Article

Progress in Human Geography
2017, Vol. 41(2) 159–177

DOI: 10.1177/0309132516629003
journals.sagepub.com/home/phg
SAGE

Beyond proximities: The socio-spatial dynamics of knowledge creation

Roel Rutten
Tilburg University, The Netherlands

Abstract
Knowledge creation is recognized as interaction between individuals in a social context, but geography-of-knowledge-creation research inadequately connects social context to physical place. The proximities approach reduces physical place to near-far dichotomies and territorial innovation models conflate social context and physical place. This paper introduces the concept of 'conversations' as social spaces of knowledge creation and develops typologies of how conversations are connected to physical places, based on the effort required to bridge distance and on the attractiveness of places for knowledge creation. Addressing the socio-spatial dynamics of knowledge creation, the paper explains how conversations may be anchored in multiple locations.

Keywords
knowledge creation, place, proximities, social interaction, space

I Introduction

The debate on the geography of knowledge creation is conducted along at least two opposing, but equally inadequate, views. The territorial innovation models (TIMs) argue that the social and institutional characteristics of places explain knowledge creation. The suggestion that factors other than geographical proximity, such as norms, values, trust and social capital, affect knowledge creation is uncontested (Cohendet, 2014; Hassink and Klaerding, 2012; Lorentzen, 2008); however, and contrary to the TIM literature's widely criticized spatial fetishism (Moulaert and Sekia, 2003), these other factors are not necessarily territorial. This criticism inspired the proximities approach, which commonly identifies geographical, social, institutional, cognitive and organizational proximity. Proximities facilitate knowledge creation by reducing uncertainty and resolving coordination problems when agents are proximate on at least one form of proximity (Boschma, 2005; Knoben and Oerlemans, 2006). Non-geographical proximities enable knowledge creation over distance even when the knowledge involved is tacit (Gertler, 2003). The proximities approach sees nothing intrinsically spatial about knowledge creation and suggests trade-offs between the proximities so that maximizing or optimizing one form of proximity may compensate distance on other forms (Boschma, 2005; Mattes, 2012). However, a satisfactory answer to how the

Corresponding author:
Roel Rutten, Tilburg University, PO Box 90153, Tilburg, 5000LE, The Netherlands.
Email: r.p.j.h.rutten@uvt.nl

proximities may substitute one another is missing (Gertler, 2003; Torre and Wallet, 2014). Moreover, the notion that non-geographical proximities may substitute geographical proximity conflates spatial reach and social depth (Morgan, 2004).

What is missing from both the TIM literature and the proximities approach is a satisfactory way of connecting the social and spatial contexts of knowledge creation (Gertler, 2003; Healy and Morgan, 2012). In response, this paper introduces the notion of 'conversations' as social spaces of knowledge creation (Lester and Piore, 2004). Connecting conversations (social space) to physical place builds a socio-spatial explanation of knowledge creation that helps move the debate forward by connecting the proximities approaches' understanding that geographical proximity is not necessary for knowledge creation and the TIM literature's understanding that knowledge creation is socially embedded. The paper builds this argument as follows: The second and third sections take some time to discuss the relational turn in economic geography and explain knowledge creation as a process of social interaction, to paint the background against which the socio-spatial context of knowledge creation can be explained. The fourth section elaborates the notion of conversations. The fifth section criticizes the proximities approach and explains that geographical proximity has both a distance and a place element. This section further explains how social space and physical place are connected. Sections six and seven develop typologies that connect conversations to social space and physical place respectively and suggest that conversations may be 'anchored' in multiple places simultaneously. A summary and conclusion follows in the final section.

II Relational economic geography

Although a comprehensive literature review is beyond the scope of this paper, it is useful to embed the discussion in the broader context of the 'relational turn' in economic geography (Bathelt and Glückler, 2003; Sunley, 2008). Several attempts at developing a relational economic geography (REG) (Bathelt and Glückler, 2011; Boggs and Rantisi, 2003) have failed to establish clear boundaries between REG and other paradigms, such as evolutionary economic geography (EEG) (Boschma, 2004) and institutional economic geography (IEG) (Martin, 2000). Instead, it is more accurate to say that relational thinking proliferated into economic geography to manifest itself 'through emphasis on networks, relational assets, the interaction between economic and non-economic, institutional thickness, the embedding of tacit knowledge, etc.' (Lagendijk, 2006: 395). The relational turn results from an inflow of ideas from outside economic geography, mostly from sociology, such as communities of practice (Wenger, 1998), embeddedness (Granovetter, 1985), social capital (Morgan, 1997) and networks as a form of organization (Nohria and Eccles, 1992). This inflow, and the largely uncritical adoption of widely divergent ideas, substantially enriched economic geography theory but did not produce greater conceptual clarity (Lagendijk, 2006; Sunley, 2008). The advent of 'relational thinking' coincided with a 'cultural turn' to overcome the false dualism between the economic and non-economic in economic (geography) theory (Hassink and Klaerding, 2012), and with the globalization of production networks and knowledge creation in the real world (Lorentzen, 2008). Relational thinking criticizes the spatial fetishism of the TIM literature, which reduces relational concepts, such as social capital, to territorial artefacts and bestows them with causal power. It also criticizes EEG's conflict-free and self-contained understanding of agency, particularly of firms (Hassink et al., 2014; Lagendijk, 2006). Instead, the relational approach focuses on the micro-level of (individual) agents and their relations rather than on bounded territory and firms

(Boggs and Rantisi, 2003; Shearmur, 2011). However, it would be too much to read into this the emergence of a separate REG (Bathelt and Glückler, 2003, 2011; Hassink et al., 2014). Institutional and evolutionary thinking feature prominently in REG (Bathelt and Glückler, 2003; Hassink et al., 2014) and relational elements enrich EEG (Boschma, 2004) and IEG (Martin, 2000).

The conclusion that REG is a partial understanding rather than a new paradigm is broadly shared (Bathelt and Glückler, 2003; Boggs and Rantisi, 2003; Sunley, 2008). Arguing for 'engaged pluralism', Hassink et al. (2014) advocate combining relational, institutional and evolutionary thinking throughout economic geography. Nonetheless, REG has a clear set of departure points, taking agents and their relations as units of analysis (Boggs and Rantisi, 2003) to build micro-scale explanations of 'associated individuals who are involved in numerous networks within and across company boundaries' (Hassink et al., 2014). Relational thinking emphasizes geographical space as places of opportunity rather than bounded territory (Shearmur, 2011). Space is not a container that confines economic action (Bathelt and Glückler, 2003) but a continuous field wherein firms and research centres are entry points to global knowledge and where proximity does not have to be geographical to access these entry points (Ibert, 2007; Shearmur, 2011). Furthermore, it looks at the interdependencies between geographical scales (Boggs and Rantisi, 2003; Hassink et al., 2014) and it understands institutions as important enablers and constraints of human agency that mediate between micro and macro and between global and local levels (Bathelt and Glückler, 2003; Hassink et al., 2014). This paper contributes to relational thinking by focusing on (1) the largely ignored knowledge creation between individuals and connecting it to firm innovation, and on (2) the interaction between social space and physical place regarding knowledge creation.

