like geographical proximity, organized proximity refers to a potential that is neutral in essence. It is the perceptions and actions of individuals that give it a more or less positive or negative dimension, and therefore, certain usefulness. Thus, being connected by logic of belonging is not a guarantee that interactions will occur, and even less a guarantee of the quality of these interactions. It is human actions that determine whether or not actors are going to start interacting; and results of the interactions vary in this regard: a firm may enter into a relationship with a laboratory in order to collaborate with the latter, or rather to try and rob the laboratory of one of its inventions. For the logic of similarity, a common project has as much chance to lead to an

industrial or technological success as to end up in a failure resulting in heavy losses for the parties involved. Finally, the logics of similarity and of belonging can also facilitate collaborations that might be immoral in their motivations.

Temporary geographical proximity

We should add to these two original notions the notion of *temporary geographical proximity (TGP)*, which constitutes one form of geographical proximity that enables actors to temporarily interact face-to-face with one another, whether these actors are individuals or organizations such as firms or laboratories for example (TORRE, 2008; TORRE; RALLET, 2005).

The development of communication technologies and ICT nowadays facilitates long-distance exchange; be there for economic reasons between producers, or for day-to-day relations between friends or relatives. Consequently co-location, which has for a long time been considered as a necessary condition of cooperation between organizations or individuals, no longer constitutes an absolute necessity. A large part of the information and knowledge that are necessary for production or innovation activities can be transferred from a distance, through telephone or Internet mediated exchanges for example (Walther et al., 2005). However, times of face-to-face interaction are necessary and beneficial in this context (FREIRE-GIBB; LORENTZEN, 2011). The growing importance of trade fairs (BATHELT; SCHULDT, 2008), or the travelling done by members of R&D (Research and Development) collaboration projects undertaken by biotech start-ups are good examples of such situations. Face-to-face interaction cannot altogether be eliminated, including in the case of communities of practice, for example (See Torre, 2008). Thus, ICT cannot be considered as substitutes for face-to-face relations: they are useful tools to support or to enhance the interaction between two or several individuals.

Space matters, but in a new way; one that consists of temporary face-to-face contact between two or several individuals. Temporary geographical proximity corresponds to the possibility of satisfying needs for face-to-face contact between actors, by travelling to different locations. This travelling generates opportunities for moments of geographical proximity, which vary in duration, but which are always limited in time. TGP is limited to certain times; this form of geographical proximity should not be mistaken for a permanent co-location of firms or laboratories.

The necessity of TGP is embodied in the existence of places that are especially made for TGP based activities. In the case of private individuals they can be conferences, theme or recreational parks. In the case of firms or laboratories they are specialized venues:

- Trade shows, conferences and exhibitions enable actors to fulfil certain needs related to the processes of production, research or innovation, such as the collection of information, sharing experiences, speculations about a certain type of production (Entwistle & Rocamora, 2006). The “hub” formula, which enables individuals from different horizons to meet in the same place, helps them to save on transport costs; these hubs are readily viewed as temporary clusters (Maskell et al., 2006), a term which highlights the relation with the permanent clusters formed by localized systems of production. But above all, these places respond to a need for face-to-face relations related to the wish to reduce the costs of transactions (Norcliffe & Rendace, 2003; North, 1991);
- Common “platforms” of project teams are meant to enable the participants of a project to work together for a period of up to several months, in the framework of a project team. It is also the case of the members of a project undertaken by the geographically dispersed subsidiaries of a firm (Kechidi & Talbot, 2010). Once the partners have reached an agreement as to the characteristics of the project, the platform is dismantled and the participants go back “home”.

There are two main reasons for the need for TGP: Business trips are undertaken in order to reach a common decision or determine the characteristics of a cooperation project; or an activity that can only be performed in a place other than the participants’ usual workplace. These meetings are needed at regular intervals during the coordination process. Their frequency and regularity are the cause of most business trips. The face-to-face interactions do not, in this case, occur in places exclusively dedicated to meetings, but in “ordinary” places, i.e., in the participants’ usual workplaces, firms or laboratories.

