

## ARTICLE

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# In the making: Open Creative Labs as an emerging topic in economic geography?

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**Abstract**

In the past 15 years, we have witnessed an upsurge of collaborative spaces providing an arena for individual and collective creativity, (co)creating craft-based products, urban manufacturing, and experimentation with business or creative ideas using innovative technologies such as 3D printing or CNC milling machines. The discourses on spaces such as coworking, hacker- or makerspaces, accelerators, Fab Labs, and open workshops promise new communities, more innovation, and a transformation of work. This has called for interdisciplinary scholarly attention, primarily from organization and management studies, sociology, and entrepreneurship studies. However, little attention has so far been paid to this development from the perspective of geography. This paper employs Open Creative Labs as an umbrella term for the diversity of spaces and aims at, first, providing an overview of recent interdisciplinary perspectives on the functions of labs in coordinating creativity and entrepreneurship, as well as the motivations of users to utilize these spaces for their projects, and, second, offers an approach to a multiscale spatial conceptualizations of labs. The paper concludes by exploring policy implications that may benefit from an economic-geography perspective.

**KEYWORDS**

collaborative work spaces, coworking, creativity, entrepreneurship, innovation, makerspaces, open creative labs

This paper introduces Open Creative Labs as an umbrella term for the diversity of collaborative work spaces. It outlines the most recent debates on these new spatial forms for work, experimentation, creativity, and communities and explores future research avenues for economic geography.

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## 1 | INTRODUCTION

Since the early 2000s, we have witnessed an increasing variety of interactive communication platforms that have intensified exchange across the network society (Castells, 2001). Additionally, technological innovations have enabled comprehensive, computer-aided additive or subtractive production modes, rapid prototyping, and the flexible production of small patches of highly individualized products. At the same time, labour markets and economic production systems have been undergoing tremendous transformation processes characterized by a spatial and functional fragmentation of work (Friedman, 2014; Pariece & Nelligan, 2018). Economic value creation is increasingly governed by temporary organizations (Bakker, DeFillippi, Schwab, & Sydow, 2016; Grabher & Ibert, 2011; Ludin & Söderholm, 1995) that are set up both within and across organizations (Lundin et al., 2015). Innovation processes and creativity are progressively organized more openly (Chesbrough, 2003), involving heterogeneous actors and collectives such as enthusiastic laypersons and product users (Franke, Schirg, & Reinsberger, 2016; Hiennerth, 2006; von Hippel, 2005), customers and clients (Grabher, Ibert, & Flohr, 2008), or communities of practice (Amin & Roberts, 2008; Brinks, 2016; Dahlander & Frederiksen, 2012). These dynamics have spurred an increase in temporary employment (van Doorn, 2017; Ward, 2005), atypical employment forms such as multiple-job holdings (OECD, 2018; Sliter & Boyd, 2014), and diverse forms of self-employment such as (start-up) entrepreneurs, freelancers, micro-enterprises, as well as of small urban manufacturers, often dubbed the maker economy (Wolf & Troxler, 2016; Wolf-Powers et al., 2016).

Digital affordances, technological development, and economic and labour-market transformation processes have enabled but have also enforced new working practices that build on collaboration, co-design, co-production, co-creation, or sharing (Dubois, Le Masson, Weil, & Cohendet, 2014; Fleischmann, Hielscher, & Merritt, 2016; Grabher & Ibert, 2018; Kozinets, Hemetsberger, & Schau, 2008; Mulder, 2012; Richardson, 2016, 2017; Sawhney, Verona, & Prandelli, 2005; Voorberg, Bekkers, & Tummers, 2015; Warren, 2014). New spatial forms have co-evolved that provide material and social settings for these processes such as hackerspaces, makerspaces, Fab Labs, open workshops, living labs, coworking spaces, or start-up accelerators. Even though these spaces have received scholarly attention across a variety of academic disciplines, such as management and organization studies, sociology, or entrepreneurial studies, it seems surprising that within contemporary conceptual debates in geography collaborative work spaces are only seldom considered, whether in relation to (temporary) proximities for knowledge generation and creativity or as spatial structures or social contexts for creative processes, knowledge dynamics, and entrepreneurship. This paper therefore aims to reflect on the comparatively high expectations of these spaces in terms of innovation, creativity, and transformation of work in light of existing research and debates in the interdisciplinary research field. Second, the paper aims at carving out geographic perspectives on Open Creative Labs and discussing policy implication in light of this debate.

