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Building Global Knowledge Pipelines:
The Role of Temporary Clusters

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Abstract:

Business people and professionals come together regularly at trade fairs, exhibitions, conventions, congresses, and conferences. Here, their latest and most advanced findings, inventions and products are on display to be evaluated by customers and suppliers, as well as by peers and competitors. Participation in events like these helps firms to identify the current market frontier, take stock of relative competitive positions and form future plans. Such events exhibit many of the characteristics ascribed to permanent spatial clusters, albeit in a temporary and intensified form. These short-lived hotspots of intense knowledge exchange, network building and idea generation can thus be seen as temporary clusters. The present paper compares temporary clusters with permanent clusters and other types of inter-firm interactions. If regular participation in temporary clusters can satisfy a firm's need to learn through interaction with suppliers, customers, peers and rivals, why is the phenomenon of permanent spatial clustering of similar and related economic activity so pervasive? The answer, it is claimed, lies in the restrictions imposed upon economic activity when knowledge



and ideas are transformed into valuable products and services. The paper sheds new light on how interaction among firms in current clusters coincides with knowledge-intensive pipelines between firms in different regions or clusters. In doing so, it offers a novel way of understanding how inter-firm knowledge relationships are organized spatially and temporally.

Key words: Economic geography, knowledge, clusters, temporary clusters, trade fairs, conventions, pipelines.

JEL Codes: D83, L22, O17, O18, R12

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1. Introduction

Over the past decade, a growing number of scholars have investigated how and why economic performance may be enhanced when firms with similar or complementary capabilities co-locate to form spatial clusters. Most studies focus on interactions within the cluster while inter-firm encounters that penetrate the cluster's external boundaries are normally dealt with in an off-hand way if addressed at all.¹

After many years of confusion it has now become increasingly recognised that most inter-firm transactions do not, in general, take place *within* clusters (Prosch 1998, Malecki and Oinas 1999, Amin and Cohendet 1999, 2004, Bathelt 2002, Malmberg and Power 2003, Gertler 2003, Clark and Tracey 2004). Instead it has been shown that firms, for many different reasons, deliberately establish trans-local relationships (Grabher 2002b, Scott 2002, Powell *et al.* 2002, Owen-Smith and Powell 2004). In a previous paper, we have used the concept of 'global pipelines' to refer to such trans-local linkages (Bathelt *et al.* 2004).

The establishment and management of global pipelines entail considerable uncertainties and high investments, not least because of differences in the cultural and institutional contexts in which the firms operate (Schoenberger 1997, Gertler 2001, Coe and Bunnell 2003, Morgan 2004). It is, at the same time, precisely such dissimilarities in context that can make global pipelines extraordinarily valuable by enabling firms to gain contact with less familiar bodies of knowledge that could be important for their long-term survival and growth. Distant contexts can be a source of novel ideas and expert insights useful for innovation processes as shown, for instance, in recent patent analyses (e.g. Rosenkopf and Almeida 2001). Firms therefore develop global pipelines not only to exchange products or services, but also in order to benefit from outside knowledge inputs and growth impulses. Such findings imply that, in a globalising knowledge-based economy, each cluster's economic prospects depend not only on its internal interactions but also on its ability to identify and access external knowledge sources located far away (Scott 1998, Maillat 1998, Bresnahan *et al.* 2001, Bathelt 2003). At least three established lines of investigation are concerned with aspects of how co-located or dispersed firms establish such trans-local pipelines with others.

First and foremost, the literature in the field of international business studies provides evidence of how firms penetrate distant markets by establishing foreign affiliates (branch plants, local offices) or by acquiring an existing foreign unit to tap into local resources and utilise local competencies in distant parts of the world. International expansion may also take place by firms linking up with an appropriate independent partner in other localities (e.g. Dunning 1988, 1998, Dunning and Kogut 1990, Pitelis and Sugden 1991). Second, the area of global supply chain management is concerned with the question of how long-distant production relations can be established and maintained (e.g. Schary and Skjøtt-Larsen 2001). Third, the processes involved in the establishment of relations and networks have also been a topic of long-term interest in the marketing literature (Young *et al.* 1989, Axelsson and Easton 1992, Ford 2002).

¹/ The term 'cluster' is applied throughout the paper in a generic sense and includes related concepts such as geographical agglomeration, industrial district and the like. See Maskell and Kebir (2005) for a discussion of partly overlapping concepts.