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The role played by Geographical and Organised Proximity in the circulation of knowledge within clusters

The geographic concentration of innovation activities, clusters particularly, have become a major subject of study, which evolves continuously. At first, authors raised the questions of how clusters emerged and developed, then they concentrated on the benefits firms draw from this process, using well known arguments on the advantages of geographical proximity between producers, such as the « cross pollination » or « synergetic » effects. The first studies placed emphasis on these phenomena and researchers then focused on the channels of innovation, or knowledge transfer. Through what channels is knowledge diffused? It is between formal and informal exchanges, technology markets, alliances and agreements, or even the relationships that develop within social networks.

Finally, there comes a third stage – that of doubt - which has to do with two factors. First of all, do enterprises always privilege local relations? if not, why do they interact with firms or laboratories located in other geographical areas or other countries? And what forms do these « long distance » relations take? Lastly, the question is raised of the validity of geographic concentration in matters of innovation: Do innovative firms or laboratories really benefit from being located in proximity to one another? Indeed, some studies show that some firms located in the same clusters do not collaborate, or that they even prefer to develop relations with partners situated far from them, even though the skills needed are available locally. Then, the questions of rivalry in innovation, or of secrecy in technological processes come and it emerges the hypothesis that “too much proximity kills proximity” and that the clusters that are not open enough to the external relations could lead the system that supports them into unfavourable or spurious dynamics.

The topic of clusters has been extensively studied and discussed because they are at the heart of the processes of regional or territorial development and because they themselves constitute places of growth (see Boschma (2005) and Frenken & Boschma (2011) for more on this question). However, all the attention focused on these systems and their supposed virtues must not let us forget that they also form and develop important relationships with outside parties, and that they are, in their majority, open systems. Indeed, an extensive literature proves the existence and importance of gatekeepers, who maintain relations with the rest of economic systems, in terms of

commercial relations or of technological exchanges; But it places even more emphasis on the importance of collaboration between organizations located long distances away from one another, such as firms situated in different clusters, or more simply, of technological collaborations, partnerships or alliances developed in a more or less formal manner. Thus, one must take into account the fact that firms that produce or use innovations which are integrated in a network of knowledge transfer and that this network reaches far beyond the area where they are located. There remains to understand how they function and examine at what point in time it becomes more interesting to turn toward the outside, to compensate for a lack of local resources, or because of misgivings about interacting too closely with other « insiders », which might prove dangerous in terms of intellectual property for example.

Several applied works have concentrated on proximity relations within clusters (see for example Biggiero & Sammarra, 2010; Carrincazeaux et al., 2008; Takeda et al. 2008; Weterings & Ponds, 2008). As stated before they lay emphasis on the diffusion of innovation and on the transmission of knowledge within these systems. Even though doubts have emerged about the positive role played by these clusters, and most of all about the probability of extended collaboration within the systems, we can assert that cluster organisation is usually seen as a useful tool for territorial development, and that many development policies are now based on these local systems of innovation. It seems interesting to take a closer look at this approach and to interpret it in terms of proximities; this will also lead us to examine and to analyse the clusters that “function”, compared with simple geographic concentrations of activities, and the high-tech activities.

Following on from the above definitions of proximity relations, we shall proceed to describing clusters and interpreting their functioning in terms of proximity relations. This will enable us not only provide a simple and elegant definition of clusters, but also to classify them very easily according to whether they are able to generate internal spillover effects or they can develop strong relations with outside partners.