Against this background, the paper is organized as follows: It first sets the scene by developing a working definition for the multiplicity of collaborative spaces, for which the umbrella term "Open Creative Labs" will be developed. It continues to outline major interdisciplinary discourses, elaborating on the following central themes: organizations, communities, and locations for (collective) actors and their practices, the role of labs in creative and innovation processes. The following section will then introduce multi-scalar spatial perspectives. The concluding section discusses some policy implications.

## 2 | PERSPECTIVES ON OPEN CREATIVE LABS

### 2.1 | A promise: Innovation, creativity, and community building through utilizing new technologies

By the turn of the millennium, Gershenfeld (1999, 2008) observed that digital production technologies not only gave impetus to creative projects but also for sharing the projects' outputs and communicating processes of creating it.

This was his starting point to set up a multilocal network of Fab Labs as “technical prototyping platforms for innovation and invention, providing stimulus for local entrepreneurship.”<sup>1</sup> Anderson (2013) interprets these new technologies as digital manufacturing tools igniting a new industrial revolution. Hatch (2013) instead elaborates new types of places for novel forms of collectives engaging in new digital technologies for digital manufacturing practices: “A makerspace is a center or workspace where like-minded people get together to make things. Some makerspace members are designers, writers, practitioners of medicine or law, architects, and other white-collar types who come in and start making things for themselves, their families, and friends” (Hatch, 2013, p. 13). Gershenfeld, Anderson, and Hatch created a rapidly spreading discourse on innovation, creativity and entrepreneurship crystalizing in spaces such as makerspaces and Fab Labs. A comparable discourse on places and communities can be observed for spaces created for mobile professionals: Coworking spaces promote themselves as new spaces for new forms of work (Brinks, 2013) and - similar to the missionary approaches of Fab Labs and makerspaces - also engaged in co-creating mission statements and manifestos: “Coworking is redefining the way we do work. Inspired by the participatory culture of the open-source movement and the empowering nature of IT, we are building a more sustainable future.” (Coworking Manifesto).<sup>2</sup>

This dynamic development of a multiplicity of spatial forms ranging from hacker- and makerspaces, Fab Labs, open workshops, and living labs to coworking spaces and start-up accelerators attracted interdisciplinary scholarly attention.

## 2.2 | Sorting the field: Typologies of Open Creative Labs

Initial categorization attempts for the variety of spaces focus on the main addressees, such as individuals, businesses, or non-profit organizations (e.g., Lahr, 2013). Others differentiated by the main business model of, for instance, coworking spaces distinguishing between non-profit and for-profit organizations (Kojo & Nenonen, 2016; Leminen, Westerlund, and Nyström, 2012) or on the strategic aims of the hosts thereby distinguishing between strategic open-innovation projects of companies, strategy development by public and non-profit organizations, educational projects by divers lab providers, and problem-solving collectives. Others (e.g., Capdevila, 2013a; 2017) are more interested in the actors (individuals or institutions) who make use of these spaces with regard to their societal and economic focus, distinguishing coworking spaces that enable individual projects for economic purposes, whereas Fab Labs, hacker- and makerspaces for individual projects target rather societal interests. By comparison, open businesses and living labs are governed by institutional actors, such as companies, public or social organizations with economic interests guiding the former and societal goals addressed by the latter (Capdevila, 2013a, p. 14). Despite offering fresh perspectives on the variety of spaces, these categorizations still make use of self-descriptions and classifications by the field, rather than developing them independently.

Attempting to circumvent self-descriptive definitions from the empirical field, Schmidt and Brinks (2017) and Schmidt, Ibert, Kuebart, and Kühn (2016) developed an alternative definition, establishing Open Creative Labs as an umbrella term that covers the heterogeneous variety of collaborative spaces (RGCS)<sup>3</sup> for experimentation, tinkering, and work. Open Creative Labs are thus spatial and social settings characterized by:

- an openness in terms of the lacking requirements for entrance qualifications,
- social curation in the form of implicit and explicit selection mechanisms and rules,
- heterotopia in form of prevailing institutional configurations viewed from the outside (e.g., an association) combined with collectively created alternative rules enacted on the inside (e.g., internal governance and hierarchy),
- user-driven creativity in blended spaces, carefully designed both offline and online,

<sup>1</sup><http://www.fabfoundation.org/index.php/what-is-a-fab-lab/index.html>, accessed 2 December 2018

<sup>2</sup><http://wiki.coworking.org/w/page/35382594/Coworking%20Manifesto%20%28global%20-%20for%20the%20world%29>, accessed 2 December 2018

<sup>3</sup><https://collaborativespacesstudy.files.wordpress.com/2016/06/rgcs-white-paper-alpha-version.pdf>, accessed 5 December 2018

- incompleteness, as spaces are constantly evolving under the influence of user constellations and projects, and
- liminality in form of temporary boundaries for individual careers and projects.