Common to the literature in these three streams of research is the basic acceptance of the fact that identifying, selecting, approaching and interacting with new partners is a tricky and costly process. To successfully establish a long-distance business link, i.e. a global or trans-local pipeline, firms must commit resources that have useful alternative applications. Rent-seeking firms therefore tend to prefer procedures that economise on valuable resources.

Among the various options available to firms, one particular procedure has thus far not received much scholarly attention: the use of international trade fairs and conventions in attempting to identify potential pipeline partners.² Yet it is common knowledge that business managers, marketing employees and technical engineers as well as lawyers, doctors, auditors and other professionals regularly attend conventions, congresses, conferences and exhibitions. At such events, their latest and most advanced findings, inventions or products are shown, examined and evaluated by their peers and competitors, as well as customers and suppliers. Large sums of money and intensive efforts are committed when firms participate in such professional gatherings in order to identify the current market frontier, take stock of relative competitive positions and form future plans.

In this paper, the phenomenon of global professional gatherings organised by the Meetings, Conventions and Exhibitions (MCE) industry³ is taken as the starting point to explore some of the unsettled issues in contemporary research on inter-firm interaction.

First, we investigate whether international professional gatherings can be viewed as 'temporary clusters' because they are characterised by knowledge-exchanging mechanisms similar to those found in permanent clusters, albeit in a short-lived and intensified form.⁴ For lack of a better term, 'temporary clusters' was adopted in this paper to emphasise the linkage between agglomeration behaviour and knowledge effects. From a different analytical perspective, trade fairs and conventions could also be viewed as 'temporary nodal networks' or, more generally, as a specific activity or organisational context for learning and interaction.

Second, we focus on the question of how firms use international trade fairs and conventions to identify and select partners that provide access to distant markets and knowledge pools.

Third, we discuss the temporary cluster as a specific form of inter-firm organisation that differs from or complements other organisational forms - such as networks, projects and permanent clusters - and offer a tentative classification of these selected forms of knowledge exchange according to their spatiality, temporality and degree of specialization.

Finally, we investigate the relation between professional gatherings, seen as temporary clusters, and permanent clusters. We ask why the phenomenon of permanent clustering is so pervasive if regular participation in temporary clusters could satisfy a firm's need to gain

²/ This observation also applies to organisational studies beyond the cluster literature (e.g. Lundin and Söderholm 1995). It further holds for studies of renewal processes in different kinds of clusters (e.g. Staber 1998). Exceptions do, however, exist. An example is, for instance, the study of Phelps and Ozawa (2003) who attempt to place clusters in a stage-theoretical setting.

³/ The MCE industry has been growing rapidly in recent decades, and it generates substantial economic effects, in particular in those cities and regions where such events have become a major source of income and employment. These effects are not dealt with in this paper, however..

⁴/ Temporary clusters, as defined here, should not be confused with the concept of 'temporal clusters', used by Lundequist and Power (2002) to denote seasonal spatial clusters of economic activity that are in full operation only during parts of year, such as holiday resorts.

knowledge through interaction with suppliers, customers, peers and rivals. The argument presented is that temporary clusters are significant vehicles for the integration of local and global communication flows and the connection between distant pockets of knowledge in different parts of the world. Thus, the specific geographical configuration of economic activity seems to play a crucial role in determining the future prospects of nations and regions.

At a more abstract level of reasoning we argue that spatial proximity acts as a basic governance mechanism in that it reduces transaction and communication costs by establishing helpful local codes and a common language (Oinas 1999, Ghemawat 2001, Antonelli and Quéré 2002).

This paper is structured as follows. In Section 2, we provide a brief account of the historical roots of the temporary professional gathering in order to understand its particular function and role in the modern economy. In Section 3, we examine the knowledge generation and acquisition processes in temporary clusters, before comparing them to other spatial and non-spatial forms of inter-firm interaction in Section 4. Section 5, by way of conclusion, focuses on the similarities and differences between knowledge transfer mechanisms of temporary and permanent clusters.