III Knowledge and knowledge creation

A fundamental notion in the discourse on knowledge is its tacitness. Popularized by Polanyi's observation that 'we know more than we can tell' (Polanyi, 1966, in Gertler, 2003: 77), tacitness implies that knowledge exchange may be hampered by the limitations of spoken and written language and by the fact that knowledge is connected to the human and social context from which it originated (Gertler, 2003). The key difference between tacit and codified knowledge is that the former cannot be codified via artefacts such as language, figures, graphs and metaphors (Cohendet, 2014; Gertler, 2003; Tsoukas, 2009). The widespread use of the tacit-codified knowledge typology has perverted into the erroneous belief that, since it can be formalized, codified knowledge is also decontextualized (Howells, 2012). This goes against the fundamentally social nature of knowledge. Codified knowledge is also contextualized, and absorbing it requires socialization because the artefacts formalizing codified knowledge are themselves a contextualized body of knowledge (Gertler, 2003; Howells, 2012; Tsoukas, 2009). Another key misconception that follows from perceiving codified knowledge as decontextualized is the idea that knowledge can be disconnected from individuals. Fundamentally, knowledge is personal because the experiences, interpretations and meanings that create knowledge are personal. But at the same time individual knowledge is highly interrelated with and interdependent on the knowledge of other individuals because experiences, interpretations and meanings are shaped through social interaction (Amin and Cohendet, 2004; Howells, 2012; Tsoukas, 2009).

This means that knowledge creation happens in 'social spaces', such as professional and social networks (Neyer et al., 2009), in communities of practice and epistemic communities (Wenger, 1998), and in intra and

inter-organizational teams (Amin and Cohendet, 2004). Knowledge creation in social space shapes and is shaped by trust and social capital, by norms and values, and by conventions, habits and routines (Amin and Cohendet, 2004; Hassink and Klaerding, 2012; Malecki, 2012; Morgan, 2004; Tsoukas, 2009). These and other 'social dynamics' perform two critical functions; they (1) build a shared frame of reference for experiences, interpretations and meanings (Ibert, 2007; Nonaka and Von Krogh, 2009) and they (2) make the behaviour of agents predictable (Amin and Cohendet, 2004; Granovetter, 1985). Although not a household term in economic geography, 'social dynamics' are widely recognized as critical factors enabling or constraining knowledge creation and innovation. They feature, for example, as untraded interdependencies in interactions between agents (Storper, 1997), as glue and lubricant in relations (Malecki, 2012), and as institutional thickness in innovative milieus (Gertler, 2010). The 'relational turn' further strengthened interest in 'social dynamics' and their effect on social interaction (Bathelt and Glückler, 2003; Shearmur, 2011).

The individual nature of knowledge allows one to distinguish between individual and organizational knowledge creation. Organizational knowledge creation is formal, organized and goal-directed, (Faulconbridge, 2014; Nonaka and Von Krogh, 2009; Tsoukas, 2009), aimed at developing innovations such as new technologies, products, services and processes (Neyer et al., 2009; Zanfei, 2000). For this purpose, organizational knowledge creation connects individual knowledge creation to organizational resources, such as finance, equipment and managerial capabilities (Lester and Piore, 2004; Nonaka and Von Krogh, 2009). We can call this firm innovation. Individual knowledge creation is more informal and cuts across organizational boundaries. Its social space is personal networks and communities rather than (inter-) organizational teams. Knowledge creation can be intentional or accidental (Amin and Cohendet, 2004) and results in new knowledge that firms use as input for innovation. While innovation is affected by organizational social dynamics, knowledge creation is affected by less pervasive and more diffuse social dynamics of personal networks and communities (Amin and Cohendet, 2004; Wenger, 1998).

From a social-interaction perspective, intentional and accidental knowledge creation are different because individuals intentionally come together for the former, often physically (Healy and Morgan, 2012), while the latter results from individuals happening to share a social space or physical place. Although undirected, accidental knowledge creation can generate valuable new ideas and establish connections for intentional knowledge creation. In the economic geography literature, accidental knowledge creation is often referred to as (local) buzz (Bathelt et al., 2004; Storper and Venables, 2004), with much discussion focusing on how local, global or virtual buzz is. While knowledge is local because it is individual and individuals are spatially sticky to the place where they live and work (Healy and Morgan, 2012; Howells, 2012), knowledge creation is not local because social interaction happens across geographical space (Ibert, 2007; Shearmur, 2011). Nor are social spaces necessarily connected to any specific geographical place (Amin and Cohendet, 2004). Accordingly, there is nothing intrinsically local about buzz, but it may be the by-product of co-location or co-presence (Storper and Venables, 2004). It is the difference between accidental knowledge creation that happens at conferences that individuals intentionally attend, and knowledge creation between individuals who happen to meet in public places, such as campus restaurants or cultural performances (Florida, 2002). From a 'social dynamics' perspective, the difference between the two is that accidental knowledge creation at conferences is subject to the social dynamics of the community or professional