Within the broad spectrum of Open Creative Labs, three distinguishing types may be differentiated: labs primarily fostering experimentation and tinkering in a social setting (experimentation labs) as well as commercial labs supporting (paid and unpaid) work-related activities (working labs), and labs promoting entrepreneurship and entrepreneurial ventures (entrepreneurial labs; Ibert, Brinks, & Schmidt, 2018; Schmidt, & Brinks, 2017; Schmidt, Brinks, & Brinkhoff, 2014). For the remainder of this paper, I shall continue to use "Open Creative Labs" as an umbrella term for the empirical diversity in the field.

## 2.3 | Organization, communities, and actors

One of the most vivid conceptual and empirical academic discussions on Open Creative Labs is concerned with the organizing function of labs, with the role of labs as community builders and with actors and their identified practices in labs.

### 2.3.1 | Organization and organizing

From an organizational point of view, the material settings of and within labs are interpreted as management and coordination devices. Williams and Hall (2015), for instance, demonstrate at the example of a hackerspace that technology was crucial to managing the space. The technological setting of the space sets the frame of physical conventions in terms of, for example, safety regulations, monitoring the activities in the space, controlling access to the space, and mediating communication among its users. Cnossen and Bencherki (2018) also find evidence that the material assemblage of Open Creative Labs functions as either an enabler or a barrier for organizational practices. In their research, the material setting of two creative hubs in Amsterdam provided a necessary crystallization node for communicatively constructing new organizations that eventually provided the necessary institutional form for continuing the operation of both labs. Both studies showcase how organizational practices are constructed and mediated by technology and space, owing to a lack of existing organizational forms and routines.

Friederici (2016) theorizes Open Creative Labs with the example of six innovation hubs in Africa (Rwanda, Zimbabwe, and Ghana) for shaping and intermediating relationships between technology entrepreneurs: The labs assemble formerly distant and unknown actors into entrepreneurship communities that differ conceptually from incubation and intermediation in that the assembly takes the interplay of individuals and environments in shaping and transforming social structures into account. Open Creative Labs thus function as catalysts for entrepreneurship, constructed by and of the social and physical assemblage in a geographic location. In comparison, Reuschl and Bouncken (2017) theorize labs as meta-organizations for entrepreneurship that combine the advantages of independent, autonomous work with the advantages of traditional organizations that provide work places, social interaction spaces, and office services. Waters-Lynch and Potts (2017) also argue that labs help to solve coordination problems between coworkers facing uncertainties about, e.g., who it might be useful to connect with.

This brings lab managers to the fore (Merkel, 2015), because they transfer information, try to create a place-based community, and promote linkages between users in the space, and yet also do so between users and organizations outside the space (Ivaldi, Pais, & Scaratti, 2018). Based on these governance functions, labs can be regarded as novel organizational forms addressing an organizational void that is marked by a lack of organizational solutions in entrepreneurial systems. In this context, labs may provide alternative structures to organizations and act as substitutes for organizations or as intermediaries between individuals, communities, and organizations (Schmidt & Brinks, 2017).

### 2.3.2 | Community

Community and community building is a theme that recurs across many studies but often lacks a clear community conceptualization. Some studies relate to the concept of communities of practices (Lave & Wenger, 1991), others rather use “community” to describe a collective of individuals sharing concerns, habits, and interests without scrutinizing the relational links within and across collectives. Garrett, Spreitzer, and Bacevice (2017) distinguish three forms of collective action that characterize coworking communities: coworkers self-select and reinvigorate a vision for themselves and their space (“endorsing”); observe social norms, identify commonalities, and perceive potentials (“encountering”); and eventually form shared routines, participate in social events, and take on responsibilities within a space (“engaging”). In this conception, coworking spaces are socially constructed by their users in an open process that allows additional members to engage with and take part in collective actions and eventually form a community of practice. Others like Capdevila (2018) and Van Weele et al. (2018) conceptualize fab labbers, makers, coworkers, and startups as knowledge communities. In this understanding, each collective (fab labbers, makers, and coworkers) belongs to an international movement or trend and thereby forms, contributes to, and engages with shared knowledge dynamics. While Fab Lab and makerspace communities constitute knowledge communities, coworkers exhibit collective practices but lack relational links among themselves (Capdevila, 2018). In comparison, start-up communities in Open Creative Labs benefit from labs as physical nodes for community building and as community catalysts, because the space facilitates interactions and relationships (Van Weele, Steinz, & Van Rijnsoever, 2018).

