

Paper no. 2013/16

**The spatiality of trust
– Antecedents of trust and the role of face-to-face contacts**

Magnus Nilsson (magnus.nilsson@circle.lu.se)

Department of Business Administration, School of Economics and Management,
and CIRCLE, Lund University, Sweden

Jannika Mattes (jannika.mattes@uni-oldenburg.de)

Institute for Social Sciences, CETRO, University of Oldenburg, Germany
and CIRCLE, Lund University, Sweden

This is a pre-print version of a paper that has been submitted for publication to a journal.

This version: April 2013

WP 2013/16

The spatiality of trust – Antecedents of trust and the role of face-to-face contacts

Magnus Nilsson; Jannika Mattes

ABSTRACT

In this paper we analyze how the spatiality of interactions influences trust creation in multi-site corporate innovation projects. By drawing on insights from the discussion on initial and gradual trust and connecting them to contributions from the field of economic geography, we examine different antecedents of trust and their dependence on face-to-face interaction. We thereby illustrate the complexity of initial and gradual trust creation and the interplay between personality traits, group-based similarities, situational and institutional factors, reputational inference, and personal interaction as trust antecedents. We can show that the speed and level of resilient trust creation is decisively influenced by the frequency and duration of face-to-face exchange between key project actors. The empirical insights are based on two qualitative case studies on specific innovation projects in multinational companies. Our findings stress the need to incorporate space as a facilitating factor in the analysis of trust development.

JEL Code: M10; M19

Keywords: Trust, spatiality, proximity, face-to-face, project work

Disclaimer: All the opinions expressed in this paper are the responsibility of the individual author or authors and do not necessarily represent the views of other CIRCLE researchers.

The spatiality of trust – Antecedents of trust and the role of face-to-face contacts

Magnus Nilsson

Department of Business Administration, School of Economics and Management, and CIRCLE, Lund University, Sweden

Jannika Mattes

Institute for Social Sciences, CETRO, University of Oldenburg, Germany and CIRCLE, Lund University, Sweden

Abstract

In this paper we analyze how the spatiality of interactions influences trust creation in multi-site corporate innovation projects. By drawing on insights from the discussion on initial and gradual trust and connecting them to contributions from the field of economic geography, we examine different antecedents of trust and their dependence on face-to-face interaction. We thereby illustrate the complexity of initial and gradual trust creation and the interplay between personality traits, group-based similarities, situational and institutional factors, reputational inference, and personal interaction as trust antecedents. We can show that the speed and level of resilient trust creation is decisively influenced by the frequency and duration of face-to-face exchange between key project actors. The empirical insights are based on two qualitative case studies on specific innovation projects in multinational companies. Our findings stress the need to incorporate space as a facilitating factor in the analysis of trust development.

Key words

Trust, spatiality, proximity, face-to-face, project work

Introduction

Within management and organization studies it is widely acknowledged that trust can lead to more effective and efficient cooperative behavior among individuals, groups, and organizations (Barney & Hansen, 1994; Becerra & Gupta, 2003; Gulati & Sytch, 2008; Hansen, Hoskisson, & Barney, 2008; G. R. Jones & George, 1998; Li, 2005; A. Zaheer, McEvily, & Perrone, 1998). Despite this general agreement on the importance of trust, one aspect that has been systematically ignored is the effect of space on trust creation. Surprisingly little is known about how trust development is linked to the spatial distribution of the involved actors, and which forms of trust can be developed and maintained over distance. At the same time, the need for understanding the influence of spatiality has become more important as development projects, especially within multinational companies (MNCs), are increasingly being carried out in spatially dispersed networks (Bartlett & Ghoshal, 1989; Serapio & Hayashi, 2004). The current neglect of space in the trust debate is hence not only a theoretical issue, but has important implications for managers. In order to acknowledge this managerial interest, the paper looks particularly at trust creation in multi-site innovation projects of multinational companies.

This paper provides an attempt to establish a link between trust, its antecedents, and spatiality. In order to do so, we complement the existing, mostly managerial and sociological trust literature with insights from economic geography. Part of our contribution is hence theoretical and lies in a systematization of the relationship between geographical trust antecedents and other types of proximity. Based on this, a theoretical framework is introduced and used in the analysis of two collaborative innovation projects in MNCs. Our findings shed light on the role of interaction in trust creation and the importance of considering spatial proximity in theoretical and empirical analyses of the formation of trust.

The frame we select for studying trust building incidents are multi-site innovation projects in multinational companies (MNCs). In project work, activities are disconnected from the line organization and the selected team members are rearranged based on the complementarity of their skills (Gernot Grabher, 2002; Gernot Grabher & Maintz, 2007). Such projects are hence described as a “hybrid mechanism” (Mendez, 2003 p.96), characterized by special responsibilities, tasks, and interacting individuals (Gernot Grabher & Hassink, 2003). They can thereby transcend both organizational and territorial borders (Sydow & Staber, 2002; Zeller, 2002) and incorporate elements of spatial proximity as well as of displacement. *Innovation* projects show the occurring instances of trust-building among the involved actors in a context of uncertainty, which renders trust even more important. Internationally dispersed innovation

projects, combining different spatial settings, therefore provide a good setting for studying the influence of spatiality on trust creation.

The paper begins with an introduction to the literature on trust creation based on the distinction between initial and gradual trust. The antecedents of initial and gradual trust are discussed and the implications of the spatiality of the actors involved are highlighted. The next section summarizes these aspects and systematizes the connection between trust formation and space and introduces our theoretical framework. In the next section, our study methods are described. We then present two innovation projects and analyze the inherent trust building processes and their spatial characteristics empirically. The article ends with some conclusions.

1. Trust

Trust can broadly be defined as the intention or willingness to accept vulnerability based on positive expectations of the intentions or behavior of others (Rousseau, Sitkin, Burt, & Camerer, 1998). Such willingness can be based on [i] trusting the intentions of others or [ii] trusting their competence/ability, benevolence, and honesty/integrity (Mayer, Davis, & Schoorman, 1995; McKnight, Cummings, & Chervany, 1998).

The literature on trust covers a vast array of topics and exhibits a remarkable diversity in the way trust is conceptualized and studied (see Bachmann & Zaheer, 2006; Bigley & Pearce, 1998 for overviews). This heterogeneity is often seen as a problem for the development of the field. In this paper, we therefore adopt a problem-centered approach (Bigley & Pearce, 1998) which allows us to focus only on those particular areas that have direct application to our study (Droege, Anderson, & Bowler, 2003). In doing so, we start from the distinction between initial and gradual trust. Initial trust is when the actors have little or no information about each other, or when the information they have does not come from first-hand personal experience (Bigley & Pearce, 1998; McKnight, et al., 1998). Gradual trust on the other hand evolves on the basis of repeated first-hand interaction over time. While both forms of trust are crucial facilitators for interaction, they are based on different antecedents and differ in important ways when it comes to their robustness in terms of resilience to shocks (Nohria & Eccles, 1992). In this chapter we introduce the key characteristics and antecedents of initial and gradual trust. We also discuss these in terms of their resilience and fragility. Thereafter, we introduce a spatial dimension to the creation of trust.

Initial and gradual trust

Initial trust has been studied from different perspectives. An attempt to classify these has been made by McKnight and colleagues (McKnight, et al., 1998) who distinguish between personality-based, cognition-based, and institution-based schools of thought. The *personality-based* school focuses on the dispositional traits of the trustor (i.e. the person who trusts). It is argued that some individuals or groups of individuals are more predisposed to trust because of, for example, early-life experiences (Rotter, 1971) or experiences from previous interaction with other actors (Hardin, 1992). The *cognition-based* school views trust as an outcome of initial cognitive cues and first impressions, such as perceiving the trustee as belonging to the same social, demographic, or professional group as themselves (in-group categorization) or to a group to which the trustor ascribes trustworthiness (stereotyping) (McKnight & Chervany, 2006; McKnight, et al., 1998). Furthermore, in the cognition-based approach initial trust may also stem from third-party referrals and second-hand information about the trustee (reputation inference) (ibid). Lastly, the *institution-based* school relates initial trust to the existence of formal and informal mechanisms that serve as guarantees or safety nets in the exchange. Here, trust is impersonal (S. P. Shapiro, 1987) and tied to formal societal structures such as laws and regulations as well as supervisory actors that guarantee that these are enforced (Zucker, 1986). An example of such institutional structures is the existence of intellectual property regulation in combination with a judiciary system to enforce these regulations. In addition to such formal structures, the institutional school also emphasizes informal constraints, such as norms and conventions that provide common behavioral expectations (Möllering, 2006; North, 1992).

In addition to these, a fourth school of initial trust research is discussed by Bigley and Pearce (1998) as the *behavioral decision theory* approach. Here, as in the institutional view, the decision to trust someone is based on a relatively rational decision-making process, but the focus is on immediate situational factors. Examples of situations that have been linked to trusting behavior are such where the long term interests of the participants are stressed initially, when there is no potential for threat (i.e. deterrence-based effects), and when there is a high potential for successful communication (Bigley & Pearce, 1998; Gargiulo & Gokhan, 2006).

These four schools are of course not unrelated but can be seen as elements in the formation of initial trust (cf. McKnight & Chervany, 2006; McKnight, et al., 1998). They focus on different aspects of initial trust and on how such trust is created in a given situation. In this sense, they are ideal-typical rather than sharply distinguishable types.

Gradual trust places emphasis on the way trust is created over time, i.e. when there is first-hand and actor-specific (rather than group-specific) experience from previous exchange. Gradual trust is knowledge-based (Gulati, 1995; D. L. Shapiro, Sheppard, & Cheraskin, 1992) insofar as it is created or dissolved as actors learn about each other through ongoing interaction (Gulati & Sytch, 2008). One side of this is that first-hand experience increases the perceived ability to predict the future behavior of the trustee by better understanding their dispositions, intentions, motives, ability and capacity (Kramer, 1999; D. L. Shapiro, et al., 1992). In this sense, gradual trust is in many cases a second step which succeeds initial trust. This is referred to as cognition-based gradual trust; i.e. when trust is grounded in rational considerations about the trustee's competence, reliability, and dependability (McAllister, 1995).

Another, less calculative form of gradual trust is affect-based trust. Affect-based trust is founded on emotional bonds between actors (Bigley & Pearce, 1998; Droege, et al., 2003); i.e. it is experience-based trust in the benevolence and goodwill of another actor. McAllister (1995) argues that cognition-based trust is an antecedent to affect-based trust. In both cases, gradual trust is dynamic and evolves in the course of time based on the interaction between the involved actors.

As has been indicated, the above types of initial and gradual trust differ in terms of their fragility and resilience. Generally speaking, gradual trust, because it develops through repeated interaction over time, is considered more robust and resilient to minor infractions (Droege, et al., 2003; S. Zaheer, Albert, & Zaheer, 1999). Gradually developed knowledge-based trust has therefore been termed *resilient trust* or *deep trust* (Leana & Van Buren, 1999; McKnight & Chervany, 2006; Ring, 1996).¹ It rests on beliefs about the other actor's goodwill. Such a belief is often based on first-hand experiences from previous exchange (Leana & Van Buren, 1999; Ring, 1996). Because of its greater resilience, gradual trust is generally more favorable in important and complex exchange situations (G. R. Jones & George, 1998).

Fragile trust, on the other hand, is based on predictability in a specific situation characterized by risk, and is thus compatible with a transaction-cost or calculative view on trust (Williamson, 1993). While resilient trust rests on the perceived moral integrity, loyalty and goodwill of another, fragile trust is situational in that it is based on a rational decision on whether to trust

¹ Resilient trust is primarily related to what McAllister (1995) term affect-based trust, while cognition-based trust is described as relatively more fragile as it is grounded in beliefs about the reliability of another actor rather than on inter-personal care and concern (Ring, 1996).

another actor in a given set of circumstances (Molm, Schaefer, & Collett, 2009; Ring, 1996). While the fragile/resilient dichotomy is not identical to that between initial and gradual trust, there is a considerable overlap between the two. The latter dichotomy relates mainly to *when* trust is developed while the former describes the '*quality*' of trust. Generally speaking, gradually developed trust is more resilient than initial trust because the former is based on first-hand experiences and personal relationships. Initial and gradual trust also induces different antecedents. This will be discussed in the next section.