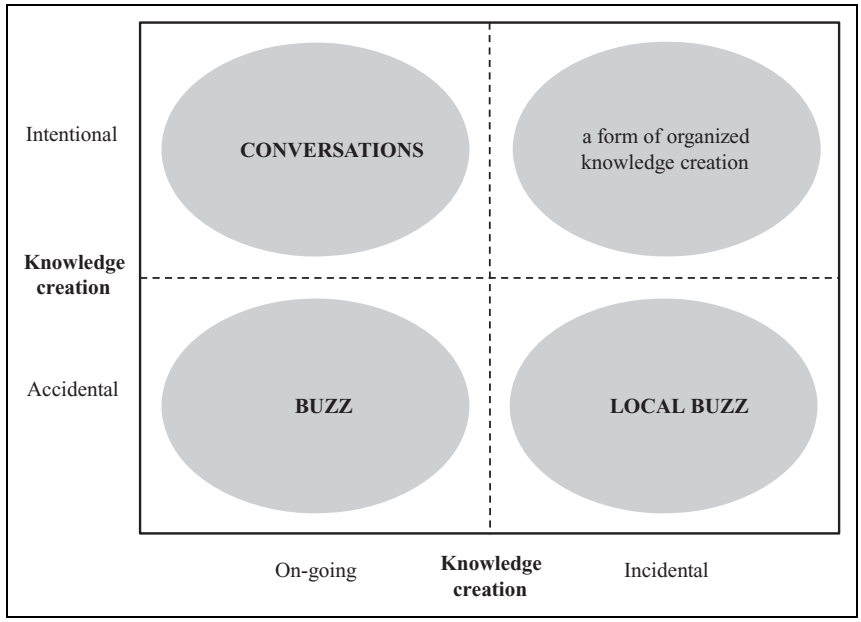

Figure 1. Forms of knowledge creation.

network that organizes them, while accidental knowledge creation in public places lacks such a clear social context. Moreover, at conferences, in communities of practice and professional networks, accidental knowledge creation is part of an ongoing discourse; accidental knowledge creation in public places is incidental in nature. Increasingly, economic geographers make a case for local buzz, i.e. accidental knowledge creation in public places, where the (temporary) co-location of creative individuals from different and unrelated backgrounds builds a conducive environment for knowledge creation (Desrochers, 2001; Gertler and Levitte, 2005; Shearmur, 2012). It is possible then to identify different forms of knowledge creation based on two dimensions: intentional versus accidental and ongoing versus incidental. While this identifies four possible forms of knowledge creation, the combination of intentional and incidental suggests a form of organized knowledge creation that is beyond the scope of this paper (Figure 1). The remaining forms are conversations, the key argument of this paper, buzz and local buzz.

IV Conversations, buzz and local buzz

This paper uses 'conversations' to identify intentional and ongoing knowledge creation between individuals. In conversations knowledge workers from various professional backgrounds, i.e. researchers and practitioners, use a range of media, from face-to-face communication to technology-mediated interaction, to create knowledge on a specific topic (Lester and Piore, 2004). Others have casually used conversations to describe interaction between individuals (Amin and Cohendet, 2004) or defined conversations as interactive, long-distance exchange of information as opposed to face-to-face interaction (Leamer and Storper, 2001). Wenger's (1998) systematic discussion of conversations as interaction within communities of practice stresses the 'ability to negotiate meaning' (Wenger, 1998: 56) and the socially embedded nature of knowledge creation (p. 74). The ability to negotiate meaning is also pivotal for Lester and Piore (2004). They discuss conversations in relation to the highly

ambiguous 'interpretative phase' of innovation where the objective is to identify problems to be solved in the 'analytical phase', i.e. innovation projects. Ambiguity they define as 'a critical resource out of which new ideas emerge' (2004: 51). Interpretative activities are 'open-ended conversations among people from different professional and organizational backgrounds' that have 'much in common with the ways in which people [within and between] linguistic communities come to understand and communicate with each other' (2004: 8). In fact, 'to maintain their innovative capabilities firms must continually . . . participate in exploratory, interpretative conversations with a variety of interlocutors' (2004: 9) because 'novelty and originality lie in the space of ambiguity' (2004: 54).

Conversations thus refer to a phase in the innovation process that precedes or runs parallel to the analytical phase (Hagardon and Sutton, 2007). The analytical phase connects new ideas from conversations to the human, technological, financial and managerial resources of firms in (inter-firm) innovation projects. Tapping into conversations, firms critically source new ideas to fuel innovation projects. Similar to communities of practice, conversations happen across organizational boundaries (Lester and Piore, 2004; Wenger, 1998) where 'social dynamics' rather than formal hierarchy regulate interaction (Hagardon and Sutton, 2007; Zanfei, 2000). Nor do conversations have formal end points like innovation projects (Lester and Piore, 2004). Conversations evolve around objects or practices and the ambiguity surrounding them creates a social space for interpretation. For example, prosthetic limbs result from a conversation between neurologists, engineers, designers and patients that builds a social space where they address ambiguities surrounding the technique of connecting muscles to the mechanics of prosthetic limbs so as to maximize their usability for a range of functions, the 'user-friendliness' and aesthetics of prosthetic limbs and the application of new technologies. This conversation happens in hospitals and medical research centres, because it depends on specific research facilities, but also at conferences, meetings, both face-to-face and virtual, and in bars and restaurants at the margins of conferences and meetings. The outcomes of the conversation are used as inputs for innovation projects where new prosthetic limbs are actually developed, while the conversation on the underlying ambiguities is ongoing.

Engagement in a conversation does not take place on the basis of community membership, however fluid that may be (Amin and Cohendet, 2004; Brown and Duguid, 1991), but is based on involvement in a particular question, problem or challenge. Engagement in a conversation can thus be broader than the membership of a community of practice. A community of architects turns a former industrial building into a creative space, a conversation on urban development connects that creative space to traffic, housing, retail, etc., to revitalize former industrial sites. Moreover, looking at communities of practice invites us to focus on a single social context, whereas individuals are engaged in knowledge creation in multiple social contexts at any one time (Cohendet, 2014; Hagardon and Sutton, 1997; Hassink et al., 2014). In fact, organizations encourage their knowledge workers to expose themselves to multiple contexts through internal teams and external networks (Amin and Cohendet, 2004; Ibert, 2007; Fitjar and Rodriguez-Pose, 2011, 2013; Zanfei, 2000).

Engaging in conversations allows organizations to tap into a wider range of globally distributed knowledge, in addition to formal inter-firm innovation projects (Hassink and Klaerding, 2012; Lorentzen, 2008). While (inter) firm innovation projects may be equally informal as conversations (Amin and Cohendet, 2004; Zanfei, 2000), they are more insulated and controlled compared to open-for-all conversations. The idea of firms tapping into conversations is akin to open innovation, which firms use

to capture knowledge from all over the world by combining internal and external innovation networks (Chesbrough, 2003; Zanfeir, 2000). As knowledge has become more global, 'useful ideas will originate outside the walls of a company' (Malecki, 2011: 42), making it necessary for firms to connect to 'scientists and engineers working in universities or research centres . . . and people in business' (Malecki, 2011: 37) from all over the world (Fitjar and Rodriguez-Pose, 2013; Hagardon and Sutton, 1997; Lorentzen, 2008). Moreover, knowledge practices may be local because they are tied to the actual performance of a specific task, but participation in knowledge networks is not restricted to a single location.