2. International professional gatherings

2.1 Antecedents

International trade fairs and similar transitory events have probably existed in some form or another throughout the history of humankind.⁵ Typically located at points of easy access or on common arteries of travel (e.g. intersecting caravan tracks, pilgrimage routes, etc.), fairs have played an important role in solving early problems of distribution by concentrating supply and demand in certain places at regular intervals.⁶ In Europe, the Roman Empire established a legal and institutional framework of fairs to encourage trade in its conquered provinces. As Europe developed further through the Middle Ages, trade fair rules became the basis of European business law while the trade fairs continued to play their traditional role as trading places.⁷

However, the role of trade fairs changed with the age of industrialisation and the associated dramatic improvements in commodity standardisation. As it became possible to produce

⁵/. The trade fair in the town of Zor (or Tyre, in contemporary Lebanon) mentioned in the Scriptures (Ezekiel, Chapter 26-27), is, perhaps, the first such event reported in writing that has survived to the present day. The term "fair", which was used for the first time in the Middle Ages, comes from the Latin word "feria", which refers to a religious festival usually taking place near a convent or a church. The same can be found in the term "Messe" used in German, which derives from the Latin term "Missa", or Catholic service, at which the padre, on pronouncing the final words "ite, Missa est", declared the end of the religious service. This would be the signal to open the market usually held in the church square. The first fair of this kind was allegedly the "Foire de Saint Denis" near Paris, founded by King Dagobert in 629. By 710, it was already attracting more than 700 merchants. (<http://www.ufinet.org/pages/thetradefairsector/basicknowledge.asp>, retrieved September 1, 2005).

⁶/. The largest of these fairs became quite important. For a brief account see Encyclopaedia Britannica Online (<http://80-search.eb.com.esc-proxy.lib.cbs.dk/eb/article?eu=34167>, retrieved March 3, 2004).

⁷/. Over time, other localities became particularly important, attracting buyers and exhibitors from all over Europe. In 1802, for instance, the Leipzig Easter trade fair had almost 6,600 buyers, with several hundred coming from Poland, Greece, France, Russia, Italy, Hungary, England and Turkey (Fischer 1992).

batches of goods of identical quality much of the *raison d'être* of traditional trade fairs became obsolete. Today, traditional trade fairs are only to be found in much weakened and reduced forms. Mostly such fairs allow local producers to sell directly to households. However, the traditional fair is still with us for a limited range of high-value commodities (e.g. horses) for which standardisation is impossible and the asymmetrical information between sellers and buyers is particularly difficult to reduce to acceptable levels by means other than personal inspection of each individual item offered for sale (Geertz 1979).

The modern trade fair has therefore taken a different turn by following the social innovation of the so-called *Mustermesse*, first held in Leipzig in 1895 (Fischer 1992, Gormsen 1996, Backhaus and Zydorek 1997, Rodekamp 2003). The innovation did away with the long-established idea that a trade fair is a place-specific and time-specific coming together of economic agents to exchange ownership of unique commodity bundles. The modern trade fair only deals with *representations* (Muster = sample) of such commodities. Customers place orders and production commences once the price and delivery conditions of a particular representation are agreed upon. The costly duplicate transport of commodities to and from the place where the trade fair is held is no longer needed. An additional advantage is that the time lag between deal and delivery allows for adjustments in the products in order to meet individual customer requirements.

Nevertheless, the modern trade fair still includes elements of medieval origin. For instance, the traditional Italian 'impannatori' used trade fairs in different parts of Europe to acquire information about shifts in fashion markets and changing consumer preferences. They would bring this back into their home base and share this information with producers in the local industrial district by ordering particular designs (Piore and Sabel 1984). At a modern trade fair, suppliers also browse their competitors' displays to gather ideas that can influence their future production decisions. Further, customers learn about the development of the technological frontier and of potential suppliers as well as of the preferences of other buyers.

2.2 Contemporary professional gatherings

The extent and scope of the modern MCE industry has grown significantly since the 1950s and rocketed in recent times (Meffert 1997, McCabe *et al.* 2000, Rogers 2003).⁸ The following observations exemplify this. Despite fears of international terrorism or the risks of transmitting infectious diseases like SARS, the number of international participants in the Singapore October 2003 convention of independent distributors of Herbalife, an international premier wellness company dedicated to simplifying the path to healthy living, exceeded

⁸/. However, the diversity of the industry has thus far impeded all attempts to provide trustworthy estimates of the total number of events or participants. For instance, consistent time series of general coverage do not exist for the industry, not even within North America or the European Union. Singular accounts show, however, how Germany hosted more than 300 such events in 2002, with 220,000 exhibitors and more than 16 million visitors, while France, Spain, Italy and the UK jointly added about 2,000 trade fairs and exhibitions, with 500,000 exhibitors and over 60 million visitors/buyers (Kresse 2003, Ausstellungs- und Messe-Ausschuss der Deutschen Wirtschaft e.V. 2004). International organisations such as the Union of International Associations (UIA) have published annual reports for the last 54 years of the number and location of meetings of a well-defined set of international organisations as well as meetings brought to their attention that lasted at least three days and had at a minimum of 300 participants, of whom a minimum of 40 % were foreigners representing at least five different nationalities. In 2002, they registered 9,124 such meetings in 180 countries (<http://www.uia.org/statistics/press/press03.pdf>, retrieved March 3, 2004). Other important international organisations in the MCE industry include UFI – the Global Association of the Exhibition Industry (<http://www.ufinet.org/>, retrieved March 3, 2004); IFES – the International Federation of Exhibitions Services (<http://www.ifesnet.com/>, retrieved March 3, 2004); and EMECA – European Major Exhibition Centres Association (<http://www.emeca.com/>, retrieved March 3, 2004).