Antecedents of trust

The way trust is created and sustained lies at the heart of the distinction between initial and gradual trust. This entails that the prerequisites for trust formation also differ. We now explicate these antecedents of different types of trust.

Antecedents of initial trust

The antecedents of initial trust are impersonal in the sense that they do not stem from any direct personal interaction between the trustor and trustee. Instead, antecedents of initial trust are based on group belonging, institutional and situational conditions, or on reputation, i.e. trust mediated by a third party.

Trust in groups means either that the trustor and trustee belong to the same demographic, professional, social etc. group; or that the group that the trustee is assumed to belong to (e.g. academics) is perceived as trustworthy. The underlying argument is that people care about and trust others more if they are perceived as close to them socially, culturally and psychologically (Gargiulo & Gokhan, 2006; T. M. Jones, 1991). Such closeness partly originates from group belonging (e.g. demographic groups) (Huff & Kelley, 2003; Levin, Whitener, & Cross, 2006). Since actors that are members of the same group are more likely to share similar values and attitudes, group membership works as a signal for trustworthiness (Björkman, Stahl, & Vaara, 2007; Gargiulo & Gokhan, 2006; Huff & Kelley, 2003). Furthermore, a central component of trust is perceived predictability, and similarity is often used as an indicator of predictability because it tends to lead to shared norms and values.

Situational and institutional factors also serve as a basis for initial trust creation. An example of a situational factor greatly affecting the level of initial trust is the level of perceived uncertainty (Nooteboom, 2006). The level of perceived uncertainty (in addition to perceived predictability) is based on the perceived likeliness that the trustee will behave opportunistically and on the expected effects of such behavior. One class of situational factors that reduces the level of

uncertainty is the threat of sanctions following opportunistic behavior (deterrence effects) (Nooteboom, 2006). Such deterrence effects may be tied to institutional conditions, which is why situational and institutional factors are closely interrelated. Zucker (1986) links institutional-based trust to the existence of formal social structures that “provide common expectations which define the actors as social beings” (Möllering, 2006 p.360). These reside in legal frameworks as well as in the commonly accepted standards and rules of accepted business behavior in a system (Bachmann, 2006; McKnight & Chervany, 2006). In this sense, institutional factors facilitate trust by making context factors explicit, transparent, and reliable for all the involved parties (Möllering, 2006 p.360).

Lastly, initial trust may also be based on *reputational inference*, notably in the form of third-party referrals and second-hand information about the trustee. Burt and Knez (1995) have shown that third-party gossip has a significant effect on trust creation. Analogously, Gulati (1998) has illustrated the significance of second-hand information and third-party referrals in the formation of strategic networks. While this form of initial trust is based on previous exchange, the exchange does not take place directly with the trustee but with an intermediary agent. It is hence a mediated basis for trust creation.

Antecedents of gradual trust

In contrast to initial trust, gradual trust is based on first-hand experience from interacting. It is thus relational and direct rather than impersonal and mediated. The bases for initial trust – especially assumed characteristics based on similarity or group belonging and third-party referrals – are here substituted by first-hand experience. Similarly, situational and institutional factors are becoming relatively less important as they are usually supplanted by the direct interaction between trustor and trustee. Social exchange is the central antecedent factor when it comes to gradual trust creation. Both the length of the relationship and the frequency of interaction are important antecedent conditions governing the creation of gradual trust. It is widely argued that repeated relationships (Gulati, 1995; Gulati & Sytch, 2008) and frequent communication (Becerra & Gupta, 2003) over time foster the creation of resilient trust between actors.

However, not only frequency and length but also the nature of the interaction is important. Granovetter argues that the strength of a tie is “a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the ties” (Granovetter, 1973 p.1361). More specifically, face-to-face

interaction as compared to technology-mediated communication is seen as particularly efficient for creating knowledge-based trust (Bathelt & Turi, 2011; D. L. Shapiro, et al., 1992). Face-to-face encounters are considered irreplaceable for building and repairing trust despite advances in information technology (Jarvenpaa & Leidner, 1999; Nohria & Eccles, 1992; Storper & Venables, 2004). This is especially the case if the knowledge exchanged is highly complex or has a strong tacit dimension (C. Jones, Hesterly, & Borgatti, 1997; Powell, Koput, Bowie, & Smith-Doerr, 2002).

The argument for this is that, when it comes to communicating complex knowledge and creating and sustaining shared discourses, meanings, and norms, the face-to-face situation, to paraphrase Berger and Luckmann (1966 p.34), “affords us an optimal situation for gaining access to another’s subjectivity”. This is sometimes discussed in terms of Cues-Filtered-Out, i.e. that when the ability to exchange social information is limited, for example in electronic communication, it alters and restricts the nature of the interaction (Walther, 1995; Wilson, Straus, & McEvily, 2006). Naquin and Paulson (2003) illustrate this in their finding that, in the negotiation phase of inter-organizational relationships, on-line negotiations are characterized by lower levels of trust than face-to-face negotiations. Drawing on the work of Goffman (1963), the Cues-Filtered-Out approach stresses that face-to-face (as compared to non-face-to-face) interaction has a positive effect on the ability and speed of role formation; the ability to mediate uncertainty and ambiguity in interaction; the ability to mobilize collective action; and the robustness of relationships (Nohria & Eccles, 1992). All these factors significantly influence the creation of knowledge-based trust between parties.

Face-to-face interaction thus enables resilient trust to develop more rapidly, primarily because the amount of social information exchanged is greater than in non-face-to-face situations (Nohria & Eccles, 1992; Turner, 2002). Wilson et al. (2006) refer to research on group work which indicates that computer-mediated groups can take up to four times as long to share information as compared to groups working face-to-face. Considering that both inter- and intra-organizational collaboration often is a high stakes game for the involved organizations and that the level of trust needed is therefore considerable, a great amount of social information needs to be exchanged in order to enable a sufficient level of trust. In such situations, relying on non-face-to-face interaction would make knowledge transfer a more time-consuming and fragile activity.

The spatial perspective on trust

Given the centrality of social interaction for the creation of gradual trust, it is surprising that so little attention has been paid to how the spatiality of social exchange affects trust creation

processes. A useful starting point for discussing this is the field of economic geography and most notably the literature on economic collocation and agglomeration. While the number of contributions that focus explicitly on trust is limited within economic geography (Murphy, 2006), trust is seen as a fundamental generative mechanism behind knowledge transfer, clusters, industrial districts, learning regions etc. (see Bathelt, Malmberg, & Maskell, 2004; Bathelt & Turi, 2011; Gössling, 2004; Murphy, 2006 for an overview; Storper & Venables, 2004). This section and the next draw together relevant trust-related aspects of this debate and connect them to antecedents and forms of trust.

In the rather extensive literature that studies economic collocation and agglomeration (e.g. Krugman, 1991; Marshall, 1920; Porter, 1998:1990; Saxenian, 1994) trust is considered as a mechanism that facilitates interaction and knowledge transfer, reduces uncertainty and geographical transaction costs and contributes to agglomeration economies and knowledge spillovers. Ceglie and Stancher (2009) show that in districts or clusters of collocated actors, the risk of opportunistic behavior is reduced because such behavior would create social stigma and affect the future ability to acquire economic partners. Such deterrence effects are coupled with knowledge-based explanations stressing that collocated actors more easily gather information on the reliability of future partners and that the frequency of face-to-face exchange is generally higher if the actors are collocated (Bathelt, et al., 2004; Dupuy & Torre, 1998; Harrison, 1992; Storper & Venables, 2004). However, these insights rarely lead to any explicit theorizing on the spatiality of trust creation processes (Murphy, 2006). Trust is primarily used as an explanation as to why geography matters. Few contributions explicitly deal with the role of geographical proximity in the process of trust creation.

The arguments for the significance of trust in economic geography are largely based on the division between tacit and explicit/codifiable dimensions of knowledge. Co-location of economic activity is often explained by the argument that knowledge, and tacit knowledge in particular, remains heavily bound in space (Lam, 2000; Malmberg & Maskell, 1999, 2006). Even as geographical transaction costs diminish and many factors of production become ubiquities as a result of technological progress, this does not infer the “death of distance” (Morgan, 2004). The reason for the spatial anchoring of tacit knowledge is its context-specificity (Asheim & Isaksen, 2002). Knowledge to a large extent defies easy articulation and transfer (Brown & Duguid, 2002; Polanyi, 1958), making it dependent on face-to-face exchange (Gertler, 2003; Lam, 2000).

Central to this argument is the contention that face-to-face interaction facilitates trust creation (Bathelt & Turi, 2011; Storper & Venables, 2004). Because face-to-face is defined in

terms of proximity in physical space, the extension of this view is that trust should be easier to generate and sustain if people are spatially clustered (Wilson, et al., 2006). This view is supported by the cues-filtered-out approach as well as by Goffman's conception of social exchange (Turner, 2002 p.26), arguing that the likelihood of an encounter taking place is a "positive additive function" of [i] the existence of social occasions that put individuals into physical proximity and [ii] the formation of a gathering that assembles individuals in sufficiently closed physical space so that they perceive co-presence. Spatial proximity is thus positively related to the ability to (effectively) exchange social information in interaction and the very likelihood that an encounter takes place at all.

Having said this, it should be acknowledged that proximity is not a solely geographical phenomenon. Geographers are increasingly stressing other (non-geographical) dimensions of proximity (Amin & Cohendet, 2004). Geographical space alone (cf. 'empty space' in Lefebvre, 2007) does not determine the ability to transfer knowledge and information. Rather, space is seen as produced through social practice; as being relational (Torre & Rallet, 2005). This social element of space is evident in the discussion on different forms of proximity, e.g. cognitive, organizational, social, institutional, and geographical (Boschma, 2005). In Table 1 five forms of proximity are delineated.

Table 1: Five forms of proximity based on Boschma (2005) (see also Nilsson, 2008).

Form of proximity	Description	Key dimension
Cognitive	The extent to which people sharing the same knowledge base and expertise learn from each other.	Knowledge gap
Organizational	The extent to which relations are shared in an organizational arrangement.	Control
Social	The extent to which relations are embedded in a social context at the micro-level (e.g. friendship).	Trust (based on social relations)
Institutional	The extent to which relations are embedded in an institutional framework (e.g. routines, established practices, laws and rules) on the macro-level.	Trust (based on common institutions)
Geographical	The extent to which relations and knowledge are shared amongst geographically proximate actors.	Distance

While geographical proximity² alone is neither necessary nor sufficient for social interaction and trust creation to take place, we argue that it is highly facilitative both for the creation of other forms of proximity and for the creation of trust. Where there is a high degree of social and cognitive proximity, e.g. within a community of practice, trust creation is possible without physical proximity (Amin & Cohendet, 2005). It is however also true that geographical proximity is sometimes generative and often correlated with other forms of proximity. As physical proximity is supportive of direct social exchange, it is also intimately related to the generation of social proximity and by extension (though to a lesser extent) also to cognitive proximity. The latter is based on the view that when individuals interact over time they develop a joint knowledge-base and cognitive models. Furthermore, geographical proximity often correlates with other proximities (though without assuming any causal connections), for example with institutional proximity. This simply means that there is a greater probability that actors that are collocated also share institutional frameworks as these are to an extent determined by regional and national levels.