Firms tapping into conversations also connects to Grandadam et al.'s (2013) notion of the 'middleground'. The middleground connects individuals (underground) to firms, organizations and research centres (upperground) in spaces where people meet in not-so-organized ways. 'The communities of the middleground form particular repositories of creative skills that are not explicitly controlled or owned by firms, but widely contribute to drive and influence trajectories of creation' (Grandadam et al., 2013: 1703). However, Grandadam et al. (2013) explicitly link their argument to places, to creative cities. They define the underground as 'the concentration of skilled individuals . . . which are not immediately linked to the commercial and industrial world, but play an important role in generating innovations and spillovers' (2013: 1702). This identifies a critical connection between physical place and social space via the middleground as the intermediate level between the formal upperground of organizations and the informal underground of communities (Gertler, 2003; Howells, 2012; Morgan, 2004). However, communities and professional networks where conversations happen are not a-priori territorial; their spatial dynamics are increasingly understood as being more complex (Crevoisier and Jeannerat, 2009; Hassink and Klaerding, 2012; Healy and Morgan, 2012; Shearmur, 2011). Moreover, benefitting from social and relational proximity, individuals from multiple places engage in conversations (Amin and Cohendet, 2004; Crevoisier and Jeannerat, 2009; Ibert, 2007), and conversations also extend into virtual space (Grabher and Ibert, 2013; Jones et al., 2010). Still, conversations may be localized when individuals physically cluster around specific problems and challenges. This may be a local issue, such as the redevelopment of a specific urban area, or it may be a temporary meeting at a conference. Localization of conversations also follows from their dependence on research facilities and the geographical clustering of individuals around them. This evidences the continued importance of face-to-face communication for complex interactions (Healy and Morgan, 2012; Howells, 2012) but it does not exclude individuals from other places from engaging in 'localized' conversations (Lagendijk and Lorentzen, 2007; Shearmur, 2011). Understanding the geography of conversations thus requires looking at their content and at the geographical distribution of the individuals engaged in them.

Being social spaces for knowledge creation, conversations are also linked to 'buzz'. The various definitions of buzz agree that it is an unplanned contact system (Storper and Venables, 2004) and a form of accidental knowledge creation among individuals who happen to be in the same physical, social or virtual place (Grabher and Ibert, 2013; Shearmur, 2012). Furthermore, buzz is understood to be different from 'pipelines', or knowledge creation through intentionally constructed communication channels (Bathelt et al., 2004). Particularly diversified city economies with their overlapping worlds of face-to-face contact produce buzz (Storper, 2013; Storper and Venables, 2004). Similarly, Bathelt et al. (2004) refer to buzz as 'learning processes taking place among actors embedded in a community by just being there' (2004: 31; Gertler, 2003; Shearmur, 2012).

However, the understanding that face-to-face communication can also be sustained over geographical distance (Amin and Cohendet, 2004; Bathelt and Turi, 2011; Fitjar and Rodriguez-Pose, 2011; Torre and Rallet, 2005) has eroded the belief that buzz is local. Asheim et al. (2007), for example, argue that there can be buzz without 'being there'. Bathelt and Turi (2011) refer to communication ecologies sustained through repeated, intensive and short face-to-face encounters – i.e. moments of being there (Faulconbridge, 2014) – as global buzz, and Jones et al.'s (2010) example of the New York theatre blogs demonstrates the existence of virtual buzz.

That leaves room to define *local* buzz as accidental knowledge creation between individuals who happen to share a physical place. In fact, that is the reasoning behind the 'urban externalities' introduced by Jacobs (1961) and elaborated by, among others, Desrochers (2001), Florida (2002) and Storper (2013). Urban externalities suggest cities as centres of loose ties and economic and social diversity attracting creative people and encouraging them to interact, exchange ideas and create knowledge by providing attractive and diverse places where these individuals can meet (Desrochers, 2001; Florida, 2002; Gertler and Levitte, 2005). This argument is very similar to Grandadam et al.'s (2013) middleground, which connects creative processes (knowledge creation, buzz) to cities in the following way:

> what is essential for the creative process . . . is that the creative city be equipped with a valuable set of places and spaces enabling the production and diffusion of knowledge assets throughout the different layers of the local milieu . . . Places and spaces . . . contribute to [bridging] the creative, artistic and cultural industries, on one side, and the individual working in related occupations, on the other side. (Grandadam et al., 2013: 1702)

Consequently, local buzz results from interaction between co-located and co-present individuals going about their daily business, and the amount of local buzz in a place depends on what Florida (2002) calls the quality of place. This has three elements: what is there (the authenticity and attractiveness of the built and natural environments), who is there (a diversity of people interacting and providing cues that everyone can plug into) and what is going on (the vibrancy of street life, café culture, arts and music; Florida, 2002: 232). This definition is mirrored by Gertler and Levitte (2005), who define quality of place broadly

> to include not only the usual list of physical, recreational and cultural amenities [what is there], but also social characteristics such as low barriers of entry and the presence of a critical mass of creative people [who is there] is vital to ensure that local communities are open to inflows of knowledge and talent [what is going on]. (2005: 505; also see Leamer and Storper, 2001)

The more diverse and dynamic the local environment, the more local buzz is likely to happen. Furthermore, places that are characterized by high levels of local buzz often have strong global connections as well because 'they are important nodes . . . of international business and culture networks, with high levels of international travel-and-meet activity' (Storper, 2013: 181; Bathelt and Schuldt, 2010; Gertler and Levitte, 2005).

In other words, far from being 'denuded spaces' (Lagendijk and Lorentzen, 2007), cities and regions differ in terms of place quality, which affects location choices of knowledge workers, i.e. where they go to connect to others and how easy they can get there. The notion of place quality underlines that knowledge creation – be it intentional conversation or accidental (local) buzz – is not only about 'being there' but also about 'being where' (Crevoisier and Jeannerat, 2009; Grandadam et al., 2013; Morgan, 2004; Shearmur, 2011).