### 2.3.3 | Actors

Another strand of literature is concerned with the actors associated with Open Creative Labs. Oftentimes, the terms “maker” and “hacker” are used synonymously, which complicates the task of disentangling makers as entrepreneurial figures (Anderson, 2013) or makers as hackers who are interested in societal processes and who may form special interest collectives, such as feminist hackerspaces (Toupin, 2014). In terms of the latter, users are framed as tinkerers rather than inventors (Dougherty, 2012). These makers actively engage with objects and the process of creating and utilizing them, which leads to learning by doing. In a similar vein, Lindtner (2014) describes hackers as makers interested in open technologies, peer production, and individual empowerment in a volatile economic and social environment. Maker identities are thereby shaped by open processes of using and extending tools, by engaging ad hoc with projects and materials, by craft-based activities exhibiting do-it-yourself attitudes, as well as visually presenting projects and processes to local and translocal maker collectives (Lange & Bürkner, 2018; Toombs & Bardzell, 2014).

From an entrepreneurial perspective, makers are regarded as artisans, tinkerers, and “digital-era inventors” (Doussard, Schrock, Wolf-Powers, Eisenburger, & Marotta, 2018). Thus, makers are manufacturers who benefit from Open Creative Labs as technology, production-side, and service providers. Wolf-Powers et al. (2016) identify three types of makers, distinguishing between entrepreneurs producing craft-based household goods, interior and fashion design, makers primarily dedicated to food, and those engaging in digital technologies for manufacturing their products. For these users, labs are more than spatial settings for work but rather enable makers to be less dependent on standard-setting institutions and government contracts necessary for setting up self-owned facilities and businesses. Likewise, coworkers are conceptualized as freelancers, entrepreneurs, self-employed media and cultural workers, and mobile professionals who work in volatile labour markets characterized by high uncertainty (Avdikos & Kalogeresis, 2017; de Peuter, Cohen, & Saraco, 2017; Merkel, 2018; Spinuzzi, 2012) and who benefit from Open Creative Labs as a spatial and social context for work. From this perspective, Open Creative Labs may be regarded as novel organizational structures for securing income and employment and for providing resilience strategies in volatile working and entrepreneurial environments (Schmidt & Brinks, 2017).

### 2.3.4 | Practices

Reflecting on the discussion above, Open Creative Labs might roughly be differentiated by the type of activities as well as collective and relational actions that are organized in and by labs and that summarize the distinguishing practices of the translocal collectives (or communities). Working labs and entrepreneurial labs provide material and social settings for income-related work (de Peuter et al., 2017; Gertner & Mack, 2017; Hochberg, 2016; Merkel, 2015; Merkel, 2018; Spinuzzi, 2012; Spinuzzi, Bodrozic, Scaratti & Ivaldi, 2019/2019), support networking (Brinks, 2013), and help to manage work (Ivaldi et al., 2018). In comparison, experimentation labs (Dickel, Ferdinand, & Petschow, 2014) are based on the sharing of technologies and space (Wolf, Troxler, Kocher, Harboe & Gaudenz, 2014), which enables collective learning (Bilandzic & Foth, 2017), tinkering (Kera, 2014), and hacking (Lindtner, 2014; Toupin, 2014; Williams & Hall, 2015). Experimentation labs are thus spaces coordinating and enabling processes of trial and error that are closely connected with technology-related knowledge, materials, manual work, and social innovation (Lange & Bürkner, 2018).

## 2.4 | Innovation, creativity, and value

Fueled by the vivid discourse in the field, expectations in terms of innovative and creative outcomes from Open Creative Labs have been quite high, but proof of direct positive effects remains to be provided (Fleischmann et al., 2016; Unterfrauner & Voigt, 2017). In fact, the innovative potential of Open Creative Labs seems to be limited (Brinks, 2019; Ibert et al., 2018). Instead, Open Creative Labs are regarded as social innovations, as elements in multilocal innovation processes, and as places fostering individual creativity and learning, thereby contributing to local value and knowledge creation.