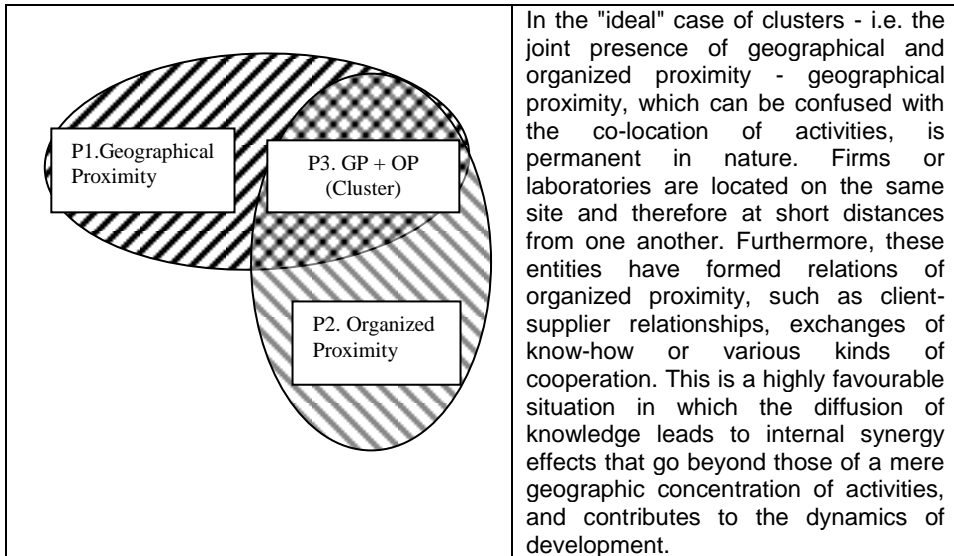
For this purpose, let us begin by positioning proximity relations in terms of potentials that can or cannot be activated, which will enable us to characterize relations within clusters and to determine to what extent they can promote development. Let us remind that

geographical and organized proximity describe two ideal types of spatial relations between humans, their combination provides some understanding of the coordination and communication process between actors, both local and remote. It is on this basis, and on that of the following hypotheses, that we shall analyse proximity relations within clusters.

- *The potential of geographical proximity can remain inactive, or not mobilized.* Two people or two firms can find themselves in a situation of geographical proximity without interacting with one another. It is possible to live in the same building as neighbours whom we don't know or visit; likewise, a laboratory can be located in proximity to a firm with which it has no connection.
- *The potential of organized proximity can remain inactive.* This is the case for people of the same geographical origin or who come from very similar cultures but who do not meet or communicate with one another. Organized proximity remains a potential state and is only activated by the establishment of interaction based on the actions of groups of individuals or institutions.
- *The simultaneous mobilization of both types of proximity gives rise to situations of localized coordination.* This is the case of "working" clusters, local innovation networks or family gatherings, situations where the combination of geographical and organized proximity promotes the establishment of coordination and interaction processes taking place in a specific location.

It is then possible to draw the ideal map of clusters, taking into account the main two categories of proximity (geographic and organized), as shown in graph 1. Although widely discussed in economic literature, this model is only one possibility among others in the interaction of proximity types, and it is not that commonly observed in reality. Indeed, organized proximity - consisting of functional relations (interaction) or relations between people sharing the same identity (common beliefs and cognitive maps) based on organization rather than territory - often exists independently of geographical proximity. Similarly, firms may find themselves in geographical proximity of one another without maintaining any organized relations.

Figure 1: The articulation of the two major categories of proximity within a cluster



This alchemy, although exceptional, is based on the activation of geographical proximity by organizational and institutional actions. In other words, in order to reveal the full potential of geographical proximity, it is necessary to mobilize the logic of belonging or the logic of similarity of organized proximity:

- From an organizational point of view, this requires collective action at a local level, and more importantly the establishment of common projects. These projects may consist of collaboration between different firms or laboratories for the co-development of products or for the provision of technical support or mutual assistance within the same group; or also of cooperation projects jointly undertaken by firms or research laboratories. Local skills and knowledge are combined to work towards a common goal shared by a group of co-located participants. It is in this context that the potential benefits of geographical proximity can be realized and contribute to the creation of synergy within the local system. Here, geographical proximity is activated by the mobilization of the logic of belonging associated with organized proximity;