12,000 persons – an all-time record.⁹ A total of more than 17,000 real estate agents, investment consultants and international property analysts and dealers attended the 16th annual meeting of the International Property Market MIPIM¹⁰ in March 2005 in Cannes, France, representing more than 2,000 exhibitors and 4,660 end-users or investors from 74 countries. Even such large events seem fairly insignificant when compared to the Hong Kong Electronic Fair in October 2003, which drew 1,950 exhibitors and over 48,000 visitors from more than 140 countries.¹¹ Similarly, the international trade fair for architecture and technology, the Light and Building, attracted 1,920 firms (57% of which were of foreign origin) and 116,000 visitors (70% from outside Germany) to Frankfurt/Main in 2004 (Messe Frankfurt GmbH 2004). Other major international fairs and conventions attracted similarly impressive crowds of business people and professionals to those cities around the globe that accommodate them.¹² Some private companies have become major organisers of international fairs and conventions (e.g. the Blenheim Group PLC, the Reed Exhibition Companies, the Andrew Montgomery Network).

Included in the intermediary size group are events organised by professional societies, such as the Academy of Management¹³ and the Association of American Geographers¹⁴, which typically list 3,500-6,000 participants. For technical professions and especially the life sciences (e.g. dentists, veterinarians, medical professionals), such annual meetings have developed into very important meeting points for related industries, which display, sell and brand pharmaceutical compounds, medical hardware or curative services.

At the bottom end of the scale we find, for instance, small regional gatherings of farmers comparing products and machinery, or the annual assembly of a mere handful of members of an association of, say, shoelace producers to be held in a single hotel suite. As opposed to the former event, the latter could, however, have a substantial impact on the global market (i.e. that of shoelaces).

3. International professional gatherings as temporary clusters

In this section we make an interpretation of what firms actually do at professional gatherings. We do not claim that this is an empirically based account of what goes on at such occasions. Rather, we put forward a series of hypothetical claims, based on a combination of common knowledge, secondary sources, public testimonies and personal experience of taking part in this kind of events.

⁹/. See <http://www.herbalife.com> (retrieved March 3, 2004).

¹⁰/. MIPIM is an acronym for *Marché International des Professionnels de l'Immobilier*, See <http://www.mipim.com/App/homepage.cfm?moduleid=75&appname=100419> (retrieved September 11, 2005).

¹¹/. See <http://www.hkelectronicsfair.com/glance/glance.htm> (retrieved March 3, 2004).

¹²/. The MCE events are far from evenly distributed over space. While the modern convention industry emerged in the early 20th century in the US and gradually spread to Europe, trade fairs never caught on as much in the US but have in recent times become significant events in the new growth economies in South East Asia (Kresse 2003).

¹³/. See <http://www.aomonline.org> (retrieved March 3, 2004).

¹⁴/. See <http://www.aag.org> (retrieved March 3, 2004).

Information exchanges between suppliers and customers about recent market trends, experiences and requirements for future products and services can be expected to take on a special intensity during trade fairs and conventions (Prüser 1997, 2003). Firms intensify social relations with their customers during the trade fair and attempt to attract new customers to market their products, display new designs or functionalities and negotiate potential contracts (e.g. Ziegler 1992, Meffert 1993). Other decisive components of interaction during trade fairs may be meetings held with suppliers that are located in different regions and nations to discuss technological changes in product specifications, developments of markets and plans for the future. At the same time, firms make efforts to identify new suppliers that exhibit interesting products or capabilities. This *vertical dimension* of the temporary cluster can thus be assumed to provide a rich arena for processes of knowledge exchange and acquisition where small observations or hints may lead firms into new lines of thinking and change their scope for creating novel and profitable combinations of existing ideas and capabilities.