Lastly, it should be stressed that spatial proximity is not always permanent. Temporary proximity created by travelling to visit meetings, congresses, and conferences etc. can to some extent act as a substitute or complement to permanent proximity (Maskell, Bathelt, & Malmberg, 2006; Torre, 2008). The very aim of such activities is to bridge geographical distance and to create temporary collocation.

Trust and its spatial characteristics – towards an integrated framework

In the review of the literature, we have argued that the antecedents of gradual trust – length, frequency, and nature of social exchange – are closely linked to the spatiality of relationships. This link has been given little treatment within the management literature. Even within economic geography, where the concept of trust is frequently drawn on to explain collocation of economic actors, the concept of trust and the process of trust creation remain under-theorized (Murphy, 2006).

In line with existing research, we argue that the link between forms of trust and spatial proximity relies mainly on the degree of the involved social interaction. Resilient trust is most easily created through social interaction and is hence based on gradual trust. Social interaction is in turn a crucial enabler of social proximity. Even with the advances in communication technology, face-to-face interaction remains crucial for economic and social exchange. While

² We use the terms spatial, geographical and physical proximity as synonyms in this article.

not a *necessary* criterion for trust creation, geographic proximity, permanent or temporary, is an enabler for establishing resilient trust smoothly and rapidly. The other, non-geographical, forms of proximity – institutional, organizational, and cognitive (cf. Boschma, 2005) – are primarily linked to the creation of fragile trust. Fragile trust, as compared to resilient trust, is arguably relatively easier to form without spatial proximity. In the creation of fragile trust, which is closely related to the antecedents of initial trust, space is reduced to an indirect mediating factor. This means for example that actors that are located close to each other often also share cultural and institutional settings (Mattes, 2012). In a similar fashion, geographical proximity has an indirect influence on the antecedents of trust in groups, reputational inference, and situational factors.

Figure 1 gives an overview of the relationships between trust, its antecedents, and different forms of proximity. We will explain this framework in the following.

Figure 1: The role of geographical proximity in trust creation processes

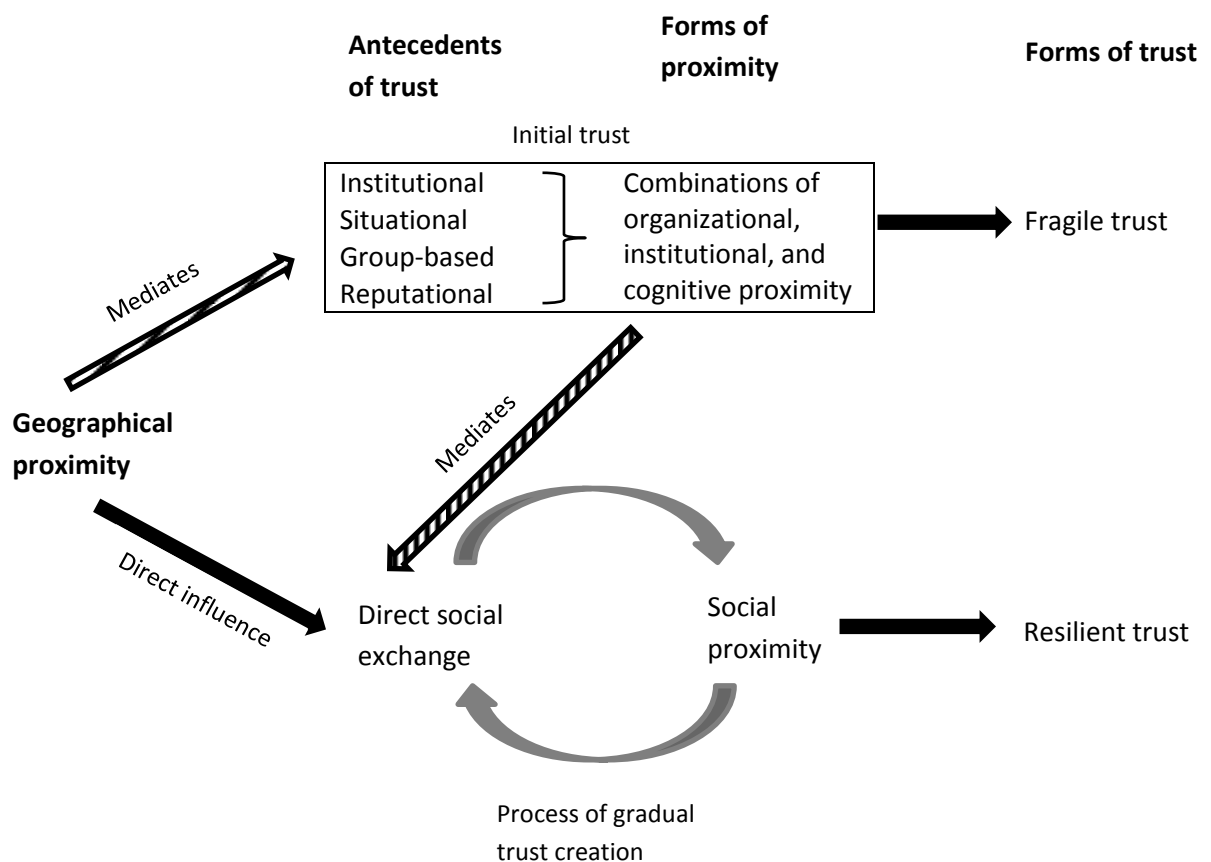


Figure 1 shows the direct and indirect effects of geographical proximity on the creation of resilient and fragile trust. The degree of geographical proximity has a direct effect on the nature and frequency of social exchange, and thereby also on the gradual process of resilient trust creation. On the other hand, it only indirectly affects antecedents of initial trust, which is why we regard it as a mediator there. The second link in our model connects antecedents of trust to other forms of proximity. We hence follow the argument that geographical proximity can influence the creation of other types of proximity (cf. Mattes, 2012; Nilsson, 2008). The antecedents and the proximity forms are different aspects of the same phenomenon. This is particularly clear for the antecedents of initial trust. Institutional, situational, reputational, and group-based antecedents can also be viewed as different combinations of organizational, institutional, and cognitive proximity. The antecedent factors cover more than what is implied in the proximity concepts, *but* the understanding of antecedent factors can be increased by asking which proximity forms are involved in each factor. To illustrate, institutional antecedent factors of trust are clearly related to institutional proximity. At the same time, institutional-based antecedent factors relate to more than institutional similarity (proximity); e.g. the existence of well-developed (but not necessarily similar) legislative and judiciary institutions. Another example is situational antecedents, which may be a result of a common cognitive perspective, or the fact that actors belong to the same organization (cognitive and organizational proximity). The clearest example of the link between proximity types and antecedent factors concerns group-based antecedents, as the latter are partially defined in terms of in-group similarities. Disentangling if these similarities are organizational, institutional, or cognitive in a given situation provides a clearer picture of what lies behind the antecedent.

The relationship between antecedents of trust and proximity forms is much more direct in the creation of gradual trust. Geographical proximity enables frequent direct social exchange which in turn creates social proximity. Only when there is a level of social proximity is resilient trust created. Social proximity also infers another benefit, namely that it facilitates further social exchange which instigates a virtuous circle of trust creation. Once initiated, such a circle is not *dependent* on geographical proximity, but geographical proximity still affects the frequency and nature of the exchange.

As illustrated in Figure 1, also the other forms of proximity (organizational, institutional, and cognitive) may influence the level of social exchange and thus the creation of resilient trust. This is consistent with the view that initial trust can be seen as an antecedent to gradual trust.

Methodology

In the empirical analysis, we draw on two cases of specific innovation projects conducted by MNC active in the transportation and information technology sectors in Germany (Mattes 2012; Heidenreich et al. 2012). The unit of analysis is instances of trust creation in collaborative projects in MNCs. Data was collected through narrative expert interviews with leading managers and individuals directly involved in the innovation projects. In the interviews, we strove to cover all the relevant functional areas, i.e. research, development, production, quality control, and marketing (Hage & Hollingsworth, 2000). The interviews were conducted in 2006 and 2007 by one of the authors. They followed an open interview guideline with narrative elements, whereby the interviewer took care to cover the intended topics, but left much freedom in the order of the proceedings to the interviewee. Topics covered were the collaboration in the innovation project in focus, assumed roles, emerging conflicts, learning and knowledge transfer as well as the role of trust and its emergence.

The two presented cases are based on 43 expert interviews as well as additional documents provided by the companies. Each interview took between one and three hours, and about 20 interviews were carried out in a tandem constellation to grant a more neutral assessment of the obtained information. They were conducted in the mother tongue of interviewees and interviewers. All interviews were recorded and transcribed. Additionally, comprehensive notes and a memorandum covering the most important aspects during visits at the company locations were also used in the analysis. We took care to have a fresh memo in the sense of a “12-hour rule”, which meant that the detailed interview notes and a baseline summary had to be completed on the very day of the interview (cf. Eisenhardt, 1989 24-hour rule). For the analysis, relevant aspects were extracted from the interviews and grouped along pre-defined and constantly adjusted coding categories, mirroring the topics covered (e.g. mutual learning, trust formation, power constellations etc.). This led to encompassing case studies, each of which gives a comprehensive account of all the relevant data on the case. These documents comprise about 200 pages per case. The quotes used for this article were translated by a professional and carefully double-checked to make sure they convey all the relevant nuances in an adequate fashion.

By drawing on the two cases in different sectors, we can provide insights into how trust is being created and which role spatial proximity plays thereby. In order to do so, we will move within the different cases and connect the observable instances of trust creation to the particular spatial arrangement. Based on the number of cases, our aim is not a statistical, but a theoretical generalization of the results (Yin, 2003).

Empirical analysis

In the following chapter, we investigate instances of trust creation and evolution in two innovation projects in the MNCs TransportCom and ITCOM. Each project is first briefly described before a number of examples are given of how trust was initiated in the project. Our focus in the analysis is on the relationship between trust antecedents and spatiality. In order to understand this, we identify the involved trust antecedents and proximity types, and then analyze in which spatial constellation trust creation occurs. In some examples, the introduced trust antecedents are closely interrelated and hence impossible to differentiate in empirical cases. For example, when actors share language this can be analyzed both as a group-based and institutional-based antecedent of trust. On the one hand the actors belong to the same socio-demographic language group and on the other hand the individuals reduce uncertainty by referring to the same institutionally situated language codes. When identifying the antecedents, we will hence point at the dominant aspects, but also accept that in many cases, a single trust formation process is decisively characterized by several antecedents. Moreover, we use proximity types as a different perspective on the same phenomenon in order to specify what lies behind the antecedents.

Case story 1: TransportCom

TransportCom is a German multinational conglomerate in the area of electronics and electrical engineering. The company employs over 400,000 people globally. The innovation project studied here is situated within the corporate division of transportation where TransportCom is a major actor on the European market. It concerns the development of an integrated technology which includes bogie, drive, and brakes for trains.

The initial idea behind the project emerges when two managers from different sites within the company meet for the first time at a company-internal conference. One of them has an idea for improving the drive, the other has worked out a combination between bogie and brakes. They realize that they increase the attractiveness of their individual ideas for the company if they combine them and turn them into a fully integrated drive for trains.

Based on the initial agreement to combine their two ideas, the project spans the two corporate sites of the transportation and drive divisions at which these managers work. The subsidiaries are located in Southern Germany and Southern Austria and both regard themselves as independent corporate units. The two initiators view themselves as equal partners in the project, which results in a very egalitarian set-up of the project. The two

initiators involve a number of their staff and colleagues in the project. As the project becomes more formalized, the German headquarters joins as a third party. Its role is mainly to integrate the new product into the corporate portfolio, a fact which appoints a strategic position to the third involved site and also explains why the main involved employee acts as the formal project leader.