From the perspective of learning, Open Creative Labs are positioned as new spaces that showcase material settings and that provide socializing spaces to engage with a broader community of knowledgeable users. From this point of view, Open Creative Labs are complementary elements to existing knowledge-generating organizations, such as libraries, schools, universities, and other organizations dedicated to teaching, learning, studying, and knowledge generation (de Boer, 2015; Moorefield-Lang, 2014; Schopf, Roche, & Hubert, 2015; Sheridan et al., 2014). Likewise, Open Creative Labs are considered to be embedded within spatio-temporal innovation processes (Butzin & Widmaier, 2016; Ibert & Müller, 2015) rather than to be drivers or initiators of innovation. From this perspective, working labs are conceptualized as intermediaries between creative individuals and firms (Capdevila, 2015) or as interaction platforms that lead to innovative outcomes, in terms of novel businesses and organizational or social innovations (Marchegiani & Arcese, 2018). Initial evidence points towards more innovative outcomes of labs where they intermediate for projects between internal and external small and large firms, such as multinational companies (Suire, 2019). From the perspective of large firms, Open Creative Labs have been integrated within corporate open-innovation strategies (Moschner & Herstatt, 2018; Richter, Jackson, & Schildhauer, 2018). For instance, multinational companies increasingly externalize innovation processes in accelerator programmes (Richter et al., 2018) or as a marketing tool within innovation strategies (Moschner & Herstatt, 2018). Consequently, Open Creative Labs function as novel but complementary structures in localized innovation systems that involve not only organizations but also communities and individual creatives, both among professionals and laypersons.

While the extent of the innovative potential of Open Creative Labs is contested, the creative potential is less challenged. Most studies agree that labs enable user-driven creativity, even though it easily centres around available technologies (Fleischmann et al., 2016) and the degree of social curation (Merkel, 2015; Schmidt & Brinks, 2017): Collaborative projects need to be initiated and coordinated, technological skills need to be acquired and trained, interaction needs to be planned and organized, and communities need to be energized.

The debate surrounding innovation and creativity leads to the question of value generation in and by Open Creative Labs. Projects initiated in labs - especially experimentation-oriented ones - often target societal challenges, such as sustainability, up-cycling, or civil participation in knowledge dynamics and technology (Unterfrauner & Voigt,

2017). Open Creative Labs thus contribute to social value generation by enabling “experimentation for the sake of experimentation” (Fleischmann et al., 2016, p. 126) and for making something meaningful to be used, thus embracing the cultural value of making (Roma, Minenna, & Scarcelli, 2017; Toombs & Bardzell, 2014). Open Creative Labs are also valued for providing wider forms of civic participation in science. Kera (2014) conceptualizes labs as open-science platforms that organize bottom-up forms of involvement in nanotechnologies and multilocal tinkering with biotechnologies thereby linking a broader public with scientific communities.

In conclusion, focusing on the innovative outcome of labs seems to be too narrow, because the contribution to novelty and social innovation lies with the process of becoming and creating, interactive planning and manufacturing, as well as the social dynamics thereof (Dickel et al., 2014; Lange & Bürkner, 2018).

### 3 | SPATIAL PERSPECTIVES

Despite a vivid array of interdisciplinary perspectives on Open Creative Labs, a particular spatial lens has been applied by only few scholars. Therefore, I shall use this section first, to outline what is known about the spatiality of Open Creative Labs. Reviewing the discussion above, it becomes clear that Open Creative Labs may be embedded within multi-scalar spatial perspectives, ranging from micro- and mesoscale to macroscale. Second, I shall offer an attempt to theorize Open Creative Labs as boundary objects that create a conceptual bridge across these spatial scales.

At the microlevel, the notion of third places is repeatedly employed to relate to the multiplicity of practices observed in Open Creative Labs, ranging from working and learning to experimenting and playing (Waters-Lynch & Potts, 2017). Others conceptualize labs as third spaces that fuse the virtual dimensions of work with real spaces (Olma, 2012, p. 30), effectively contradicting the original sense of third places as introduced by Ray Oldenburg (Oldenburg, 1997; Oldenburg & Brissett, 1982) who theorizes third places as easily accessible places for social relations and unexpected encounters outside work and home. Third places thus lack social distinctions based on educational or class backgrounds, are less socially homogeneous than homes or work places, and enable individuals to temporally and playfully experience foreignness (Oldenburg & Brissett, 1982, p. 283). Open Creative Labs, however, invite users to tinker and experiment, to implement creative projects, but also to develop professional careers in various forms. As such, labs are indeed places outside home and work but rather as complementary structures to both.