V Proximities

The proximities approach identifies non-geographical forms of proximity to explain knowledge creation over distance (Gertler, 2003). All proximities 'reduce uncertainty . . . resolve the problem of coordination and thus facilitate interactive learning and innovation' (Boschma, 2005: 62). Several studies have investigated the various proximities, but substantial ambiguity on their definitions remains (Knoben and Oerlemans, 2006). Torre and Rallet (2005) distinguish between geographical proximity, i.e. near or far, and organized proximity, which is built around a logic of belonging and/or similarity that enables organization members to interact. Boschma (2005) distinguishes geographical, cognitive, organizational, social and institutional proximity, and he too simplifies geographical proximity into near or far. Cognitive proximity refers to overlapping knowledge bases of agents; organizational proximity concerns a history of relations between organizations; social proximity is a micro-level phenomenon that considers friendship and kinship ties; institutional proximity is a macro-level phenomenon that pertains to shared norms, values, habits and routines (Boschma, 2005). Boschma acknowledges that organizational, social and institutional proximity are strongly interconnected and consequently argues that social proximity (micro or individual level) and institutional proximity (macro level) affect knowledge creation in similar ways. Also Knoben and Oerlemans (2006) discuss proximity on the level of organizations. They define four main forms of proximity: geographical proximity (distance), cultural proximity (national, regional and organizational culture), technological proximity (shared tools, devices and knowledge), and organizational proximity. Because of its conceptual ambiguity they break down organizational proximity into three sub-forms: cognitive proximity (similarities in actors' perception, interpretation and understanding of the world), social proximity (personal relations), and institutional proximity (shared norms, rules and procedures).

In a recent contribution to the proximities approach, Mattes (2012) argues that innovation requires balancing heterogeneity and proximity. Innovation needs diversity, but to benefit from diversity firms have to be proximate on at least one dimension. Why proximity on only one dimension should suffice and whether all forms of proximity are equally potent facilitators of innovation are questions she avoids. Using Boschma's (2005) five proximities, Mattes suggests that cognitive, institutional and organizational proximity are critical for learning, while geographical and social proximity are auxiliary factors. This is unconvincing because the social capital and embeddedness literatures have demonstrated that social proximity can be a very powerful force of its own by forging strong ties (Gertler, 2003; Granovetter, 1985; Malecki, 2012) while geographical proximity should be understood as much broader than a near-far dichotomy. Interactions between the various proximities certainly exist (Boschma, 2005; Gertler, 2003), but Mattes' (2012) idea of balancing heterogeneity and proximity, by making 'trade-offs' between the various proximities, is problematic because it suggests that proximities are more or less static relational states that are available separately. However, proximities are more accurately seen as outcomes of social interaction where they are constructed through social dynamics. Analytically, proximities may be identified separately, but they are constructed simultaneously through social interaction and, in turn, affect social interaction in combination (Amin and Cohendet, 2005; Howells, 2012).

In sum, this paper takes issue with the proximities approach for the following reasons. First, the proximities approach has a simplistic understanding of geography as near versus far (Lagendijk and Lorentzen, 2007; Moodysson and Jonsson, 2007). Geography is not only

about 'being there'; 'being where' (i.e. place qualities) also matters (Healy and Morgan, 2012). Second, the various proximities have too many overlaps and conflate individuals and firms. While the proximities approach is primarily concerned with firm innovation, it frequently refers to individual-level interaction, particularly when explaining social and institutional proximity (Lagendijk and Lorentzen, 2007; Moodysson and Jonsson, 2007). However, the social and spatial dynamics of firm innovation may be very different from those of individual knowledge creation (Hassink and Klaerding, 2012; Grandadam et al., 2013; Lorentzen, 2008). Third, the proximities approach mistakenly understands codified knowledge as de-contextualized in order to create an artificial separation between the social and geographical contexts of knowledge creation (Howells, 2012; Morgan, 2004). Finally, the proximities approach suggests proximities as static relational states, but they are more accurately understood as constructed through social interaction (Amin and Cohendet, 2005). In other words, proximities are not inputs for knowledge creation but outcomes of social interaction; they are not the mechanism to reduce uncertainty and resolve coordination problems and, consequently, they are the wrong metaphor to understand the socio-spatial dynamics of knowledge creation.

1 Non-geographical proximities

Social dynamics rather than proximities are responsible for reducing uncertainty and solving coordination problems (Lagendijk, 2006). Social dynamics have various 'origins', such as the private sphere and inter-personal relations (e.g. norms and values), the institutional and cultural context (e.g. routines and conventions), or social networks (e.g. trust and social capital); however, on the level of social interaction between individuals it does not immediately matter where social dynamics come from. Individuals are simultaneously exposed to social dynamics from multiple origins, e.g. from social and professional networks and from regional and national culture (Moodysson and Jonsson, 2007). This reflects Granovetter's (1985) embeddedness argument, which says that individuals are embedded in ongoing systems of social relations. 'System of social relations' pertains to both the norms and values of the immediate social context and to social institutions (Granovetter, 1985). This corresponds to Torre and Rallet's (2005) observation that interaction is double embedded in social networks (micro-social dynamics) and institutions (macro-social dynamics). Focusing on social dynamics thus addresses the conceptual ambiguity of the proximities by bringing the social factors affecting interaction under one denominator. This has precedence in the literature; in a related discussion on institutions and regional economic change, Gertler (2010) defines institutions so broad as to include social, cultural and organizational proximity. Yet, it makes sense to distinguish between mirco-level and macro-level social dynamics and to identify their connection to proximities. The former reflect the social dynamics of networks and communities and affect social interaction in a direct way. The latter pertain to the social dynamics of regional and national society which affect social interaction in more subtle, indirect ways (Granovetter, 1985). Shaping and being shaped by social interaction, social dynamics have explanatory power that proximities, as relational states, lack.

2 Geographical proximity

The role of geographical proximity in knowledge creation is more complicated. First, knowledge creation does not need geographical proximity (Amin and Cohendet, 2004; Gertler, 2003); however, the continued importance of face-to-face communication remains undisputed (Howells, 2012; Lorentzen, 2008; Torre and Wallet, 2014). Second, quality of place

means that knowledge creation happens more in some places than in others (Healy and Morgan, 2012; Lagendijk and Lorentzen, 2007; Shearmur, 2012). The first argument pertains to geographical distance and individuals' willingness to bridge it; the second argument, place quality, pertains to individuals' preference to connect to specific places. Both arguments underline that geographical proximity is not just a near-far dichotomy but involves choices concerning real places to access knowledge. Amin and Cohendet (2005), among others, point at spatially stretched connectivity and the blurring distinction and growing interdependence between global and local circuits and that, consequently, 'knowing in any single site can no longer be described as local vs global' (2005: 172). Others concur that local circuits on their own offer too limited choice and that firms build global networks in search of 'the best' knowledge (Fitjar and Rodriguez-Pose, 2011; Lagendijk and Lorentzen, 2007; Moodysson and Jonsson, 2007; Malecki, 2011; Neyer et al., 2009; Zanfei, 2000). Amin and Cohendet (2005) illustrate the interaction between local and global circuits with an example of a molecular biology conversation around a laboratory. The presence of a laboratory is necessary for such a conversation and encourages localized practices involving 'experimental work with physical objects and complex instruments [place argument]. But laboratories also talk to each other and there is considerable international flow of information and people between them [distance argument]' (2005: 480; Ibert, 2007).