When the individual components of the new technology have been developed, their integration takes place in a separate production site in Western Germany. All the involved parties are at least temporarily physically present at the production site. Quality tests again involve a displacement of the project to another site in Western Germany, but all persons that stay involved dislocate together with the project. After completion, the prototype is used by a local railway operator (lead client) in Southern Germany.

In the following, we enter an analysis of critical moments of trust creation taking place in the course of this project. They refer to different points in time in the project: the initiation and the formalization.

The first example of trust relations concerns the two initiating managers, how they get to know each other, and how they start their collaboration. The divisions within TransportCom have always been given great autonomy. The two subsidiaries from where the initiating managers come are part of two different corporate divisions, the drive division and the transport division. While they are highly independent and work closely together, the former acts as an internal supplier for the latter. Despite this formal autonomy and the fact that the initiators did not know each other before, a level of initial trust is created at the outset. This can be ascribed to similarities in terms of language and culture (German-Austrian, academic background, etc.; i.e. cognitive and institutional proximity) in combination with situational factors like the fact that the exchange takes place within the setting of TransportCom (organizational proximity; cf. also Gargiulo & Gokhan, 2006). A further situational factor influencing the creation of initial trust is the fact that both initiators had tried but failed to develop similar ideas in the past. This made them conscious of the potential benefits and low risks associated with collaboration.

Group-based antecedents are also important in this process of initial trust creation. A concrete example is their shared language. One of the two initiators outlines this in the following.

And the same language, that helps enormously. Well, it is also much more difficult when it has to be done in English. I'm not saying that it doesn't work... [...] But normally it's better in the mother tongue because in your mother tongue you can very quickly describe the effect you're

concerned about or you want to have. And if it's Austrian or Bavarian, that somehow goes together. It certainly helped that the multinationals have limited themselves to Austrian and German there. ([Manager 1] 12f.)

However, the fact that the two initiators quickly develop a high level of trust can only partly be traced back to these antecedents of initial trust. In this example, gradual trust also develops quite rapidly as the two initiators instantly start sending out signals of trustworthiness to each other in their initial interactions (c.f. Beckert, 2006). This results in mutual sympathy (social proximity) as an early form of gradual trust. Their underlying disposition to trust can also be regarded as a personality trait of the two involved actors (personality-based trust) (c.f. Gargiulo & Gokhan, 2006; McKnight & Chervany, 2006), resulting in more rapid development of both initial and gradual trust.

[Manager 2] it is very easy-going. This [the ability to rapidly develop resilient trust] also has to do with the fact that we're relatively easy-going... ([Manager 1] 9)

On the basis of the outlined similarities regarding language, culture, and educational background as well as their personal interest in pushing the project forward (situational factor), and with the personal traits of the individuals they quickly establish a level of resilient trust, i.e. trust that is maintained over multiple transactions and less sensitive to minor infractions (Droege, et al., 2003). After the first face-to-face encounter creates some level of trust, geographical distance does not hamper the subsequent creation of this resilient trust.

It wasn't as if we met God knows how many times there. (...) Anyway, it wasn't much. Back then, it was something that he simply took for granted and something that I took for granted. Somehow the puzzle just fitted together. It didn't require a high level of synchronisation. And the distance wasn't an issue at all. ([Manager 2] 9)

This example illustrates the role of initial trust as an antecedent for gradual trust. The personal disposition of the two initiators to trust each other combined with similarities as well as situational and institutional factors explains the level of initial trust. The development of fragile trust through institutional, cognitive, and organizational proximity coincides with the first meeting of the two actors, and it is instantly reinforced by the creation of resilient trust. Based on situational and personality factors and the favorable situation, the actors need only little direct social exchange to gradually build a significant level of resilient trust. Geographical proximity is the crucial facilitator for triggering the process. It is critical at the very beginning, but even after only a couple of hours of face-to-face interaction, the trust creation runs smoothly even without collocation.

A second example of trust creation is the moment when the project starts to involve more people and thereby increases in complexity. At this stage, the project involves employees from three subsidiaries within TransportCom and a number of external partners (mainly suppliers). This phase involves the *identification* and *integration* of new partners. When deciding on whom to involve, the initiators primarily draw on people they already know and have established a level of trust towards. This illustrates that in complex social situations, previously developed resilient trust is particularly important (cf. Gulati & Sytch, 2008).

Well, we usually already had internal relationships or knew internal contacts beforehand. They were people that you knew from other projects or from the past. This means that the relationship had already been established, maybe not on this project level, but from somewhere else. In most cases this meant that you already knew each other on a first name basis and had known each other for ages on another level. This makes it easier to resume contact and of course dealing with each other is pretty straightforward. ([Electronics employee] 4)

When the required competencies cannot be found within the existing network of contacts, these are sought via social recommendations (reputational inference) or formal qualifications (trust in groups or institutional factors). Hence, trust that is based on referrals or formal qualifications serve as an alternative connecting device when firsthand experiences are not available.

Okay, but you can assume that if the trade manager and the technical expert have written and read this report, that a certain, how should I put it, a certain trust level exists. ([Quality employee] 10)

In order to integrate new people in the project, gradual trust is being created via face-to-face contacts. The initiators visit their location physically in order to convince them of the idea and to establish trust for their cooperation. It is stressed that without a first personal meeting, it would be much more difficult to motivate new partners to take an active role in the project. This illustrates that when the setting is complex and when there are no referrals or previous experience, there is a need for face-to-face contact at least in the initial phase of the exchange (cf. C. Jones, et al., 1997; Powell, et al., 2002).

In some instances, establishing a working relationship also includes overcoming initially present distrust based on differences (i.e. (dis)trust in groups, e.g. based on cognitive

distance). In these instances, face-to-face contact is again critical. The following quote illustrates the difficulty of establish trust between employees from different corporate levels.³

I can, of course, just fall back on my position and say: "Look here, I'm a PhD, great, excellent." But this will sometimes create a problem in the factory. However, if you turn up at the factory and say: "Ok, we need to build a component somewhere here." And you show up wearing jeans and a torn t-shirt, and you are the first in the pit (...) and the last to leave, this creates an incredibly good working atmosphere. It gets rid of barriers. (...) This essentially creates a certain degree of permeability between the layers. Without being present on site, this can't be achieved. (...) ([Project coordinator] 19f.)

The importance of these face-to-face meetings becomes clear when looking at the limits of communication technology (cf. cues-filtered-out Wilson, et al., 2006):

Certainly many details can be arranged by telephone. But you can't really strengthen personal relationships on the telephone. It's always better face to face. When you sit at the table together like we are doing now, you can interact and converse far more effectively. Even the little things like this sketch I have just drawn. That would be really difficult on the telephone. ([Project coordinator] 18)

This shows that distant communication is helpful and often sufficient to maintain a good working level on the basis of an already established level of trust. However, it does not help to establish and create trust in the first place. Even though the antecedents of initial trust may help to establish the first contact between the involved actors, a reliable basis for collaboration is dependent on social interaction. As in the previous case, social interaction is not restricted to face-to-face contact, but it is more likely to take place and be more efficient if it involves at least temporary collocation. This is particularly important if trust barriers need to be overcome. The relationship between distant communication and the robustness, complexity, and speed of the developed trust will be addressed in more detail in the ITCOM example.

We can conclude that various antecedents of trust can be identified in the outlined project. As expected, initial trust is less reliant on geographical proximity than gradual trust. In many

³ In order to understand this example, it is important to know that educational degrees (above all the doctor's degree) are of an enormous social importance in Germany. People who are not well acquainted address each other using the formal title and the last name. Degrees and qualifications induce social divides that difficult to overcome. The situation in other countries, for example in Sweden, would hence be very different. Nonetheless, the example is instructive also for other contexts as it illustrates how distrust can be overcome via intensive social interaction.

cases, when creating initial trust, group-oriented factors act as mediators, for example qualifications obtained in a certain university or having a particular profession. While situational and institutional factors may be bound to space, they do not require direct proximity. Examples include a shared language (which you are likely to share when living in the same or proximate countries) and a common cultural or legal framework (also largely bound nationally). At the same time, trust is not always dependent on direct and lasting face-to-face interaction. First of all, indirect ties such as recommendations by colleagues can help to establish an a-priori level of trust similar to trust in groups. Second, even though trust in new partners requires an initial personal meeting, once formed, it can be maintained and even extended over a distance. Here, other connecting factors such as situational factors, group similarities, and institutional factors seem to substitute (part of) the geographical elements.

These findings are summarized in the way the local cluster manager describes the emergence of contacts and trust in the region around TransportCom. The following quote shows how trust building is not strictly enabled, but at least facilitated via geographic proximity.

The cluster doesn't exist from contacts alone. Contacts don't mean a thing if you don't trust the person and know about them. Regionally, of course, you can set that up more quickly and efficiently. ([Cluster manager]: 8).

Case study 2: ITCom

ITCom is a US-based corporation active in the IT sector. It is a major player in the areas software, hardware, and IT-related services. The company has more than 400.000 employees worldwide. The project studied here is led by the software division and takes place in the main German development center of ITCom. It concerns the development of a software bridging device that translates an information-oriented application into a different process language.

The project arises from an idea by a software engineer in the German development site who collaborates with a professor from the local university. The core of the project is a small group of people concentrated at the German site. A sponsor from the US headquarters holds a protective hand over the project. In the development phase, work in the separate software areas is carried out within the same unit, but besides the initiating department, a second department that is expert in the process language also becomes involved. Hence, new trust relations have to be established. Software tests are conducted by Indian and Chinese IT-Com sites and involve communication with Japanese partners. Throughout this process, the central responsibility remains in the initiating lab in Germany. A small group of well acquainted people at the German site are the core drivers of the project from start to finish. There are two groups

that are not located in proximity to the German site: The US headquarters with the chaperoning “sponsor” who is not directly involved in the actual development work, and the marginally involved Chinese and Indian testers. While both groups have approximately the same level of involvement in the project, the level of trust between the German site and these two groups differs substantially.

We will now explain some of the critical trust-creation processes which occurred at different stages of this project (initiation, start of development, and unit testing).

The **first example** concerns the initial stage of the project. All the actors involved here know each other personally based on prior interactions: the professor and the US sponsor are former colleagues that worked together with the initiating software engineer in the German lab. Through this geographically close arrangement and frequent face-to-face contact, sustainable resilient trust relations have already been built. The position of the US-based sponsor from the headquarters is particularly interesting. He holds a protective hand over the project and makes sure it receives the necessary funds, even though the market success of the idea cannot be guaranteed. The relationship between the US-sponsor and his German colleagues is very informal and works without regular or institutionalized interaction. This illustrates that once resilient trust has been established, it can be maintained over a long period of time – even without face-to-face exchange taking place.

Of course, I’ve known my counterparts in the USA for a long, long time. I thought that the half-life is half a year, and after one and a half years that’s it, finished, which is absolutely not the case at all. I’ve noticed no impairment. It practically doesn’t change at all. [...] What I’m trying to say is that if you know each other for long enough, the relationship dissolves surprisingly slowly. ([Prof 2]: 8f.)

This example clearly illustrates that previous social relations and the involved first-hand experience from face-to-face exchange act as a strong antecedent of trust (social proximity) (cf. Gulati & Sytch, 2008). These relationships are already sustainable and able to cope with diverging opinions, leading to resilient trust. The fact that the trust in the person is simply not being questioned acts as a great asset in working together. The involved actors have the feeling of being able to predict and judge the other person’s opinions (cf. Ring, 1996).

Perhaps from my other project I can say that I know the marketing manager really well and of course that leads to more efficient communication there. That means with a single email I’ll take care of something or he’ll do something. He knows he can trust me. I know I can trust him. And I can size him up pretty well. I know what he won’t do and I know what he will do. And I know where I’ll

probably have to chase him up. And that is actually very satisfying for both of us. ([Software engineer 1]: 12)

In summary, trust creation in this example focuses on gradual trust based on previous and concurrent social exchange. The actors have established a level of social proximity among them; they like each other and can estimate each other's reactions. Geographical proximity contributes to the strengthening of existent trust, but previously established resilient trust can likewise be maintained over a distance.