- But the institutional dimension and the role played by history and time in the mobilization of the potential benefits of geographical proximity must not be underestimated. Just as the examples of the

Hshinsu Technopole in Taiwan or Sophia Antipolis (Lazaric et al. 2008) have shown, the creation of synergy within a local system is based on the development of shared representations or expectations by local actors: It can be said that geographical proximity is activated by the mobilization of the logic of similarity associated with organized proximity. Furthermore, time favours the creation of a local innovation network and the transition from the juxtaposition of R&D activities to a system characterized by organized relations, by the creation of a sense of belonging and common representations, through successive confidence-producing interactions.

When this type of relationship develops at local level, it becomes one of the drivers of development. Indeed, the synergy effects spread within the system and lead to a dynamic process of growth that reaches beyond the field of technology and benefits all sectors of production and the local populations, via rising income and employment. We have here the pecuniary externalities Perroux, and later Krugman (1991), enthusiastically identified and discussed, along with the upstream and downstream spillover effects within regional productive systems. Nevertheless, taking into account this type of relation does not exempt us from studying the relationships that the clusters' members develop with outsiders. Here again, analysing the proximity relations enables us to provide a framework to analyse these external interactions, most often based on cooperation.

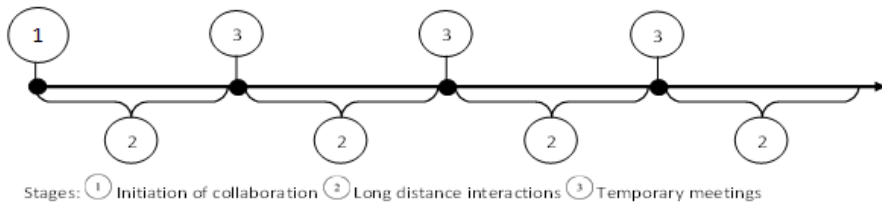
Temporary geographical proximity and its role in cooperative knowledge behaviours

Taking into account long-distance relations rests on the explicit integration of the processes of mobility and ubiquity of actors, mobility and ubiquity, which have increased dramatically with the development of transport and communication infrastructure. In order to account for these processes, we can use the notion of temporary geographical proximity (TGP, see before) (Torre & Rallet 2005; Torre 2011).

Let us look at a situation of long-distance collaboration between two firms working on a common project, of research and development for example. The analysis of the dynamics of proximity necessitates an understanding of the stages of interaction between the actors participating together to the innovation process; in other words either between the participants - located at some distance from one another - of a common project of production and knowledge exchange, two partners located at some distance from each other and involved in

common research and development project necessitating interactions for the transfer and the co-creation of knowledge. The process of collaboration, which takes place over a period of several months or years, involves frequent exchanges and interactions of different natures. It can be illustrated as follows (Graph 1). The horizontal straight line represents the time-course of the process of collaboration. The numbers correspond to different sequences of face-to-face or long-distance interactions. We retain three main sequences.

Graph 1: The process of collaboration between firms and the stages of interactions between the participants



Short stage 1 is that of the initiation of the collaboration. The aim of this initial stage of co-presence is to enable the project participants to get to know one another, adjust their points of view, prepare the technical and human aspects of the cooperation, plan the future stages of the project and negotiate agreements concerning the possible gains or losses resulting from the cooperation process. Its purpose is also to promote the development of trust relationships between the participants of the common project. The duration of this initial stage depends on the complexity of the project and on the number of partners involved (from a few days for small organizations to several months in the case of the platform teams of large manufacturers).