The reasons why individuals bridge distance and prefer to connect to some places rather than others flow from the following considerations:

- Distance is more accurately expressed in terms of the *effort* required to bridge it, which explains why knowledge creation between (international) transport hubs is fairly uncomplicated. (Healy and Morgan, 2012)
- Knowledge creation is related to *preference* and personal *choice*: individuals who have developed a bond are more likely to bridge distance. (Gertler, 2003; Howells, 2012)
- *Dependency* on and the spatial *distribution* of important contacts also affects individuals' willingness to bridge distance. (Shearmur, 2011)

Geographical distance is thus more accurately seen as a dynamic trade-off between effort, preference and dependency. This 'distance dynamic' explains to what extent bridging distance, i.e. 'being there', matters for knowledge creation.

The second argument, quality of place, explains how the combination of traditional agglomeration advantages and 'urban externalities' connects individuals to places, either as residents or as visitors (Leamer and Storper, 2001; Moodysson and Jonsson, 2007; Storper, 2013). Traditional agglomeration advantages, such as 'access to good education, jobs, social security, health service, housing . . . [and] the possibility to travel abroad, very much depend on [an individual's] place of . . . residence' (Lagendijk and Lorentzen, 2007: 462; Shearmur, 2012). Urban externalities point at the role of socio-cultural diversity and the need for attractive amenities for knowledge creation (Gertler and Levitte, 2005; Grandadam et al., 2013; Shearmur, 2012). Socio-cultural diversity is increasingly recognized as an important source of new ideas and opportunities because it encourages interaction between people from many different backgrounds (Desrochers, 2001; Storper, 2013). Economic and technological creativity and cultural and artistic creativity are further argued to reinforce each other because as individuals cross over between those spheres they turn a place into a vibrant community (Desrochers, 2001; Hassink et al., 2012; Storper, 2013). Socio-cultural diversity can thus be seen as a 'place dynamic'. Furthermore, the continued importance of face-to-face

communication for knowledge creation (Healy and Morgan, 2012; Lorentzen, 2008; Moodysson and Jonsson, 2007) results in a need for physical places where networks and communities may converge, such as conference venues, research facilities and offices (Ibert, 2007; Howells, 2012). Therefore, the meeting of physical place and social space in attractive amenities is another place dynamic (Grandadam et al., 2013; Lagendijk and Lorentzen, 2007; Shearmur, 2011).

Place dynamics (socio-cultural diversity and attractive amenities) explain why it matters for knowledge creation to be in some places rather than others, i.e. 'being where' matters. It is important not to understand place dynamics as characteristics of places but as dynamic elements shaping and being shaped by social interaction. Socio-cultural diversity does not necessarily produce creativity, nor do authentic amenities necessarily attract people. Place dynamics (socio-cultural diversity and amenities) connect to distance dynamics (effort, preference and dependency) because individuals are more likely to make an effort to connect to places of choice where they can interact with interesting individuals. Instead of geographical proximity it is thus more accurate to speak of geographical dynamics (distance and place dynamics) when referring to the geography of knowledge creation. Geographical dynamics are not unlike social dynamics because they (1) bring people together and connect them and (2) shape and are shaped by social interaction. Understanding the geography of knowledge creation as interaction between place and distance dynamics explains where individuals choose to connect social space and physical place, accounting for both their preferences and the opportunities and restrictions of their physical world.

VI Conversations and social dynamics

Social dynamics can make a social space a secure environment where individuals can create knowledge without being constrained by concerns over malfeasance and appropriation (Amin and Cohendet, 2004; Grandadam et al., 2013); however, knowledge creation suffers when relations become too close because close relations crowd out diversity in terms of knowledge inputs (Bathelt et al., 2004; Desrochers, 2001) and socially accepted practices (Amin and Cohendet, 2004; Malecki, 2012). In response, the proximities approach argues for optimum levels of proximity to avoid the problems of too little proximity (not enough common ground for interaction) and too much proximity (Boschma, 2005). In the social-dynamics language of this paper, 'optimum distance' is rephrased as balancing weak and strong social dynamics, where weak and strong reflect diversity levels between individuals. Weak social dynamics describe situations where diverse knowledge bases, divergent norms and values, and low levels of trust and social capital inhibit social interaction and therefore knowledge creation. Conversely, strong social dynamics reflect situations where overlapping knowledge bases, convergent norms and values and high levels of trust and social capital encourage social interaction to the extent that newness and diversity suffer and hamper knowledge creation (Gertler, 2010; Malecki, 2012; Wenger, 1998). Similar to the optimum-distance argument, moderate social dynamics encourage knowledge creation by balancing diversity and homogeneity (Faulconbridge, 2014; Howells, 2012; Tsoukas, 2009).

Moderate social dynamics define conversations because of the ambiguity of their content and the diversity of the individuals engaged. Moreover, strong social dynamics hamper knowledge creation by making a social space closed and inward-looking, while weak social dynamics make social spaces very open, which comes at the expense of the cohesion needed for knowledge creation. The boundaries between conversations and other social spaces are fluid; however, social dynamics can be used to

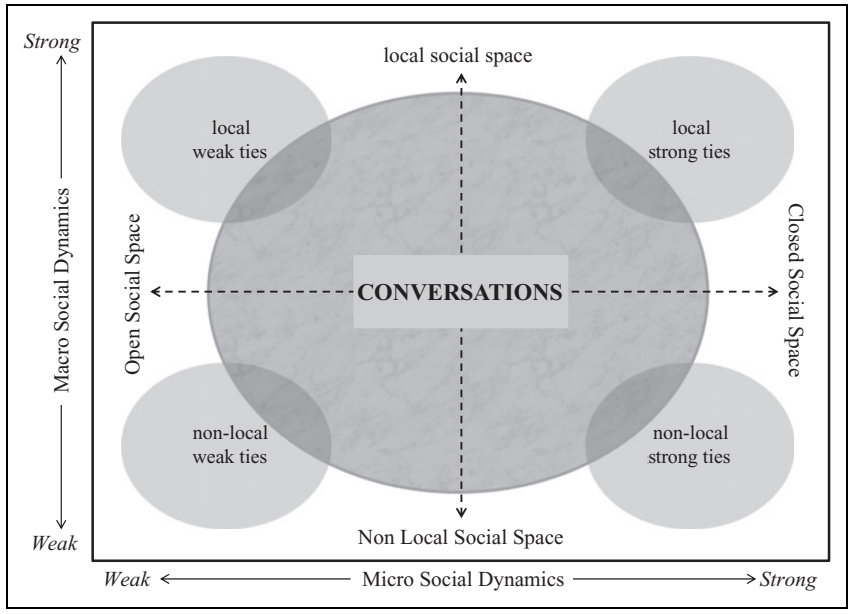

Figure 2. Conversations and social dynamics.