This vertical interaction along the value chain is supplemented by the horizontal interaction between competing firms. This is because trade fairs bring together competing firms that would not normally meet or interact. Professional gatherings thus provide multiple opportunities for firms to observe and compare their products and strategies with those of their competitors. They may systematically look at the exhibits of their competitors and make note of product designs, modifications, innovations and new fields of application. Depending on the industry, firms may also compare customers' reactions to the displays of their competitors in order to identify market trends and future preferences. They can collect and consider any available information indicating what new products or changes in strategies competitors may be planning. Sometimes representatives of competing firms may engage in discussions of general technological problems or industry trends during trade fairs.

Similar to permanent clusters, the corridors, cafés, bars and similar meeting points may sometimes be the most important places for information exchange in temporary clusters. Parts of this screening and observation process are, however, less systematic, as firms utilise the occasion to get an overview of what is going on in their business in terms of technological trends and market developments. Such broader and unanticipated information exchange is also of great importance because it enables the firms to determine whether or not they are on the right track or in danger of being left behind. This, in turn, may help firms to make decisions about their technological focus and future investments and serves to stimulate reflexive practices.

Because of these attributes, temporary clusters are arguably particularly important for firms on the lookout for suitable partners for joint innovative efforts and knowledge creation. The process of establishing relationships is supported by the multiplex nature of social relationships between the people who attend trade fairs and interact with one another as competitors, colleagues, or experts during the day or acquaintances at less formal dinner meetings in the evening (Uzzi 1997). Through consecutive trade fairs and conventions, potential partners get to know one another better so that some level of relational trust can be established. Initial low risk interaction may be gradually intensified in a stepwise manner.¹⁵

¹⁵. In a situation where markets are highly concentrated, characterised by a lot of shared information about competitors, suppliers and customers, the selection of potential partners is, of course, much easier. We may assume, however, that such a situation at least partially reflects the experience gathered in past trade fairs and conventions. Thus, the processes of pipeline formation described in this section would also apply.

Commonalities, over time, lead to the formation of latent networks that do not have any immediate economic value. However, such structures can become quite important at a later point in time (Grabher 2001, 2002a). Latent structures can be mobilised without much effort and thus serve to increase a firm's flexibility and responsiveness towards unexpected changes in markets and technology. Tentative initial contacts might gradually develop into strong and durable partnerships.

Finally, extended communities of practice can be established and reproduced over the years and common interpretative schemes developed as technologies deepen and the frontiers move in new and unexpected directions (Brown and Duguid 1991, Wenger 1998).

In sum, we put forward the idea that international trade fairs and conventions establish distinct, yet temporary clusters by bringing together core personnel from firms with similar or complementary capabilities or related interests regardless of the firms' physical location(s). The rich information flows generated during the event help reduce information asymmetries and uncertainties that could otherwise seriously inhibit extra-local interaction.

4. Temporary and spatial forms of inter-firm interaction

Having discussed international trade fairs as temporary clusters that enable knowledge exchange and pipeline formation between firms permanently located in different spaces worldwide, we will view this configuration in the present section at a more general level as a particular form of inter-firm interaction and compare it to other temporary and permanent forms of inter-firm interaction.

4.1 Permanent clusters

Much of the contemporary debate about the spatial organisation of production revolves around the benefits firms may gain by pursuing co-location strategies (Krugman 1991, Gertler 1995, Enright 1998). In particular, it is argued that firms with a volatile set of business partners draw advantages from being located in a cluster of similar or complementary economic activities (Maskell and Lorenzen 2004). In earlier work, we have suggested that firms generally benefit from clustering because it allows them to participate in profitable 'local buzz' (Bathelt *et al.* 2004, Storper and Venables 2004). The relevant buzz consists of a continuous flow of updated information of specific interest for the local industry, together with a multitude of interpretations and informed suggestions on how to transform any new turn of events into something commercially viable. The concentration of ongoing opportunities for knowledge exchange during frequent unanticipated encounters favours an emerging common understanding of market trends and technological breakthroughs that is continuously developed through local experimentation combined with proprietary ideas.

In contrast to the establishment of global pipelines, participation in this buzz does not require specific investments or any particularly active solicitation since clustered firms are, almost by definition, surrounded by a tight web of gossip, opinions, recommendations, judgements and interpretations. Free access to local buzz is a natural consequence of just being there (Gertler 1995, 2003).