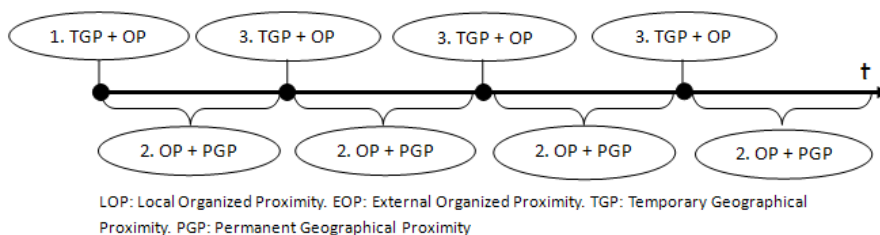
Long stage 2 is that of long-distance teamwork. Once the partners have reached their agreements and have adjusted their points of view, they separate and carry on working together « from a distance ». The project develops and progresses, it thanks to exchanges made through ICT (telephone, fax, the Internet, text, communicating terminals...). Thus, the participants of the project exchange information or knowledge and solve the daily operational problems. It should be noted that this phase is the longest of the three. At this stage, the relationship between the partners rests on the trust that was initially created, as well as on the common rules decided or

implemented by the management team. The long-distance interactions that develop between the partners must not only foster the process of production at technical level, but also promote the development of cooperation. They enable the members to communicate and to discuss the technical characteristics of the products, the necessary improvements, the small problems encountered during the daily operation of R&D or production activities, and to prepare future operations.

Stage 3 is that of occasional face-to-face meetings. These meetings generally last one to a few days. The scheduled meetings are fixed in advance, either contractually or informally, generally at the beginning of the project. They generally take place twice a year and are aimed at verifying that the work is performed properly, at determining what has been achieved and at preparing the future stages of the collaboration, and in some cases, at modifying the organization of the project so as to adapt to possible changes that might have occurred at one of the partners' since the previous meeting. *Adhoc* meetings become necessary when long-distance interactions are not enough to solve certain problems that degenerate into conflicts. In this case, some members of one or several teams travel in order to meet one another and discuss, in person, the problems that have arisen so as to find solutions to them. The meetings enable the members to meet face-to-face, to communicate verbally or non-verbally, but also to interact outside the strictly professional context.

To each phase correspond permanent geographical proximity relations, temporary geographical proximity relations, and local or external organised Proximity relations (graph 2).

Graph 2: Geographical and organized proximities during the process of collaboration between firms



Short stage 1 corresponds to the initiation of the collaboration, a stage of creation and / or activation of the potential of organized proximity. The potential of organized proximity is created when the actors do not yet know one another or do not share the same references. It is activated by the face-to-face interactions between the actors of the process of collaboration, which contribute to the development of knowledge-based relationships and of trust relations (see Nooteboom 2000). This operation aims to create bonds of belonging. The first stage also relies on TGP, for the meeting between the protagonists lasts a limited period of time. The potential of geographical proximity is mobilized when different individuals meet in the same place.

Long stage 2 corresponds to long-distance teamwork, when relations of organized proximity develop without permanent face-to-face interactions. The stages of long-distance teamwork enable the partners to continue collaborating even in the absence of face-to-face interactions, by using communication infrastructures. These stages exclude relations of geographical proximity and aim to promote interactions of organized proximity. The potential of organized proximity, which already exists, is mobilized in a « positive » manner by the multiplication – through the use of ICT - of interactions between people who are located far from one another. The geographically distant actors find themselves in a situation of ubiquity; they exchange technical information and use their bonds of belonging to a common project to facilitate coordination.

Short stage 3 corresponds to occasional meetings and is based upon relations of temporary geographical proximity and of organized proximity. The occasional meetings involve the resources of temporary geographical proximity. They are stages of short term face-to-face interaction, during which transport infrastructures are used. The actors are then in a situation of mobility; during these meetings the partners reconfirm their initial agreements, maintain or consolidate their mutual trust, try to find solutions to possible tensions and conflicts and plan the future stages of the collaboration program. As in stage 1, the potential of geographical proximity is mobilized when different individuals meet in the same place. TGP enables the partners to confirm their bonds of belonging; the potential of organized proximity is reinforced by the confirmation of the knowledge - and trust-based bonds. TGP offers the partners another chance to make the process of long-distance cooperation a successful one, by giving them

the opportunity to reconcile their points of view, to partly modify the relational configuration or review the ways in which they cooperate.