Other spatial approaches regard labs as complements within a wider network of social and material settings and offer a conceptual bridge that places Open Creative Labs within mesolevel and macrolevel geographies comprising relational links between internal and external practices. Capdevila (2013b, p. 5), for instance, theorizes labs as urban microclusters constituted by entrepreneurs, freelancers, communities, and micro-organizations that feature similar knowledge dynamics as are observable in industrial clusters but at a smaller geographic scale. Knowledge dynamics in microclusters are characterized by their interaction with external sources that either stem from the mobility of (international) freelance workers or from the lab's local surroundings. He places coworking, but also makerspaces, within local networks of makers and coworkers who may benefit from events organized by the labs and open spaces such as cafés within the lab that are accessible to wider society and that create “improbable” encounters for sharing information, ideas, and knowledge (Capdevila, 2013b, p. 9). Doussard et al. (2018) likewise demonstrate how maker economies utilize multiple sources in urban ecosystems within which makers are integrated, whereas start-up entrepreneurs opportunistically exploit the brokerage mechanisms of accelerators to enhance connections to networks and capital outside the actual space and across territorial boundaries (Brown, Mawson, Lee, & Peterson, 2019). Against this background, start-up incubators and accelerators have been established as instruments to foster student entrepreneurship and university spin-off activities (Bliemel, Flores, De Klerk, & Miles, 2019; Breznitz, Clayton, Defazio, & Isett, 2018; Wright, Siegel, & Mustar, 2017) thus creating additional complements in knowledge-intensive entrepreneurial ecosystems (Malecki, 2018; Mason & Brown, 2014; Pitelis, 2012; Spigel, 2017; Stam, 2015). In this line of thinking, Open Creative Labs are complements within a wider network of financial, social, and



material resources for (maker) entrepreneurs who organize the production, marketing, and sales of their products without the organizational setting of a firm (Doussard et al., 2018). Against this background, work-oriented Open Creative Labs have been framed as novel forms of social urban infrastructures (Holman, 2015; Merkel, 2015; Montgomery, 2007) that also take on organizational functions (Schmidt & Brinks, 2017) for coordinating entrepreneurial and creative processes. Tying in with Friederici's (2016) argumentation, Open Creative Labs thus assemble social and material resources for entrepreneurial activities while working outside of firms, and in this way may contribute to the development and evolution of local entrepreneurial ecosystems.

While we find evidence for the role of Open Creative Labs within entrepreneurial processes, their function in innovation processes and thus, for instance, in local or even translocal innovation systems is rather anecdotal and primarily based on self-reflections by labs and their users. Wolf-Powers et al. (2017, p. 375) already warn against "exuberant expectations" in terms of the regional development potential of the urban maker economy and Brinks (2019) also cautions against overly high expectations of the innovative potential of Open Creative Labs. Even though Open Creative Labs have been conceptualized as local platforms for knowledge creation (Bathelt & Cohendet, 2014), Brinks situates labs within the user-innovation literature and demonstrates that creative processes in labs mainly draw on already existing knowledge. She therefore suggests that Open Creative Labs may be regarded as resources for innovations that draw on communities in labs and that are situated within the "low-cost innovations niche" (Brinks, 2019, p. 11).

Still, the narrative that Open Creative Labs provide material and social settings for creativity, creative work, entrepreneurship, and independent, creativity driven, and craft-based work has created a somewhat natural link to urban contexts (Fiorentino, 2018; Gandini, 2015; Jamal, 2018; Merkel, 2015; Schmidt et al., 2016; Wolf-Powers et al., 2016; Wolf-Powers et al., 2017). The existing body of literature either builds on case-study designs that apply research on single labs in urban environments (e.g., Toombs & Bardzell, 2014; Williams & Hall, 2015), on various labs within a particular metropolitan region (e.g., Capdevila, 2015; Lin, 2019), or research that compares a limited number of cities (e.g., Merkel, 2015; Wolf-Powers et al., 2017). A systematic comparison across macroregions, such as the European Union, or across several countries, is still lacking.

To my knowledge, this exercise was only applied to the national scale of Germany (Lange & Bürkner, 2017; Schmidt et al., 2016). Here, the authors identified Open Creative Labs across all 11 German metropolitan regions. Based on the official delineation of metropolitan regions by the MKRO (Ministerial Conference on Regional Planning), these regions consist of the respective metropolitan cores as well as noncore, rural regions. In the example of Germany, it was possible to demonstrate that Open Creative Labs are indeed primarily found in the metropolitan cores of metropolitan regions. More specifically, within these urban agglomerations, labs tended to cluster in neighbourhoods that have recently undergone gentrification and transformation processes or that are regarded as particularly creative with a high density of creative professions as well as entrepreneurs working in digital industries. These location patterns seem to support a discourse that places creativity primarily in urban agglomerations (Wijngaarden, Hitters, & Bhansing, 2019) as well as coincides with the location preferences of mobile professionals, freelance workers, and creative occupations in urban agglomerations (Florida, 2011). Furthermore, multinational companies that outsource innovation to accelerator programmes provide venture capital or function as lead clients for start-ups as well as universities that increasingly set-up incubators, coworking spaces, and accelerators to support student start-ups (Miller & Acs, 2017; Wright et al., 2017) are also located in metropolitan regions.