4.2 Stable inter-firm networks

Firms that interact in markets realise over time through conjecture or experimentation that their external transactions become less costly¹⁶ or have greater value-added if structured. One approach commonly selected by firms is to invest in relationships with upstream or downstream partners – especially when the set of customers and suppliers, as well as products, is reasonably stable (Maskell and Lorenzen 2004). Networks operate according to certain goals that have been explicitly or tacitly agreed upon by the firms involved. Goals may constantly be checked, revised and adjusted according to the joint experiences of the participants in the network. These goals in some sense pre-structure the future course of action and provide a basis for ongoing communication and problem solving. Many advantages of inter-firm networks are based on seemingly perpetual social relations that may help the partners achieve effective co-ordination and learn extensively, but which may concurrently also reduce diversity in visions and strategies (Granovetter 1973, Håkansson and Snehota 1989, Foss and Koch 1996, Cooke and Morgan 1998, Soda and Usai 1999)

The literature on networks does not provide much guidance, however, as to which spatial configuration an inter-firm network would have. On the one hand, one could argue that network formation and maintenance would be simpler, and thus more common, among partners who are spatially proximate to one another. Empirical work, on the other hand, does not indicate that this is the case. Most firms seem fully capable of developing and handling spatially extended network relations. Given that such network relations normally follow the value chain of an industry, and given that value chains are becoming increasingly global in most industries, this is indeed not surprising.

4.3 Inter-firm projects

In contrast to networks and clusters, inter-firm projects are only temporary by nature. They are regularly formed within creative industries around processes, such as producing a film, designing an advertising campaign or producing and releasing a music CD (Caves 2000, Grabher 2002b, 2002c). Inter-firm projects are also the customary way of structuring market exchange within the construction industry when building a house or constructing a highway (Gann and Salter 1998). In the course of the project, the partners co-operate closely with one another. When the pre-determined target is reached or the task completed, the project organisation is usually dissolved and the participating partners may never interact again (Lundin 1995, Bogenrieder and Nooteboom 2001).¹⁷

Inter-firm projects are based on a deep social division of labour. Like networks, they are characterised by strong interdependencies between the agents involved. However, the spatiality of projects is more fluid in that they take place in different places or form temporary localities of interaction and exchange (Lee 2001), just as an inter-firm project is not usually based on any fixed infrastructure (DeFillippi and Arthur 1998). Sometimes the members of a project get together to work at a particular site throughout the entire course of the project, whereas in other cases, they work in different places by themselves but get together on a

¹⁶/ These costs emerge when the ownership of bundles of commodities or services are transferred from one firm to another, whether regulated by a contract or not. There are costs involved in identifying a similarly inclined partner for trading, negotiating prices and conditions, making detailed specifications of what is to be transferred, checking that all specifications are met after the transfer, securing the payment, etc. (see, in particular, Williamson 1975, 1985. For recent overviews see Grandori 1999 or Grabher and Powell 2005).

¹⁷/ In many settings, however, the limited number of firms holding distinct capabilities increases the likelihood of meeting old project partners again in some new combination.

regular basis to exchange results and adjust their work accordingly. In both cases, temporary nodes of interaction designed to enable task-oriented co-operation are formed. These spatial configurations are quite different, however, from the temporary clusters that are discussed in the following section.

4.4 Temporary clusters

Face-to-face interaction is widely held to be a necessary condition for establishing trustful relations and communicating sensitive, not well-established knowledge and information. It is sometimes overlooked, however, that while such interaction presupposes direct contact between individuals, such meetings need not necessarily be based on more or less permanently collocated firms. Global face-to-face interaction taking place at international professional gatherings such as trade fairs, conventions and conferences, in many ways functions as a substitute for the buzz of a permanent cluster and may even exceed it.

Due to the fact that these events are characterised by a multidimensional structure similar to that of permanent clusters, they function as temporary hubs that stimulate processes of knowledge creation and dissemination. In particular, they enable firms to compare their products and investigate competing innovation trajectories while monitoring customer reactions. This creates, in itself, a powerful knowledge set that, if properly handled, may assist managers when making decisions regarding future investments and strategies. Further, international professional gatherings provide a wealth of opportunities for making contact with firms from all over the world. This provides an important basis for the establishment of trans-local pipelines that supply access to new knowledge pools and markets.

The argument so far is summarised in Table 1.

Table 1: *Organisational configurations of knowledge creation by time horizon and focus*

		TIME HORIZON FOR KNOWLEDGE CREATION	
		Quasi-permanent	Temporary
FOCUS OF KNOWLEDGE CREATION	Strong focus (goal-oriented)	Stable inter-firm networks	Inter-firm projects
	Broad/diffuse focus (vision-oriented)	Clusters	Trade fairs, conventions, professional gatherings

On the horizontal axis of the table a distinction is made between well-studied, durable or quasi-permanent forms of inter-firm interaction and the temporary interactions that often have a fixed termination date from the outset. On the vertical axis a distinction is made between, on the one hand, the strongly focused or targeted knowledge generation processes, often with ex-ante defined goals and sometimes supported by explicit contractual arrangements, and, on the other hand, the less structured knowledge exchange processes where unanticipated encounters and interactions can play a major role. In this matrix, the temporary clusters of trade fairs,

conventions, exhibitions and other professional gatherings share some characteristics with inter-firm projects and some with permanent geographical clusters of firms.