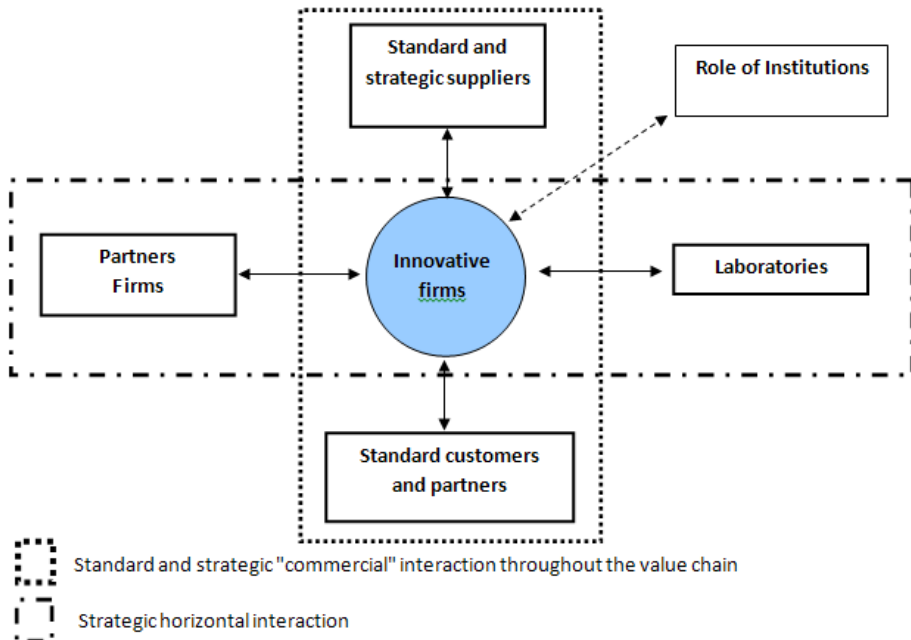
Summary - The role of the different proximities in the strategic behaviours of innovative firms

Having now examined the relations formed by the firms or research laboratories within the cluster, and then their relations with parties outside the cluster, we can come back to the various types of cooperative interactions, whether they are with insiders or outsiders, and draw some conclusions in terms of proximity relations. Indeed, it clearly appears that we can examine this question from the perspective of innovation actors, and even more of firms, which are involved or have a vested interest in the innovation process and interact with the market, that is either industrial clients or end consumers. Giving a closer look at firms, it seems a good way of identifying the hard core of development processes and of their contrasted origins.

In order to assess the role played by the different types of proximity, and even more by the different ways in which they are used by organizations, it is first of all necessary to make a last detour via the types of relations developed by innovative firms, it can be standard purchaser seller relations, or relations of cooperation through which knowledge circulates or innovations are diffused. We have summarized them in graph 2, which highlights the partners of organizations by identifying:

- Purchaser/seller relations, described here as « standard », and which concern both the suppliers of intermediate goods or raw materials and the clients of the firm;
- The relations we consider to be « strategic » and which either take the form of horizontal interactions of cooperation with partner firms or laboratories, or from vertical relations of cooperation with suppliers or industrial clients that participate in the definition of the product (Von Hippel, 2010) ;
- And finally, let us not forget to mention the role of institutions in organizing the relations between the members of the network, but also giving it meaning, and an explicit purpose.