The German study still supports the dominant urban bias and neglects the relational links among labs and their communities across territorial boundaries. For instance, start-up programmes in Open Creative Labs usually address local and translocal start-ups by organizing and enabling access to likewise multilocal networks of potential venture-capital providers, multinational companies as clients or costumers, or complementary support programmes (Brown et al., 2019). Here, Open Creative Labs play an intermediary, brokering role that leads to a proliferation of local as well as translocal start-up communities. Similarly, even though Open Creative Labs in the form of hacker- or makerspaces have been investigated at the local level, these labs are also embedded within translocal movements sharing particular values and practices (Toombs & Bardzell, 2014). Within this context, Open Creative Labs may be



conceptualized as an infrastructure-like social and material setting that is adapted to local needs and requirements and enacted by local user communities.

### 3.1 | Open Creative Labs as boundary objects bridging multiple spatial scales

The discussion above illustrates how different spatial perspectives are employed in investigating Open Creative Labs, ranging from microgeographic research on social practices and material settings in Open Creative Labs, to meso-spatial scales interested in the interplay between Open Creative Labs and their local and regional environments such as local entrepreneurial and innovation systems, as well as to macro-geographic scale research interested in the translocality of communities and practices that locally anchor in Open Creative Labs. It seems that the concept of Open Creative Labs as places providing material and processual work arrangements (Star, 2010) is addressed, interpreted, reflected upon, and applied to diverse contexts ranging from user driven creativity and innovation and entrepreneurship to socio-cultural collectives such as hacker and maker communities. Against this background, I shall introduce two lines of thinking into this debate to explain the mobility and adaptability of such a concept to multiple spatial and social contexts: Firstly, if Open Creative Labs are framed as boundary objects it seems, secondly, possible to regard these boundary objects as translocal assemblages that then offer a conceptual framework that creates a bracket for the outline of a multilayered, interdisciplinary debate.

Reflecting on her own contributions and conceptualizations of boundary objects, Star (2010) defines boundary objects as interpretively flexible and “a sort of arrangement that allows different groups to work together without consensus” (p. 602). Boundary objects are thus interpreted and utilized differently by various social groups (Star & Griesemer, 1989). This may explain why the concept of Open Creative Labs is attractive, because it consists of a comparatively easily understandable mission (open places for diversity, creativity, innovation, and work) supported by a somewhat standardized material setting (such as contemporary technologies such as 3-D printers, CNC milling machines, and further physical and digital tools and devices or open office environments) that may be adapted to a variety of needs (work, start-up businesses, share passions, and creativity). Labs thus provide work arrangements for their users that enable particular practices and social encounters that are not found elsewhere, especially not at home or at other work places. How exactly these arrangements are interpreted and utilized depends on the local setting and local groups who tailor these to their “social world” (Star, 2010). Returning to the discussion laid out here, Open Creative Labs are in a continuous state of becoming (see Sections 2.2 and 2.3), depending on the activities and requirements of their users and providers. Even though the material settings across types of labs resemble each other, how these settings are utilized and locally lived depends on how the structure is interpreted. For instance, while many Fab Labs or makerspaces look alike, their users often create their own social rules within the spaces and continuously reflect upon further elements that might be integrated into or subtracted from their local spaces. Likewise, others use the same material setting to enable entrepreneurial ventures and develop a business.

The second line of thinking I would like to add to the discussion suggests an assemblage perspective (Anderson, Kearnes, McFarlane, & Swanton, 2012; Lange & Bürkner, 2017; McFarlane, 2009) on Open Creative Labs as boundary objects. Anderson et al. (2012) argue that assemblage thinking brings together “two seemingly contradictory ways of understanding social order: the ephemeral and the structural” (p. 175). Thus, assemblage thinking favours processes of formation that bring together heterogeneous social and material entities into a temporal whole over the actual result of the process. As explained in Section 2.2, Open Creative Labs can be regarded as liminal spaces that facilitate individual, but also collective development, and comprise processes of transformation of the space itself. Lange and Bürkner (2017) also demonstrate that labs in form of open workshops need to be conceived as “temporary and shifting” and are, therefore, in a constant state of becoming. Open Creative Labs as socio-material assemblages may also function as enablers of, or barriers to, organizational practices within and beyond the lab (see section 2.3, Cnossen & Bencherki, 2018). As Friederici (2016) argues, labs assemble previously unknown actors, taking into account the interplay between social groups and their environments.

McFarlane (2009) suggest a translocal perspective on assemblage thinking that helps to position Open Creative Labs in translocal movements and communities, such as hacker and maker movements, start-up communities, and other creative and professional communities. He explains that translocal assemblage considers the exchange of knowledge, ideas, practices, materials, and resources within place-based social movements. Therefore, relations between local sites of assemblage in these movements are more than mere connections between the sites and are rather more relational links that contribute to the negotiation, contestation, and processual development of the assemblage. These links manifest themselves, for example, in the links that providers of Open Creative Labs create to external actors, both at the local and translocal level, helping them to keep alive the dynamic development of the social movements and their material requirements.