By placing the four forms of inter-firm interaction in a two-by-two matrix we highlight the divergent role played by temporality and proximity.¹⁸ Each form of inter-firm interaction identified in the matrix has its own distinct characteristics that make it particularly suited for certain processes of knowledge generation. In the present globalising knowledge-based economy, all four forms thus play an important role different from that of the others.

5. Discussion and conclusion: temporary and permanent clusters – substitutes or complements?

In this paper we make five related points regarding knowledge exchange and acquisition through inter-firm interaction over space and time.

First, we argue that professional gatherings can be viewed as temporary clusters since they display some of the knowledge creating mechanisms found in permanent clusters, albeit in a short-lived and intensified form.

Second, we maintain that firms use international trade fairs and conventions to identify knowledge frontiers and select partners that can provide access to distant markets and knowledge pools.

Third, we offer a novel classification scheme of how firms organise their inter-firm knowledge relationships spatially and temporally.

Fourth, we extend the literature on spatial clustering by proposing that active participation in temporary clusters might also help explain the success of solitary firms that are not located in industry agglomerations.

Fifth, we wish to broaden our understanding of clustered firms' external links by investigating the ways in which temporary clusters are complementary to, rather than substitutes for, permanent or durable clusters.

We develop this last point in the following by first re-emphasising that trade fairs and conventions may help firms to systematically acquire information about technological and other strategic choices made by their competitors, suppliers or customers. Through regular attendance in such events, firms may thus learn and acquire important information, find suitable partners to complement their needs, establish trust with potential future partners and, sometimes even initiate durable inter-firm collaboration in research, production or marketing.

Given these considerations, one could argue in line with Amin and Cohendet (2004: 93) that “there is no compelling reason to assume that ‘community’ implies spatially contiguous

¹⁸/ We are well aware that a classification of complex real-world inter-firm interactions into four cases using two-by-two matrices is a crude simplification. Other significant forms of inter-firm organisation might be added when using different variables. In addition, the cases distinguished may have less internal coherence than what has been assumed here.

community, or that local ties are stronger than ties at a distance.”¹⁹ Relational proximity can, they argue, exist between actors located in different parts of the world. Modern technological and institutional developments facilitate both the transfer of information and the travelling of people across space.

This line of thinking is, perhaps, strengthened by recent empirical findings showing that the locational choices of new firms appear to play a role in de-agglomeration processes (Dumais *et al.* 2002) and that knowledge may be replicated across space without being transferred directly (Zander 1999, Baden-Fuller and Volberda 2002).

Is it thus possible that relational proximity in global epistemic communities (Knorr Cetina 1981, Lave and Wenger 1991) and communities of practice (Brown and Duguid 1991, Wenger 1998, Knorr Cetina 1999, Amin and Cohendet 2004) obliterates any knowledge benefits stemming from permanent spatial proximity? Before answering this, we will briefly summarise some important similarities and differences between temporary and permanent clusters.

Both temporary and permanent clusters offer firms advantageous settings for knowledge generation and acquisition. One might conclude that it would be more advantageous for a firm to have access to both temporary and permanent clusters and not just one or the other. The discussion provided above gives some support to this interpretation, at least in terms of the mutually reinforcing powers of buzz and pipelines: the value of knowledge gained in temporary clusters will multiply when inserted into the buzz of a permanent cluster. The continuous scrutiny, selection and application of new ideas that take place in a permanent cluster give rise to a number of interpretations and new combinations or experiments beyond what could be achieved in a temporary setting in a short period of time. The permanent cluster provides a broader range of concurrent solutions that local firms may monitor without major costs and combine with ideas of their own. Economic progress has become significantly dependent on a constant testing of new solutions and a steady flow of novel approaches to be applied or modified by local firms.

Even when striving to utilise such potential advantages, the firms' absorptive capacity is limited in similar ways in temporary and in permanent clusters. In both cases, firms need to convert knowledge from the outside into a form that will make it applicable for problem solving and development purposes inside the firms. Knowledge that is not already part of their repertoire needs to be adjusted to meet the firms' organisational and cognitive peculiarities.