A **second example** concerns the trust formation process that occurs when a second department within the German lab starts to participate in the project. The two departments do not typically have frequent interaction. The fact that the project initiator asks the second department to contribute derives from their complementary competences, and the fact that the second department is located in the same building makes it easily accessible. The formation of trust is facilitated by group-based similarities such as shared socio-cultural backgrounds of the people involved and by a shared organizational culture and institutional context (organizational and institutional proximity). While these are not necessarily reliant on geographical proximity, they often co-exist with it (cf. also Mattes, 2012). Because of this, there is a level of initial trust as well as favorable conditions for rapid creation of gradual trust.

One thing that spatial proximity does is that it makes direct communication easier, the other thing is that you come from the same culture, and that means that you likely have a similar sense of timing and these kinds of things that could be different from culture to culture. But the third thing within [this working area], of course, is that you come from the same corporate culture. [...] We also have a kind of labour culture... ([Overall manager]: 5)

While a level of initial trust is facilitative for successful exchange between departments, complex and sensitive situations, such as product development processes, often require trust that has developed through personal exchange over time (cf. G. R. Jones & George, 1998). In this case, the initial trust can be seen as a first step towards the development of resilient trust that is more robust and resistant to shocks. In the latter, face-to-face meetings and direct interaction between the involved actors are critical as they foster social proximity. The following citation even equalizes trust with personal meetings (cf. Nilsson, 2008):

And I think that meeting physically in person is just really important. I know this from my other projects. To develop trust, to be able to understand others and by doing so to firstly remove all barriers which can get in the way of working together technically and which will also facilitate this exchange,

in order to be able to achieve technical innovations, at least this part where you are searching for solutions. [...] And in my opinion trust is really essential to this. ([Software engineer 1]: 4)

For this transformation from initial to resilient gradual trust, direct geographical proximity is seen as critical. Again, the importance and efficiency of face-to-face interaction is evident when comparing it to the distant communication that takes place with the US headquarters. Above all, the speed of knowledge exchange (and with it the *speed* of trust-building) decreases as geographical distance increases (cf. Wilson, et al., 2006). Face-to-face is hence a facilitator of resilient trust creation.

In January I was in the States for two weeks and I'm certain [...] that if we had done this via email or on the telephone we would have needed two or three months instead of the week we were there. ([Development employee 1]: 2f.)

Besides differences in the speed of trust creation, the *robustness* of the trust created also differs with the geographical dispersion of the involved actors. While facilitating interaction, information technology cannot supplant face-to-face exchange. Having met in person, even only once, gives way to a different quality of trust which is much more sustainable and durable (cf. Nohria & Eccles, 1992; Walther, 1995).

However, trust in the team members is of fundamental importance and it cannot be overestimated – you've probably already heard that a lot. That famous saying: you can't email a smile. When you start a new project which is spread across multiple development teams, within the first few weeks the teams have to meet, mind you not everyone together but first of all the chief engineers and managers etc., in order to establish trust. After a year, everyone who has frequent contact with each other should have met in alternation. Personal relationships and trust are fundamental to the project. And when you know someone personally and have had a beer together, then that's completely different. [...] And that's a really great foundation for distributed projects. And then you can get on the telephone and say: "Listen Joe or Karl-Heinz, you need to do this for me. Do me a favour and then I'll do you a favour tomorrow. Something isn't right and you need to do this or that." And that actually works really well. ([Prof 2]: 8)

This example illustrates that geographical proximity above all makes the creation of a reliable level of trust easier and more efficient (cf. Naquin & Paulson, 2003). It is hence not an absolute requirement, but it can reduce the involved time, costs, and effort in creating trust. It can be concluded that if there is no geographical proximity involved in the process of gradual trust creation, this process will be considerably more difficult and is more likely to fail.

A **third example** of trust formation concerns the involvement of the Indian and Chinese test teams as well as some Japanese partners. They all work in specialized test labs of ITCOM and perform tasks specified by the German development lab. In these cases, there is almost no face-to-face interaction taking place. Furthermore, there is an absence of initial trust antecedents, e.g. group-based similarities or institutional similarities. A result of this is that the relationship between these collaborators and the German team is not based on a high level of trust. Instead, both parties retain an arms-length relationship, characterized by a high degree of skepticism and apprehension, making the trust that *does* exist more fragile and sensitive to minor infractions or misunderstandings. One respondent describes how the lack of face-to-face contact is responsible for this:

Even if it's just talking through the design of a particular function, you can spend a lot of time at meetings. That can also happen to you here on site, but I have more control here on site. Then I say, "OK everyone, let's all get together on this. We'll decide this here and now within the next 15 minutes." You can work with your colleagues face to face and the right decision will be made. With colleagues overseas, you sometimes have to examine the situation carefully. When do we need a decision? How much leeway do we actually have or should we have? It's not all that easy. In this sense when cooperating I think it's preferable to have closed units which develop together at one location... ([Software engineer 1]: 14)

Apart from the difficulty to establish trust across geographical distance, the different institutional contexts in which the actors are embedded also hamper communication and thereby trust-creation (institutional distance). The following quote illustrates how different cultural habits lead to difficult and awkward communication between the German team and their Japanese partners.

Communication is different. They have a different way of communicating and talking with each other. OK, for example, if a problem crops up, we say: "Yeah, OK, there's this or that problem. There is this or that problem at your end. That doesn't work." But this doesn't mean to say: "What kind of a mess have you created this time! Are you crazy?" But if you write something like that to the Japanese, they're offended. [...] It's a type of protocol for how you speak with each other. So when I wrote an email, I would say: first off "Yashida-san' (jap.) I'm terribly sorry. I can't get it working. I'm doing something wrong. Excuse me. This or that is my problem." Even though I know for sure that the problem is at their end, nevertheless: "Please tell me what I need to do to get it working. Again, please excuse me, thank you very much, goodbye." And then he writes back: "Yeah that could be. - I also apologize many times (laughs) - it could be that I've made a mistake. I'll have a look at it, but thank you again for the..." and so on. ([Development employee 1]: 22f.)

This example illustrates how geographical distance coupled with social/cultural distance can act as a barrier to trust creation. It also shows how non-spatial forms of proximity influence

the nature of social exchange. In this sense, the combined lack of geographical, institutional (mainly cultural), and social proximity makes it extremely difficult to create even fragile trust. The exchange is therefore based on formal rules and distrust.

In conclusion, the ITCOM case illustrates that even in contexts where communication technology is widely accepted and used; it can only provide a complement to face-to-face exchange, but not a substitute. In face-to-face interaction, trust is created more rapidly, the trust that is created is more robust, and it thus enables the exchange of more subtle and sensitive information. At the same time, once resilient trust has been established on the basis of personal interaction, it can be maintained over large distances for a long time. For the direct cooperation in a project, regular face-to-face contact and a high level of gradual trust still seem to be favorable.

Implications and conclusions

The aim of this paper has been to show that geographical proximity plays an important but often overlooked role in the process of trust creation. Our analysis indicates that the importance of space differs between situations where trust is being created gradually compared to initial trust. Our findings confirm the view that face-to-face interaction influences the type of trust created (i.e. F2F facilitates the creation of resilient trust) and the speed at which trust is created (cf. Bathelt & Turi, 2011; Nohria & Eccles, 1992). As face-to-face contacts are closely linked to (at least temporary) collocation, spatial proximity acts as an important facilitator. In the following, we will outline some of the main results of our analysis.

The initiating individuals' personal relationships and level of trust are important for the success of the project. If there is already a degree of trust developed in previous exchanges (as between the initiators in ITCOM), or if robust trust develops swiftly through face-to-face interaction and social proximity between the involved actors (as between the initiators in TransportCOM), it is possible to sustain the relationship over time and space. In these cases, space gets less important as the project proceeds. Without a basis for developing such robust trust (as in the case of ITCOM between the German lab and the Chinese and Japanese test sites), the decision to trust is more situation-based and calculative than in the case of trust created through personal exchange and favorable antecedents of initial trust. These insights show that even temporary face-to-face interaction can act as a trust-facilitating factor which has impacts long beyond the actual collocation.

Experiences from previous exchange (resilient trust) are important not only in the initial phase of the projects, but also whenever new actors enter the project (as in the second example in TransportCom). This is particularly critical as the complexity and economic significance of the projects increase over time. The type and quality of exchange with new entrants markedly differs according to the situation. In cases where there are favorable conditions for the development of trust (e.g. organizational proximity), resilient trust relationships develop more easily and swiftly than in situations where such conditions are lacking. Collocation between existing project members and new entrants is one such condition as it facilitates gradual trust. Another one is the existence of good conditions for initial trust such as similarities in terms of background, culture, and institutional context (institutional, cognitive, and organizational proximity). These antecedents of initial trust facilitate the emergence of fragile trust, which can then over time gradually develop into resilient trust. In this transformation process, face-to-face social exchange is often, but not always, required.

Spatial proximity is thus critical for building resilient trust as it fosters the creation of social proximity. Fragile trust, however, is not directly reliant on face-to-face contacts, especially in situations where new actors establish initial trust. However, many of the antecedents to initial trust are mediated by collocation. Actors in the same locality (and working in the same industry or firm) often share institutional setting, culture, language, social belonging etc. (institutional, organizational, and cognitive proximity) and have access to third-party referrals about the trustworthiness of other actors. All these shared aspects facilitate trust-building. However, commonalities can also exist between actors residing in different localities. Nonetheless, the outlined constellation between the German ITCOM lab and the Indian and Japanese test sites illustrates how the lack of initial trust antecedents and missing face-to-face contact significantly hampers the trust creation process between actors in different sites.

Lastly, it should be stressed that while this paper focuses on how geographical proximity affects trust creation, it is difficult to draw any direct and unambiguous causal linkages between space and trust. Geographical proximity is neither necessary nor sufficient for the development of resilient trust. Nor does it guarantee that trust will actually be created. Moreover, our findings show that a permanent collocation is not at all necessary for trust creation, but temporary face-to-face contacts are enough for triggering the trust creation spiral. In this sense, and that is the main point of our paper, geographical proximity is facilitative, and acts as a generative mechanism in the creation of trust. Therefore, it should be included in the analysis of trust development in future contributions to the topic.