Figure 2: The cooperative relations between firms within and without a cluster



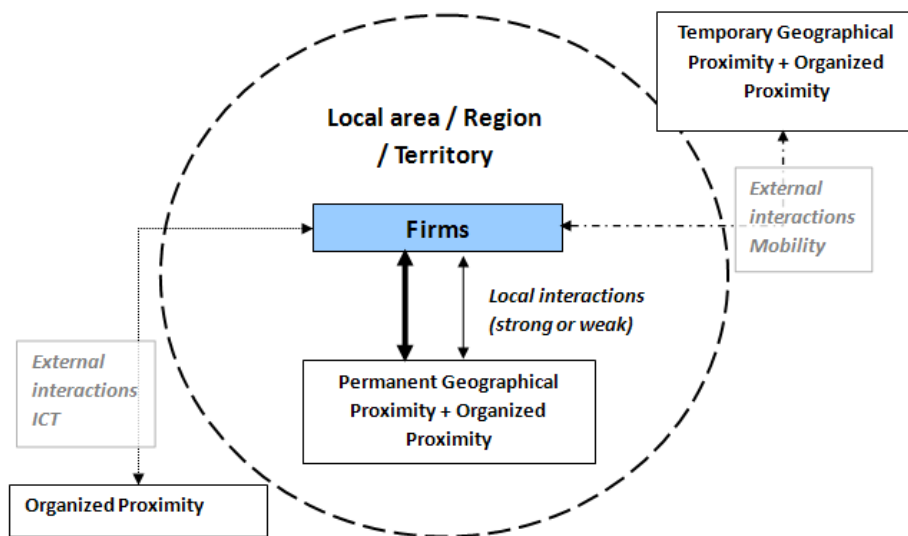
On this basis, and given what we know of inter-firm relations within clusters (See for example, Gallaud & Torre, 2004; Boufaden et al, 2009; Torre & Lourimi, 2013), we can draw the map of the proximity interactions developed by innovative firms, as well as of the different ways in which firms use the different types of proximity.

One can say that innovative firms maintain three types of proximity relations with their partners. Relations can be:

- Permanent geographical proximity relations, activated by organized proximity relations and which are based on interaction internal to the cluster, through meetings or more informal encounters (face-to-face). To a greater or lesser extent, these relations may be accompanied by;
- External relations through temporary geographical proximity relations, which also rely on organized proximity relations and involve the organization of short visits and trips using different means of transport (mobility);

- External relations through long-distance organized proximity relations that depend on the use of ICT, such as the telephone or internet.

Figure 3: Internal and external interactions of clustered firms: the use of different types of proximities



This diagram characterizes the relations between firms and their local or wider environment in terms of geographical and organized proximity as well as in terms of internal or external links to the cluster. It is only a general and broad image, which does not take into consideration the peculiarities of various groups of firms. Indeed, on the basis of this figure, we can draw typologies of firms that belong to clusters, according to whether they have more or less close relations with insiders or with outsiders, according to whether they exchange knowledge using the different types of mobility or information and communication technologies, or whether they use one or several of these different forms of interaction. Thus, we find that there are important differences between firms according to which sector they belong to, their age, or their size. As an obvious consequence of this, depending on their characteristics and their networks of interaction, firms do not all have the same ability to drive development processes at local or more global levels.

Conclusion

Through what channel is knowledge diffused? It is between formal and informal exchanges, technology markets, alliances and agreements, or even the relationships that develop within social networks. Do enterprises always privilege local relations? if not, why do they interact with firms or laboratories located in other geographical areas or other countries? And what forms do these « long distance » relations take? Lastly, the question is raised of the validity of geographic concentration in matters of innovation: Do innovative firms or laboratories really benefit from being located in proximity to one another?

The study of geographical and organised proximity relations brings a lot of responses to these crucial questions. They can be summarised in a few propositions:

- The process of coordination between productive partners located in the same area is based upon the combination of both geographical and organised proximities. It is especially the case for clusters' formation and growth
- Organized proximity helps in building trust and cooperative relations in the process of knowledge diffusion, it can be at the local level or at a distance
- The process of coordination between geographically distant partners of innovation and production processes, research or development projects is mainly based on organised proximity (e.g. non spatial proximity)
- Temporary Geographical Proximity helps in building (trust) and repairing (in case of conflicts) distant cooperative relations. It makes it possible to maintain internal local ties to the clusters as well as global ties
- All the proximities contribute to the process of territorial development in helping distant or close partners to work together

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