identify those other social spaces. As far as macro-social dynamics are spatial, because they pertain to regional and national society (Howells, 2012), strong macro-social dynamics suggest social spaces that are relatively closed to individuals from other geographical places. Micro-social dynamics pertain to networks and communities (Amin and Cohendet, 2004), so strong micro-social dynamics suggest strong ties within networks and communities, making them relatively inaccessible. A combination of strong micro- and strong macro-social dynamics thus suggests local strong ties, whereas weak micro- and weak macro-social dynamics suggest non-local weak ties, i.e. very open social spaces that are unconnected to specific places. The two remaining combinations can be defined as local weak ties (weak micro-social dynamics, strong macro-social dynamics) and non-local strong ties (weak macro-social dynamics, strong micro-social dynamics) (Figure 2). Although imperfect, this typology connects social space and geographical place in a way that goes beyond the flawed attempts of both the proximities approach and the TIM literature.

VII Conversations and geographical dynamics

Not all conversations are connected to physical places equally strong. That follows from connecting conversations to geographical dynamics. Strong distance dynamics suggest that individuals are willing to bridge distance, in which case conversations are conducted across multiple geographical locations rather than in a single one (Lorentzen, 2008). Strong place dynamics suggest that individuals are strongly connected to a specific place (permanent or temporary) and benefit from its qualities (Moodysson and Jonsson, 2007). Both distance and place dynamics may 'anchor' conversations to a specific place, for example when:

- Individuals from other places engage in the conversation through temporary proximity;

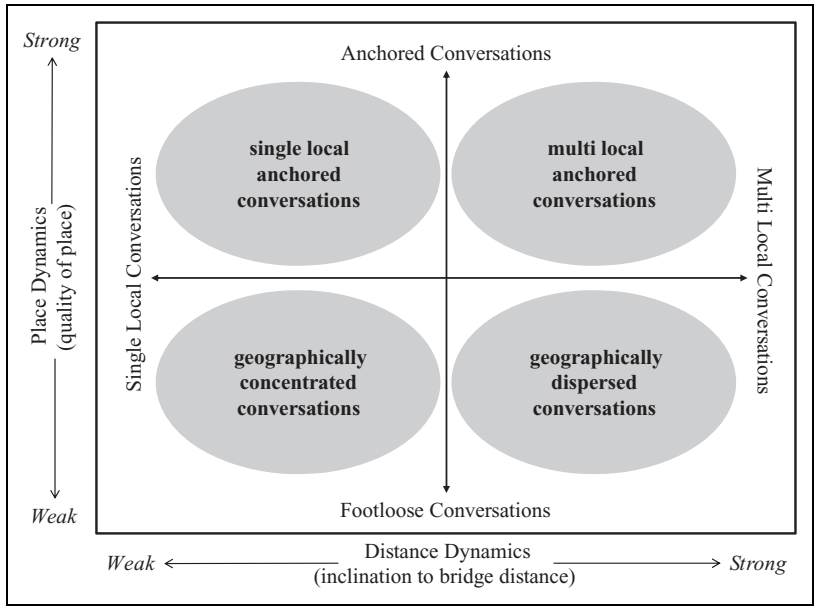

Figure 3. Geographical dynamics of conversations.

- The conversation benefits from local socio-cultural diversity;
- The conversation connects to other conversations in that place;
- The conversation converges in the amenities of the place.

Geographical 'anchoring' acknowledges that conversations are social spaces that are not necessarily connected to any particular place. However, since individuals are 'spatially sticky' and interact with their physical and socio-cultural environment, conversations become 'anchored'. The geographical anchoring of conversations may take multiple forms, depending on the content of the conversation and on how place and distance dynamics affect it (Figure 3).

Multi-local anchored conversations are anchored in multiple places (Crevoisier and Jeannerat, 2009) and they shape and are shaped by local place qualities, including research facilities and knowledge bases of local firms, which may be global, turning local firms into entry points for global knowledge (Lorentzen, 2008; Shearmur, 2011). Individuals engaged in these conversations are also connected to global knowledge through strong distance dynamics, resulting in strong connections between the various places where the conversation is anchored. The Ebola vaccine conversation is an example of a multi-local conversation. The development of an Ebola vaccine in 2014 is an example of ongoing knowledge creation that builds on earlier attempts and on the wider knowledge domain of vaccine development. The conversation goes on between medical scientists, doctors and fieldworkers. The latter discuss disease symptoms and treatment effects with doctors and scientists in medical laboratories, which they combine with their knowledge and expertise to give feedback to fieldworkers and further research efforts. This knowledge creation happens in the field, virtually, at research facilities and at conferences. It transcends organizational boundaries, it is bottom-up and distributed and it is used as input for the actual innovation, i.e. the development of a new vaccine. While the conversation goes on within the social space of medical professionals and practitioners, it is centred on specific physical locations, such as

(field) hospitals and medical laboratories. The conversation is a critical input for firm innovation because it addresses the ambiguity surrounding the disease and its treatment.

Single local anchored conversations are anchored in a single place, while weak distance dynamics mean that few individuals from other places engage in them. These conversations are highly specialized and revolve around local challenges and opportunities, making them less accessible for outsiders. The storm surge barrier conversation is an example of a single local anchored conversation. Few countries have built storm surge barriers, but none more than the Netherlands, and the Dutch have been involved in most projects elsewhere. This highly centres the conversation on Delft University of Technology and a limited number of specialized research centres in the area. Although this conversation is intimately connected to a wider, global conversation on hydraulic engineering, the challenges of building storm surge barriers are unique. The conversation brings together hydraulic engineers, civil engineers and marine biologists around dedicated computer simulations and scale models to study water movement and to address the ambiguities surrounding the use of new construction materials and techniques, as well as the effect of storm surge barriers on marine ecosystems. The knowledge created in this conversation is used in the construction of new storm surge barriers in New Orleans and Jakarta.