Bibliography

- Amin, A., & Cohendet, P. (2004). *Architectures of knowledge: firms, capabilities, and communities*. Oxford: Oxford University Press.
- Amin, A., & Cohendet, P. (2005). Geographies of Knowledge Formation in Firms. *Industry and Innovation*, 12(4), 465-486.
- Asheim, B. T., & Isaksen, A. (2002). Regional Innovation Systems: The Integration of Local 'Sticky' and Global 'Ubiquitous' Knowledge. *Journal of Technology Transfer*, 27(1), 77-86.
- Bachmann, R. (2006). Trust and/or power: towards a sociological theory of organizational relationships. In R. Bachmann & A. Zaheer (Eds.), *Handbook of trust research* (pp. 393-408). Cheltenham, UK: Edward Elgar.
- Bachmann, R., & Zaheer, A. (Eds.). (2006). *Handbook of trust research*. Cheltenham, UK: Edward Elgar.
- Barney, J. B., & Hansen, M. H. (1994). Trustworthiness as a Source of Competitive Advantage. *Strategic Management Journal*, 15(Winter), 175-190.
- Bartlett, C. A., & Ghoshal, S. (1989). *Managing across borders. The transnational solution*. Boston Mass: Harvard Business School Press.
- Bathelt, H., Malmberg, A., & Maskell, P. (2004). Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation. *Progress in Human Geography*, 28(1), 31-56.
- Bathelt, H., & Turi, P. (2011). Local, global and virtual buzz: The importance of face-to-face contact in economic interaction and possibilities to go beyond. *Geoforum*, 42(5), 520-529. doi: 10.1016/j.geoforum.2011.04.007
- Becerra, M., & Gupta, A. K. (2003). Perceived Trustworthiness within the Organization: The Moderating Impact of Communication Frequency on Trustor and Trustee Effects. *Organization Science*, 14(1), 32-44.
- Beckert, J. (2006). Trust and markets. In A. Zaheer & R. Bachmann (Eds.), *Handbook of trust research* (pp. 318-331). Cheltenham, UK: Edward Elgar.
- Berger, P. L., & Luckman, T. (1966). *The Social Construction of Reality - A Treatise in the Sociology of Knowledge*. New York: Anchor Books.
- Bigley, G. A., & Pearce, J. L. (1998). Straining for Shared Meaning in Organization Science: Problems of Trust and Distrust. *The Academy of Management Review*, 23(3), 405-421.
- Björkman, I., Stahl, G. K., & Vaara, E. (2007). Cultural Differences and Capability Transfer in Cross-Border Acquisitions: The Mediating Roles of Capability Complementarity, Absorptive Capacity, and Social Integration. *Journal of International Business Studies*, 38(4), 658-672.
- Boschma, R. (2005). Proximity and Innovation: A Critical Assessment. *Regional Studies*, 39(1), 61-75.

- Brown, J. S., & Duguid, P. (2002). Local knowledge: Innovation in the networked age. *Management Learning*, 33(4), 427-437.
- Burt, R. S., & Knez, M. (1995). Kinds of Third-Party Effects on Trust. *Rationality and Society*, 7(3), 255-292.
- Ceglie, G., & Stancher, A. (2009). The industrial district model in the development strategy of international organizations: The example of UNIDO. In G. Becattini, M. Bellandi & L. De Propris (Eds.), *A handbook of industrial districts* (pp. 754-769). Cheltenham, UK: Edward Elgar.
- Droege, S. B., Anderson, J. R., & Bowler, M. (2003). Trust and organizational information flow. *Journal of Business and Management*, 9(1), 45-59.
- Dupuy, J.-C., & Torre, A. (1998). Cooperation and trust in spatially clustered firms. In N. Lazaric & E. Lorenz (Eds.), *Trust and Economic Learning* (pp. 141-161). Cheltenham: Edward Elgar.
- Eisenhardt, K. M. (1989). Making fast strategic decisions in high-velocity environments. *Academy of Management Journal*, 32(3), 543-576.
- Gargiulo, M., & Gokhan, E. (2006). The Dark Side of Trust. In R. Bachmann & A. Zaheer (Eds.), *Handbook of Trust Research* (pp. 165-186). Cheltenham: Edward Elgar.
- Gertler, M. S. (2003). Tacit knowledge and the economic geography of context, or The undefinable tacitness of being (there). *Journal of Economic Geography*, 3(1), 75-99.
- Goffman, E. (1963). *Behavior in Public Places: Notes on the Social Organization of Gatherings*. New York: Free Press.
- Grabher, G. (2002). Cool Projects, Boring Institutions: Temporary Collaboration in Social Context. *Regional Studies*, 36(3), 205-214. doi: 10.1080/00343400220122025
- Grabher, G., & Hassink, R. (2003). Fuzzy Concepts, Scanty Evidence, Policy Distance? Debating Ann Markusen's Assessment of Critical Regional Studies. *Regional Studies*, 37(6-7), 699-700.
- Grabher, G., & Maintz, J. (2007). Learning in personal networks: Collaborative knowledge production in virtual forums. In H. Hof & U. Wengenroth (Eds.), *Innovationsforschung. Ansätze Methoden Grenzen und Perspektiven* (pp. 187-201). Hamburg: Lit Verlag.
- Granovetter, M. (1973). The strength of weak ties. *The American Journal of Sociology*, 78(6), 1360-1380.
- Gulati, R. (1995). Does Familiarity Breed Trust? The Implications of Repeated Ties for Contractual Choice in Alliances. *Academy of Management Journal*, 38(1), 85-112.
- Gulati, R. (1998). Alliances and networks. *Strategic Management Journal*, 19(4), 293-317.
- Gulati, R., & Sytch, M. (2008). Does familiarity breed trust? Revisiting the antecedents of trust. *Managerial and Decision Economics*, 29(2-3), 165-165.
- Gössling, T. (2004). Proximity, trust and morality in networks. *European Planning Studies*, 12(5), 675-689. doi: 10.1080/0965431042000220011
- Hage, J., & Hollingsworth, R. (2000). A strategy for analysis of idea innovation networks and institutions. *Organization Studies*, 21(5), 971-1004.

- Hansen, M. H., Hoskisson, R. E., & Barney, J. B. (2008). Competitive advantage in alliance governance: resolving the opportunism minimization-gain maximization paradox. *Managerial and Decision Economics*, 29(2-3), 191-208.
- Hardin, R. (1992). The street-level epistemology of trust. *Analyse & Kritik*, 14, 152-176.
- Harrison, B. (1992). Industrial districts: old wine in new bottles? *Regional Studies*, 26(5), 469-483.
- Huff, L., & Kelley, L. (2003). Levels of Organizational Trust in Individualist versus Collectivist Societies: A Seven-Nation Study. *Organization Science*, 14(1), 81-90.
- Jarvenpaa, S. L., & Leidner, D. E. (1999). Communication and Trust in Global Virtual Teams. *Organization Science*, 10(6), 791-815.
- Jones, C., Hesterly, W. S., & Borgatti, S. P. (1997). A General Theory of Network Governance: Exchange Conditions and Social Mechanisms. *The Academy of Management Review*, 22(4), 911-945.
- Jones, G. R., & George, J. M. (1998). The Experience and Evolution of Trust: Implications for Cooperation and Teamwork. *Academy of Management Review*, 23(3), 531-546.
- Jones, T. M. (1991). Ethical Decision Making by Individuals in Organizations: An Issue-Contingent Model. *The Academy of Management Review*, 16(2), 366-395.
- Kramer, R. M. (1999). Trust and Distrust in Organizations: Emerging Perspectives, Enduring Questions. *Annual Review of Psychology*, 50, 569-598.
- Krugman, P. (1991). *Geography and trade*. Leuven, Belgium, Cambridge, Mass.: Leuven University Press; MIT Press.
- Lam, A. (2000). Tacit knowledge, organizational learning and societal institutions: An integrated framework. *Organization Studies*, 21(3), 487-513.
- Leana, C. R., & Van Buren, H. J. (1999). Organizational social capital and employment practices. *Academy of Management Review*, 24(3), 538-555. doi: 10.5465/amr.1999.2202136
- Lefebvre, H. (2007). *The Production of Space*. Oxford: Blackwell Publishing.
- Levin, D. Z., Whitener, E. M., & Cross, R. (2006). Perceived Trustworthiness of Knowledge Sources: The Moderating Impact of Relationship Length. *Journal of Applied Psychology*, 91(5), 1163-1163.
- Li, L. (2005). The Effects of Trust and Shared Vision on Inward Knowledge Transfer in Subsidiaries' Intra- and Inter-Organizational Relationships. *International Business Review*, 14(1), 77-95.
- Malmberg, A., & Maskell, P. (1999). The Competitiveness of Firms and Regions: 'Ubiquitification' and the Importance of Localized Learning. *European Urban and Regional Studies*, 6(1), 9-25.
- Malmberg, A., & Maskell, P. (2006). Localized Learning Revisited. *Growth & Change*, 37(1), 1-19.
- Marshall, A. (1920). *Principles of economics : an introductory volume* (8. ed.). London: Macmillan.
- Maskell, P., Bathelt, H., & Malmberg, A. (2006). Building global knowledge pipelines: The role of temporary clusters. *European Planning Studies*, 14(8), 997-997.

- Mattes, J. (2012). Dimensions of Proximity and Knowledge Bases: Innovation between Spatial and Non-spatial Factors *Regional Studies*, 46(8), 1085-1099.
- Mayer, R. C., Davis, J. H., & Schoorman, D. F. (1995). An Integrative Model of Organizational Trust. *Academy of Management Review*, 20(3), 709-734.
- McAllister, D. J. (1995). Affect- and Cognition-Based Trust as Foundations for Interpersonal Cooperation in Organizations. *The Academy of Management Journal*, 38(1), 24-59.
- McKnight, D. H., & Chervany, N. L. (2006). Reflections on an initial trust-building model. In R. Bachmann & Z. Akbar (Eds.), *Handbook of Trust Research* (pp. 29-51). Cheltenham, UK: Edward Elgar.
- McKnight, D. H., Cummings, L. L., & Chervany, N. L. (1998). Initial Trust Formation in New Organizational Relationships. *The Academy of Management Review*, 23(3), 473-490.
- Mendez, A. (2003). The coordination of globalized R&D activities through project teams organization: an exploratory empirical study. *Journal of World Business*, 38(2), 96-109.
- Molm, L. D., Schaefer, D. R., & Collett, J. L. (2009). Fragile and Resilient Trust: Risk and Uncertainty in Negotiated and Reciprocal Exchange*. *Sociological Theory*, 27(1), 1-32. doi: 10.1111/j.1467-9558.2009.00336.x
- Morgan, K. (2004). The exaggerated death of geography: learning, proximity and territorial innovation systems. *Journal of Economic Geography*, 4(1), 3-21.
- Murphy, J. T. (2006). Building Trust in Economic Space. *Progress in Human Geography*, 30(4), 427-450. doi: 10.1191/0309132506ph617oa
- Möllering, G. (2006). Trust, institutions, agency: Towards a neoinstitutional theory of trust. In R. Bachmann & A. Zaheer (Eds.), *Handbook of Trust Research*. Cheltenham, UK: Edward Elgar.
- Naquin, C. E., & Paulson, G. D. (2003). Online bargaining and interpersonal trust. *Journal of applied psychology*, 88(1), 113.
- Nilsson, M. (2008). *A Tale of Two Clusters: Sharing Resources to Compete*. PhD, Lund University, Lund.
- Nohria, N., & Eccles, R. G. (1992). Face-to-Face: Making Network Organizations Work. In N. Nohria & R. G. Eccles (Eds.), *Networks and Organizations: Structure, Form, and Action* (pp. 288-308). Boston, Massachusetts: Harvard Business School Press.
- Nooteboom, B. (2006). Forms, Sources and Processes of Trust. In R. Bachmann & A. Zaheer (Eds.), *Handbook of Trust Research* (pp. 247-263). Cheltenham: Edward Elgar.
- North, D. C. (1992). Transaction costs, institutions, and economic performance. *International Center for Economic Growth, Occasional Papers No. 30*.
- Polanyi, M. (1958). *Personal knowledge : towards a post-critical philosophy* (Repr. (with corr.) ed.). London: Routledge & Kegan Paul.
- Porter, M. E. (1998:1990). *The competitive advantage of nations*. New York: Free Press.
- Powell, W. W., Koput, K. W., Bowie, J. I., & Smith-Doerr, L. (2002). The spatial clustering of science and capital: Accounting for biotech firm-venture capital relationships. *Regional Studies*, 36(3), 291-305.