It is an established fact that knowledge may easily be ignored if it is too novel or unique and, in particular, if it is produced by outsiders - often referred to as the 'not-invented-here' syndrome (Tushman and Katz 1980, Cohen and Levinthal 1990, Durham 1991, 1992). It is thus an increasing challenge for all firms, whether clustered or not, to find ways to create new mental maps that may encompass novel knowledge emerging from outside the firm. Few firms are able to cope with knowledge that cannot easily be broken down to be processed

¹⁹. Geography is treated somewhat as an historical relic in this approach. Regarding knowledge clusters, Amin and Cohendet (2004: 102) emphasise how “[t]he ‘stickiness’ of knowledge in these sites ... stems from the unique interactions and combinations of bodies, minds, speech, technologies, and objects that can be found there ... It has little to do with ‘native’ practices or locally confined assets.”

within the existing organisational hierarchy. This is no surprise as each firm is structured to handle only certain types of knowledge. There is no such thing as a competitive 'jack-of-all-trades' when it comes to knowledge management. For this very reason, new foreign knowledge often tends to fall through the cracks in the organisational structure if it does not fit the current hierarchy.

Categorically new knowledge that is received by the firm through its pipelines or obtained by its representatives at a trade fair or convention therefore often requires that the firm's organisational structure be reconfigured. New internal connections, interpretative schemes and symbolic representations must be in place before the firm can make real use of radically new ideas. Precisely because of the risks and costs associated with such changes, managers will be rather hesitant to use or apply the knowledge before its advantages are clear. Much novel knowledge produced outside the firm will, consequently, be ignored, allowing it to be picked up by entrepreneurs starting new firms.

In most cases, however, the knowledge picked up at trade fairs and conventions is similar to the incremental improvements that local rivals display in the cluster. It is, in a sense, pre-processed by being part of a community with more and less well-defined positions and interfaces. Such new knowledge thus comes in packages that rarely necessitate any major organisational adjustments. The managerial problem consists of selecting among competing pieces of knowledge and implementing the ones chosen within the organisation. Basically, the challenge is similar for co-located firms wanting to copy some improvement developed by their neighbour and for solitary firms that frequently participate in trade fairs and conventions or utilise other distant knowledge sources. The procedure of knowledge acquisition, however, may differ a great deal, as may the costs. Imitating solutions developed far away requires the transfer of all relevant knowledge across space. In this process, important details may easily be missed when the solution is implemented. This is usually not a problem if the initial knowledge source is close by. But if the source is far away, or stems from someone met at an event long passed, its recovery may be a major venture.

Compared to competitors located elsewhere, firms in clusters are also at an advantage regarding the interpretation of incomplete knowledge coming down the pipelines. This is because other firms in the cluster will simultaneously struggle to put together the missing pieces. When one firm is successful, the result, or parts of the applied knowledge, will sooner or later leak out to the firm's nearby competitors (Marshall 1890, Mansfield 1985).

Co-located firms benefit from the fact that more people are involved in collecting and assembling knowledge from the many nearby knowledge sources available in the cluster. Most employees will, after all, be 'at home' most of the time, and only a small segment of the employees who contribute to the economic performance of a firm (or region) will be in the global trade fair circuit – and often also only for a fraction of their work time (Malmberg 2003). Without diminishing their possible importance as gatekeepers and pipeline builders, it would be a mistake to assume that the firm's most frequent travellers or official knowledge brokers are the only ones responsible for innovation, competitiveness and growth. In other words, we should not forget the large majority of people who live and work permanently in a local setting, following a similar daily trajectory most days of the year. Over time, they acquire a sense of the 'localised capabilities' (Maskell and Malmberg 1999) and the area's 'untraded interdependencies' (Storper 1997) that make them better equipped to interpret incremental improvements that originate from within the community.

So, even if we accept that much knowledge is replicated across space with or without direct transfer and acknowledge that many well-managed new firms start and thrive outside clusters, there are still commercially interesting advantages that are not easily undermined by the ICT revolution or the other globalisation processes when co-locating with peers, customers and suppliers.

The bottom line, however, is that temporary and permanent clusters are a bit like ‘close cousins’. They may be equipped with many dissimilar qualities but their basic similarities cannot be denied: both are in the same knowledge game; both have become important phenomena; and both show that ‘geography matters’. Were it not the case that personal meetings and face-to-face contacts support certain forms of knowledge exchange and creation, presumably neither permanent nor temporary clusters would exist.

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