To sum up, Open Creative Labs as socio-material assemblages serve as a basis for exchange and sharing (Star, 2010) that adjust to the demands and needs of local communities. Likewise, Open Creative Labs offer an “interpretive flexibility” for integrating such social (such as hackers, makers, and fab labbers) and commercial communities (such as start-up and tech-entrepreneurs, freelancers, and microbusinesses) as complementary elements within multiscale and translocal spatial concepts, such as innovation and entrepreneurial ecosystems and translocal knowledge communities. However, there still is a research gap that seeks to investigate this interplay between internal practices and external, even translocal institutional environments of labs.

## 4 | CONCLUSION

This paper discussed ongoing interdisciplinary research on Open Creative Labs - a term introduced to capture the multiplicity of collaborative spaces. The discussion laid out in Section 2 demonstrates that the empirical phenomena of labs have indeed gained interdisciplinary scholarly attention primarily concerned with social practices of organizing, learning, knowledge generation, hacking, and tinkering, processes of community building, and actor constellations. The spatiality of the processes within which labs are embedded is only seldom explicitly addressed. I therefore concentrated on outlining spatial dimensions of Open Creative Labs and suggested theorizing Open Creative Labs as boundary objects of translocal social-material assemblages. Following this line of thinking, Open Creative Labs can be regarded as a basis for communication and exchange that eventually helps to transform and adjust the socio-material assemblage of Open Creative Labs to multiscale spatial contexts.

Against the background of these considerations, I will use the remainder of this section to focus on potential policy implications. From my perspective, Open Creative Labs can be regarded as social innovations that may unfold their value both, in terms of contributing to social processes of learning, exchanging, and interacting (e.g., in experimentation labs) as well as in terms of commercial value in working and entrepreneurial labs.

- Open Creative Labs assemble technological innovations for collaborative manufacturing, co-creation, and digital production, and thereby provide access to these technologies and material settings to a broader society (Bergvall-Kåreborn & Ståhlbröst, 2009; Dell'Era & Landoni, 2014; Kera, 2014; Rosa & Pereira, 2016). Therefore, Open Creative Labs contribute to supporting the participation of social groups in technological advances, primarily in experimentation labs. This has been recognized by some public organizations already that set up makerspaces or Fab Labs in public libraries and schools (e.g., Moorefield-Lang, 2014). Pushing this idea further, Open Creative Labs as boundary objects provide a flexible material assemblage that may be translated into diverse local and social contexts, such as rural or peripheral regions. Here, labs could be supported by regional development policies as public nuclei for local economic and non-economic initiatives, for communicative exchange outside home and work, for local problem solving or as a means to provide access to contemporary technological advances.
- Open Creative Labs also represent new forms of organization, that is, meta-organizations that manage practices without the administrative structure of an organization. Labs thereby clearly take on governance functions either as substitutes for or alternatives to organizations, and assemble networks, actors, finances, and places. The

creation of these new organizational forms, their integration into and interplay with economic, entrepreneurial, and innovation systems may contribute to the evolution of regional entrepreneurial ecosystems. Regional development policies may therefore regard labs as complements in their existing portfolio of regional development tools for fostering entrepreneurship.

- Open Creative Labs raise awareness for the geography of new forms of work and entrepreneurship, especially in urban contexts. Working labs epitomize the transformation of work, based on shifting work contexts, such as increasing project-based work, increasing social and spatial fragmentation of work, and new forms of organizing and coordinating income, all of which require novel spatial solutions. Working and entrepreneurial labs are part of an increasing variety of spatial settings for organizing work and of spatial systems for entrepreneurship. It seems that policies too quickly aim at utilizing labs as a tool to govern this process, without addressing the wider context. Labs as work environments for a workforce increasingly working outside established social-security schemes (that are traditionally constructed for full-time, tenured employment) thus also express the need to further negotiate new public security schemes, which ties in with the need to further develop labour market policies that better take into consideration the new ways of working and career development.
- Finally, the question of value of Open Creative Labs beyond its economic dimensions needs to be addressed from a policy perspective as well. Labs generate value by providing spaces for creative processes, for the act of making, and for participating in practices and technological progress but often for a limited user community (still often white, male). Regional policies acknowledging the social and creative value of labs could support the transformation of the social-material assemblages of labs to integrate a wider public beyond these typical lab user.

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## CONFLICT OF INTEREST

None.

## ENDNOTES

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