- Ring, P. S. (1996). Fragile and Resilient Trust and Their Roles in Economic Exchange. *Business & Society*, 35(2), 148-175. doi: 10.1177/000765039603500202
- Rotter, J. B. (1971). Generalized expectancies for interpersonal trust. *American Psychologist*, 26(5), 443-452. doi: 10.1037/h0031464
- Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management*, 23(3), 393-404.
- Saxenian, A. (1994). *Regional advantage : culture and competition in Silicon Valley and Route 128*. Cambridge, Mass.: Harvard Univ. Press.
- Serapio, M. G., & Hayashi, T. (2004). *Internationalization of research and development and the emergence of global R&D networks*. Amsterdam: Elsevier.
- Shapiro, D. L., Sheppard, B. H., & Cheraskin, L. (1992). Business on a handshake. *Negotiation Journal*, 8(4), 365-377. doi: 10.1007/bf01000396
- Shapiro, S. P. (1987). The Social Control of Impersonal Trust. *American Journal of Sociology*, 93(3), 623-658.
- Storper, M., & Venables, A. J. (2004). Buzz: face-to-face contact and the urban economy. *Journal of Economic Geography*, 4(4), 351-370.
- Sydow, J., & Staber, U. (2002). The Institutional Embeddedness of Project Networks: The Case of Content Production in German Television. *Regional Studies*, 36(3), 215-227. doi: 10.1080/00343400220122034
- Torre, A. (2008). On the Role Played by Temporary Geographical Proximity in Knowledge Transmission. *Regional Studies*, 42(6), 869-889. doi: 10.1080/00343400801922814
- Torre, A., & Rallet, A. (2005). Proximity and Localization. *Regional Studies*, 39(1), 47-60.
- Turner, J. H. (2002). *Face to Face: Towards a Sociological Theory of Interpersonal Behavior*. Stanford, California: Stanford University Press.
- Walther, J. B. (1995). Relational aspects of computer-mediated communication: Experimental observations over time. *Organization Science*, 6(2), 186-203.
- Williamson, O. E. (1993). Calculativeness, Trust, and Economic Organization. *Journal of Law and Economics*, 36(1), 453-486.
- Wilson, J. M., Straus, S. G., & McEvily, B. (2006). All in due time: The development of trust in computer-mediated and face-to-face teams. *Organizational Behavior and Human Decision Processes*, 99(1), 16-33.
- Yin, R. K. (2003). *Case study research : design and methods - third edition* (3. ed.). Thousand Oaks, Calif.: Sage Publications.
- Zaheer, A., McEvily, B., & Perrone, V. (1998). Does Trust Matter? Exploring the Effects of Interorganizational and Interpersonal Trust on Performance. *Organization Science*, 9(2), 141-159.
- Zaheer, S., Albert, S., & Zaheer, A. (1999). Time Scales and Organizational Theory. *Academy of Management Review*, 24(4), 725-741.
- Zeller, C. (2002). Project Teams as Means of Restructuring Research and Development in the Pharmaceutical Industry. *Regional Studies*, 36(3), 275-289. doi: 10.1080/00343400220122070

Zucker, L. G. (1986). Production of trust: Institutional sources of economic structure, 1840-1920. In B. M. Staw & L. L. Cummings (Eds.), *Research in Organizational Behavior: An Annual Series of Analytical Essays and Critical Reviews, 1986* (Vol. 8, pp. 53-111). Greenwich, CT: JAI Press.

CIRCLE ELECTRONIC WORKING PAPERS SERIES (EWP)

CIRCLE (Centre for Innovation, Research and Competence in the Learning Economy) is a multidisciplinary research centre set off by several faculties at Lund University and Blekinge Institute of Technology. CIRCLE has a mandate to conduct multidisciplinary research and education on the following issues: Long-term perspectives on innovation, structural change and economic growth, Entrepreneurship and venture capital formation with a special focus on new ventures, The dynamics of R&D systems and technological systems, including their impact on entrepreneurship and growth, Regional innovation systems in different national and international contexts and International comparative analyses of national innovation systems. Special emphasis is done on innovation policies and research policies. 10 nationalities and 14 disciplines are represented among the CIRCLE staff.

The CIRCLE Electronic Working Paper Series are intended to be an instrument for early dissemination of the research undertaken by CIRCLE researchers, associates and visiting scholars and stimulate discussion and critical comment.

The working papers present research results that in whole or in part are suitable for submission to a refereed journal or to the editor of a book or have already been submitted and/or accepted for publication.

CIRCLE EWPs are available on-line at: <http://www.circle.lu.se/publications>

Available papers:

2013

WP 2013/01

Start-up rates, Entrepreneurship Culture and the Business Cycle Swedish patterns from national and regional data
Martin Andersson

WP 2013/02

Market Thickness and the Early Labor Market Career of University Graduates -An urban advantage?
Lina Ahlin, Martin Andersson and Per Thulin

WP 2013/03

Implementing an R&D Strategy without Prior R&D-Experience - Recruitment as a Source of R&D-related Routines and Capabilities?
Lina Ahlin, Martin Andersson and Thorben Schubert

WP 2013/04

The Choice of Innovation Policy Instruments
Susana Borrás, Charles Edquist

WP 2013/05

What Does Evolutionary Economic Geography Bring To The Policy Table? Reconceptualising regional innovation systems
Bjørn Asheim, Markus M. Bugge, Lars Coenen, Sverre Herstad

WP 2013/06

Commercializing clean technology innovations – the emergence of new business in an agency-structure perspective
Sofia Avdeitchikova, Lars Coenen

WP 2013/07

Renewal of mature industry in an old industrial region: regional innovation policy and the co-evolution of institutions and technology
Lars Coenen, Jerker Moodysson and Hanna Martin

WP 2013/08

Systematic anchoring of global innovation processes and new industry formation – the emergence of on-site water recycling in China
Christian Binz, Bernhard Truffer and Lars Coenen

WP 2013/09

The internationalisation of R&D: sectoral and geographic patterns of cross-border investments
Cristina Castelli and Davide Castellani

WP 2013/10

Clean-tech innovation in Emerging Economies: Transnational dimensions in technological innovation system formation
Jorrit Gosens, Yonglong Lu and Lars Coenen

WP 2013/11

Why space matters in technological innovation systems – the global knowledge dynamics of membrane bioreactor technology
Christian Binz, Bernhard Truffer and Lars Coenen

WP 2013/12

MNC affiliation, knowledge bases and involvement in global innovation networks
Sverre J. Herstad, Bernd Ebersberger, Bjørn Asheim

WP 2013/13

System Failures, Knowledge Bases and Regional Innovation Policies
Roman Martin and Michaela Trippl

WP 2013/14

Differentiated Knowledge Bases and the Nature of Innovation Networks
Roman Martin

WP 2013/15

The Geography and Structure of Global Innovation Networks: A Knowledge Base Perspective
Ju Liu, Cristina Chaminade, Bjørn Asheim

WP 2013/16

The spatiality of trust – Antecedents of trust and the role of face-to-face contacts

2012

WP 2012/01

Is the University Model an Organizational Necessity? Scale and Agglomeration Effects in Science

Tasso Brandt and Torben Schubert

WP 2012/02

Do regions make a difference? Exploring the role of different regional innovation systems in global innovation networks in the ICT industry

Cristina Chaminade and Monica Plechero

WP 2012/03

Measuring the knowledge base of regional innovation systems in Sweden

Roman Martin

WP 2012/04

Characteristics and Performance of New Firms and Spinoffs in Sweden

Martin Andersson and Steven Klepper

WP 2012/05

Demographic patterns and trends in patenting: Gender, age, and education of inventors

Olof Ejermo and Taehyun Jung

WP 2012/06

Competences as drivers and enablers of globalization of innovation: Swedish ICT industry and emerging economies

Cristina Chaminade and Claudia de Fuentes

WP 2012/07

The Dynamics and Evolution of Local Industries – The case of Linköping

Sabrina Fredin

WP2012/08

Towards a Richer Specification of the Exploration/Exploitation Trade-off: Hidden Knowledge-based Aspects and Empirical Results for a Set of Large R&D-Performing Firms

Torben Schubert and Peter Neuhaeusler

WP 2012/09

The European Spallation Source (ESS) and the geography of innovation

Josephine V. Rekers

WP 2012/10

How Local are Spatial Density Externalities? - evidence from square grid data

Martin Andersson, Johan Klaesson, Johan P Larsson

WP 2012/11

Why Pre-Commercial Procurement is not Innovation Procurement

Charles Edquist, Jon Mikel Zabala-Iturriagoitia

2011

WP 2011/01

SMEs' absorptive capacities and large firms' knowledge spillovers: Micro evidence from Mexico

Claudia de Fuentes and Gabriela Dutrénit

WP 2011/02

Comparing knowledge bases: on the organisation and geography of knowledge flows in the regional innovation system of Scania, southern Sweden

Roman Martin and Jerker Moodysson

WP 2011/03

Organizational paths of commercializing patented inventions: The effects of transaction costs, firm capabilities, and collaborative ties

Taehyun Jung and John P. Walsh

WP 2011/04

Global Innovation Networks: towards a taxonomy

Helena Barnard and Cristina Chaminade

WP 2011/05

Swedish Business R&D and its Export Dependence

Karin Bergman and Olof Ejermo

WP 2011/06

Innovation Policy Design: Identification of Systemic Problems

Charles Edquist

WP 2011/07

Regional Institutional Environment and Its Impact on Intra-firm and Inter-organisational Innovation Networks: A Comparative Case Study in China and Switzerland

Ju LIU

WP 2011/08

Entrepreneurship: Exploring the Knowledge Base

Hans Landström, Gouya Harichi and Fredrik Åström

WP 2011/09

Policy coordination in systems of innovation: A structural-functional analysis of regional industry support in Sweden

Magnus Nilsson and Jerker Moodysson

WP 2011/10

Urban Design in Neighbourhood Commodification

Ana Mafalda Madureira

WP 2011/11

Technological Dynamics and Social Capability: Comparing U.S. States and European Nations

Jan Fagerberg, Maryan Feldman and Martin Srholec

WP 2011/12

Linking scientific and practical knowledge in innovation systems
Arne Isaksen and Magnus Nilsson

WP 2011/13

Institutional conditions and innovation systems: on the impact of regional policy on firms in different sectors
Jerker Moodysson and Elena Zukauskaitė

WP 2011/14

Considering adoption: Towards a consumption-oriented approach to innovation
Josephine V. Rekers

WP2011/15

Exploring the role of regional innovation systems and institutions in global innovation networks
Cristina Chaminade

2010

WP 2010/01

Innovation policies for development: towards a systemic experimentation based approach
Cristina Chaminade, Bengt-Ake Lundvall, Jan Vang-Lauridsen and KJ Joseph

WP 2010/02

From Basic Research to Innovation: Entrepreneurial Intermediaries for Research Commercialization at Swedish 'Strong Research Environments'
Fumi Kitagawa and Caroline Wigren

WP 2010/03 Different competences, different modes in the globalization of innovation? A comparative study of the Pune and Beijing regions
Monica Plechero and Cristina Chaminade

WP 2010/04 Technological Capability Building in Informal Firms in the Agricultural Subsistence Sector In Tanzania: Assessing the Role of Gatsby Clubs

Astrid Szogs and Kelefa Mwantima

WP 2010/05

The Swedish Paradox – Unexploited Opportunities!
Charles Edquist

WP 2010/06

A three-stage model of the Academy-Industry linking process: the perspective of both agents
Claudia De Fuentes and Gabriela Dutrénit

WP 2010/07

Innovation in symbolic industries: the geography and organisation of knowledge sourcing
Roman Martin and Jerker Moodysson

WP 2010/08

Towards a spatial perspective on sustainability transitions
Lars Coenen, Paul Benneworth and Bernhard Truffer

WP 2010/09

The Swedish national innovation system and its relevance for the emergence of global innovation networks
Cristina Chaminade, Jon Mikel Zabala and Adele Treccani

WP 2010/10

Who leads Research Productivity Change? Guidelines for R&D policy makers
Fernando Jiménez-Sáez, Jon Mikel Zabala and José L- Zofío

WP 2010/11

Research councils facing new science and technology
Frank van der Most and Barend van der Meulen

WP 2010/12

Effect of geographical proximity and technological capabilities on the degree of novelty in emerging economies
Monica Plechero