Geographically dispersed conversations are characterized by weak place dynamics and strong distance dynamics. Individuals from many places engage in them but these conversations are not anchored to specific places, making them footloose. These conversations are important to individuals in many places but they do not evolve around local amenities or 'spatially sticky' investments. The virtual banking conversation, for example, is about improving and expanding the services, interfaces and security of online banking. This conversation has been ongoing since the 1980s, when banking met IT, and involves financial and IT knowledge workers but also graphic designers, high street and online retailers and clients. The conversation addresses ambiguity by connecting user demands and technological feasibility to identify innovation trajectories. The conversation happens at conferences, in task forces, working groups and discussion boards, but also in coffee bars and pubs where the professionals involved meet informally. The conversation is connected to the physical locations of banks, IT firms and major retailers but does not depend on specific research facilities. Moreover, these organizations are ubiquitous, giving the conversation a dispersed geography.

Geographically concentrated conversations are specific to local problems and challenges that are not immediately relevant for or dependent on people in other places, resulting in weak distance dynamics. Nor are these conversations closely connected to local quality of place, resulting in weak place dynamics. For example, conversations on local development initiatives, i.e. the construction of a new retail centre, are aimed at creating knowledge on the costs and benefits for the local economy. This knowledge is then used as input by decision-makers and planners, who do the actual 'innovation' by developing and implementing plans. Involved in such conversations are researchers, consultants, the business community, politicians, local interest groups and citizens. These conversations address the ambiguities surrounding the economic, political and societal feasibility of local development initiatives before they can be put into practice. Such conversations happen in the local media, in local politics and in a range of formal and informal meetings, hearings and work groups. Local development conversations are highly localized, concerning local problems and challenges, and attract limited outside interest. On the other hand, these conversations are not unique to any particular

region, nor do they depend on specific local facilities, which makes them 'footloose'.

VIII Summary and conclusion

This paper delivered a typology to explain the socio-spatial dynamics of knowledge creation. The typology is based on an understanding of knowledge creation as informal and bottom-up social interaction between individuals, as opposed to organized knowledge creation or firm innovation. The focus on individual knowledge creation fills a gap in the firm-centred literature on the geography of knowledge creation. The paper criticizes the proximities approach's static explanation of geographical (and other forms of) proximity, arguing that proximities are outcomes of rather than inputs for social interaction and that social dynamics rather than proximities reduce uncertainty and resolve coordination problems. Explaining the socio-spatial dynamics of knowledge creation, this paper focused on conversations as intentional, ongoing knowledge creation between individuals. Conversations are social spaces in which individuals from multiple organizations engage and contribute to a body of knowledge that firms tap into to fuel their innovation processes.

Explaining the geography of conversations requires connecting the social space where individuals create knowledge to the physical place(s) they occupy in the real world. This effort takes into account the actual qualities of places (place dynamics) and the effort required to bridge distance (distance dynamics). It leads to a geographical typology of conversations that goes beyond the simplistic near-far dichotomy of the proximities approach while avoiding the spatial fetishism of the TIM literature. Depending on the issues around which conversations evolve and on the geographical dynamics affecting them, conversations may be geographically anchored or footloose, and they may be conducted in a single location or in multiple locations. Quality of place (place dynamics), such as the presence of innovating firms and an attractive urban environment, may connect individuals to places and thus anchor conversations. The need or wish to connect to certain individuals (distance dynamics) may achieve the same. Moreover, individuals from multiple locations can engage simultaneously in conversations.

The discussion of conversations has several theoretical implications. First, it contributes to the relational literature by distinguishing between interpersonal and inter-firm relations and explains how knowledge creation in the former contributes to innovation in the latter. This fills a gap in the predominantly (inter) firm focused literature on geography and knowledge creation (Hassink and Klaerding, 2012), which ignores that social and geographical proximities function differently on different levels. Second, the notion of geographical dynamics (distance and place dynamics) moves beyond the idea that generalizations can be made on the geography of knowledge, either from a territorial or a relational perspective. Geography is a function of its place and distance dynamics. A dynamic understanding of the geography of knowledge creation is captured in the typologies of conversations. Third, the geography of conversations is about access to locations where social space and physical place meet. These locations are venues, such as transportation hubs, research centres, conference facilities and restaurants, where individuals actually meet rather than cities or regions as a whole. This suggests that the interaction between social space and physical place for knowledge creation happens on a smaller geographical scale than cities or regions (Grandadam et al., 2013; Malecki, 2011) and questions the TIM literature's understanding of places as integrated systems. The relevant physical place for knowledge creation may be more fragmented and distributed across multiple cities and regions, and the causal mechanism behind knowledge creation may go through social and geographical dynamics (Crevoisier and Jeannerat, 2009; Moulaert and Sekia, 2003) rather than, for example, 'local milieu'.

Fourth, at the same time, conversations emphasize the role of cities for firm innovation. Conversations may happen anywhere, but if innovation is a function of the number of conversations that are going on, then innovation is more likely to happen in places with access to multiple local and non-local conversations. Cities, with their multitude of issues and challenges around which conversations evolve, high levels of local buzz through which cross-overs between conversations may occur and transport facilities connecting them to conversations elsewhere, are such places (Shearmur, 2012; Storper, 2013). Fifth, the nature of conversations and the social and geographical dynamics shaping them may emphasize existing spatial divisions and inequalities. After all, individuals must cross a 'threshold of indifference' (Van Houtum and van der Velde, 2004) before connecting to new physical places and are unlikely to connect into physical places they reject (Lagendijk and Lorentzen, 2007). This may have profound implications for the development of less-favoured regions. Rather than improve their 'milieu', it may be more productive to connect local business communities to conversations elsewhere (Lorentzen, 2008; Shearmur, 2011).

Acknowledgements

I wish to thank Martina Fromhold-Eisebith and David Charles for helpful comments on early versions of this paper, Paul Benneworth and Arnoud Lagendijk for inspirational discussions on the social dynamics of innovation networks, and three anonymous reviewers for their constructive critique.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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Author biography

Roel Rutten is assistant professor in the Tilburg School of Social and Behaviour Sciences and has worked as a consultant of regional innovation policy. His research interests include the geography of knowledge creation and the organization of innovation. He is a founding member of the Social Dynamics of Innovation Networks research community and an active member of the Regional Studies Association. Rutten frequently engages with practitioners in the field of innovation and regional development.