WP 2010/13

Are knowledge-bases enough? A comparative study of the geography of knowledge sources in China (Great Beijing) and India (Pune)
Cristina Chaminade

WP 2010/14

Regional Innovation Policy beyond 'Best Practice': Lessons from Sweden
Roman Martin, Jerker Moodysson and Elena Zukauskaitė

WP 2010/15

Innovation in cultural industries: The role of university links
Elena Zukauskaitė

WP 2010/16

Use and non-use of research evaluation. A literature review
Frank van der Most

WP 2010/17

Upscaling emerging niche technologies in sustainable energy: an international comparison of policy approaches
Lars Coenen, Roald Suurs and Emma van Sandick

2009

WP 2009/01

Building systems of innovation in less developed countries: The role of intermediate organizations.
Szogs, Astrid; Cummings, Andrew and Chaminade, Cristina

WP 2009/02

The Widening and Deepening of Innovation Policy: What Conditions Provide for Effective Governance?
Borrás, Susana

WP 2009/03

Managerial learning and development in small firms: implications based on observations of managerial work
Gabrielsson, Jonas and Tell, Joakim

WP 2009/04

University professors and research commercialization: An empirical test of the "knowledge corridor" thesis
Gabrielsson, Jonas, Politis, Diamanto and Tell, Joakim

WP 2009/05

On the concept of global innovation networks
Chaminade, Cristina

WP 2009/06

Technological Waves and Economic Growth - Sweden in an International Perspective 1850-2005
Schön, Lennart

WP 2009/07

Public Procurement of Innovation Diffusion: Exploring the Role of Institutions and Institutional Coordination
Rolfstam, Max; Phillips, Wendy and Bakker, Elmer

WP 2009/08

Local niche experimentation in energy transitions: a theoretical and empirical exploration of proximity advantages and disadvantages
Lars Coenen, Rob Raven, Geert Verbong

WP 2009/9

Product Development Decisions: An empirical approach to Krishnan and Ulrich
Jon Mikel Zabala, Tina Hannemann

WP 2009/10

Dynamics of a Technological Innovator Network and its impact on technological performance
Ju Liu, Cristina Chaminade

WP 2009/11

The Role of Local Universities in Improving Traditional SMEs Innovative Performances: The Veneto Region Case
Monica Plechero

WP 2009/12

Comparing systems approaches to innovation and technological change for sustainable and competitive economies: an explorative study into conceptual commonalities, differences and complementarities
Coenen, Lars and Díaz López, Fernando J.

WP 2009/13

Public Procurement for Innovation (PPI) – a Pilot Study
Charles Edquist

WP 2009/14

Outputs of innovation systems: a European perspective
Charles Edquist and Jon Mikel Zabala

2008

WP 2008/01

R&D and financial systems: the determinants of R&D expenditures in the Swedish pharmaceutical industry
Malmberg, Claes

WP 2008/02

The Development of a New Swedish Innovation Policy. A Historical Institutional Approach
Persson, Bo

WP 2008/03

The Effects of R&D on Regional Invention and Innovation
Olof Ejermo and Urban Gråsjö

WP 2008/04

Clusters in Time and Space: Understanding the Growth and Transformation of Life Science in Scania
Moodysson, Jerker; Nilsson, Magnus; Svensson Henning, Martin

WP 2008/05

Building absorptive capacity in less developed countries
The case of Tanzania
Szogs, Astrid; Chaminade, Cristina and Azatyan, Ruzana

WP 2008/06

Design of Innovation Policy through Diagnostic Analysis: Identification of Systemic Problems (or Failures)
Edquist, Charles

WP 2008/07

The Swedish Paradox arises in Fast-Growing Sectors
Ejermo, Olof; Kander, Astrid and Svensson Henning, Martin

WP 2008/08

Policy Reforms, New University-Industry Links and Implications for Regional Development in Japan
Kitagawa, Fumi

WP 2008/09

The Challenges of Globalisation: Strategic Choices for Innovation Policy
Borrás, Susana; Chaminade, Cristina and Edquist, Charles

WP 2008/10

Comparing national systems of innovation in Asia and Europe: theory and comparative framework
Edquist, Charles and Hommen, Leif

WP 2008/11

Putting Constructed Regional Advantage into Swedish Practice? The case of the VINNVÄXT initiative 'Food Innovation at Interfaces'
Coenen, Lars; Moodysson, Jerker

WP 2008/12

Energy transitions in Europe: 1600-2000

Kander, Astrid; Malanima, Paolo and Warde, Paul

WP 2008/13

RIS and Developing Countries: Linking firm technological capabilities to regional systems of innovation

Padilla, Ramon; Vang, Jan and Chaminade, Cristina

WP 2008/14

The paradox of high R&D input and low innovation output: Sweden

Bitarre, Pierre; Edquist, Charles; Hommen, Leif and Ricke, Annika

WP 2008/15

Two Sides of the Same Coin? Local and Global Knowledge Flows in Medicon Valley

Moodysson, Jerker; Coenen, Lars and Asheim, Bjørn

WP 2008/16

Electrification and energy productivity

Enflo, Kerstin; Kander, Astrid and Schön, Lennart

WP 2008/17

Concluding Chapter: Globalisation and Innovation Policy

Hommen, Leif and Edquist, Charles

WP 2008/18

Regional innovation systems and the global location of innovation activities: Lessons from China

Yun-Chung, Chen; Vang, Jan and Chaminade, Cristina

WP 2008/19

The Role of mediator organisations in the making of innovation systems in least developed countries. Evidence from Tanzania

Szogs, Astrid

WP 2008/20

Globalisation of Knowledge Production and Regional Innovation Policy:

Supporting Specialized Hubs in the Bangalore Software Industry

Chaminade, Cristina and Vang, Jan

WP 2008/21

Upgrading in Asian clusters: Rethinking the importance of interactive-learning

Chaminade, Cristina and Vang, Jan

2007

WP 2007/01

Path-following or Leapfrogging in Catching-up: the Case of Chinese Telecommunication Equipment Industry

Liu, Xielin

WP 2007/02

The effects of institutional change on innovation and productivity growth in the Swedish pharmaceutical industry

Malmberg, Claes

WP 2007/03

Global-local linkages, Spillovers and Cultural Clusters: Theoretical and Empirical insights from an exploratory study of Toronto's Film Cluster

Vang, Jan; Chaminade, Cristina

WP 2007/04

Learning from the Bangalore Experience: The Role of Universities in an Emerging Regional Innovation System

Vang, Jan; Chaminade, Cristina.; Coenen, Lars.

WP 2007/05

Industrial dynamics and innovative pressure on energy -Sweden with European and Global outlooks

Schön, Lennart; Kander, Astrid.

WP 2007/06

In defence of electricity as a general purpose technology

Kander, Astrid; Enflo, Kerstin; Schön, Lennart

WP 2007/07

Swedish business research productivity – improvements against international trends

Ejermo, Olof; Kander, Astrid

WP 2007/08

Regional innovation measured by patent data – does quality matter?

Ejermo, Olof

WP 2007/09

Innovation System Policies in Less Successful Developing countries: The case of Thailand

Intarakumnerd, Patarapong; Chaminade, Cristina

2006

WP 2006/01

The Swedish Paradox

Ejermo, Olof; Kander, Astrid

WP 2006/02

Building RIS in Developing Countries: Policy Lessons from Bangalore, India

Vang, Jan; Chaminade, Cristina

WP 2006/03

Innovation Policy for Asian SMEs: Exploring cluster differences

Chaminade, Cristina; Vang, Jan.

WP 2006/04

Rationales for public intervention from a system of innovation approach: the case of VINNOVA.

Chaminade, Cristina; Edquist, Charles

WP 2006/05

Technology and Trade: an analysis of technology specialization and export flows
Andersson, Martin; Ejermo, Olof

WP 2006/06

A Knowledge-based Categorization of Research-based Spin-off Creation
Gabrielsson, Jonas; Landström, Hans; Brunsnes, E. Thomas

WP 2006/07

Board control and corporate innovation: an empirical study of small technology-based firms
Gabrielsson, Jonas; Politis, Diamanto

WP 2006/08

**On and Off the Beaten Path:
Transferring Knowledge through Formal and Informal Networks**
Rick Aalbers; Otto Koppius; Wilfred Dolfsma

WP 2006/09

Trends in R&D, innovation and productivity in Sweden 1985-2002
Ejermo, Olof; Kander, Astrid

WP 2006/10

Development Blocks and the Second Industrial Revolution, Sweden 1900-1974
Enflo, Kerstin; Kander, Astrid; Schön, Lennart

WP 2006/11

The uneven and selective nature of cluster knowledge networks: evidence from the wine industry
Giuliani, Elisa

WP 2006/12

Informal investors and value added: The contribution of investors' experientially acquired resources in the entrepreneurial process
Politis, Diamanto; Gabrielsson, Jonas

WP 2006/13

Informal investors and value added: What do we know and where do we go?
Politis, Diamanto; Gabrielsson, Jonas

WP 2006/14

Inventive and innovative activity over time and geographical space: the case of Sweden
Ejermo, Olof

2005

WP 2005/1

Constructing Regional Advantage at the Northern Edge
Coenen, Lars; Asheim, Bjørn

WP 2005/02

From Theory to Practice: The Use of the Systems of Innovation Approach for Innovation Policy
Chaminade, Cristina; Edquist, Charles

WP 2005/03

The Role of Regional Innovation Systems in a Globalising Economy: Comparing Knowledge Bases and Institutional Frameworks in Nordic Clusters
Asheim, Bjørn; Coenen, Lars

WP 2005/04

How does Accessibility to Knowledge Sources Affect the Innovativeness of Corporations? Evidence from Sweden
Andersson, Martin; Ejermo, Olof

WP 2005/05

Contextualizing Regional Innovation Systems in a Globalizing Learning Economy: On Knowledge Bases and Institutional Frameworks
Asheim, Bjørn; Coenen, Lars

WP 2005/06

Innovation Policies for Asian SMEs: An Innovation Systems Perspective
Chaminade, Cristina; Vang, Jan

WP 2005/07

Re-norming the Science-Society Relation
Jacob, Merle

WP 2005/08

Corporate innovation and competitive environment
Huse, Morten; Neubaum, Donald O.; Gabrielsson, Jonas

WP 2005/09

Knowledge and accountability: Outside directors' contribution in the corporate value chain
Huse, Morten; Gabrielsson, Jonas; Minichilli, Alessandro

WP 2005/10

Rethinking the Spatial Organization of Creative Industries
Vang, Jan

WP 2005/11

Interregional Inventor Networks as Studied by Patent Co-inventorships
Ejermo, Olof; Karlsson, Charlie

WP 2005/12

Knowledge Bases and Spatial Patterns of Collaboration: Comparing the Pharma and Agro-Food Bioregions Scania and Saskatoon
Coenen, Lars; Moodysson, Jerker; Ryan, Camille; Asheim, Bjørn; Phillips, Peter

WP 2005/13

Regional Innovation System Policy: a Knowledge-based Approach
Asheim, Bjørn; Coenen, Lars; Moodysson, Jerker; Vang, Jan

WP 2005/14

Face-to-Face, Buzz and Knowledge Bases: Socio-spatial implications for learning and innovation policy

Asheim, Bjørn; Coenen, Lars, Vang, Jan

WP 2005/15

The Creative Class and Regional Growth: Towards a Knowledge Based Approach

Kalsø Hansen, Høgni; Vang, Jan; Bjørn T. Asheim

WP 2005/16

Emergence and Growth of Mjärdevi Science Park in Linköping, Sweden

Hommen, Leif; Doloreux, David; Larsson, Emma

WP 2005/17

Trademark Statistics as Innovation Indicators? – A Micro Study

Malmberg, Claes